

Who Uses the Cost-Benefit Rules of Choice? Implications for the Normative Status of Microeconomic Theory

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We find three factors to be associated with use of cost-benefit rules in everyday decisions. These are effectiveness in achieving desirable life outcomes, intelligence, and training in economics. We argue that these empirical findings support the claim that cost-benefit reasoning is normative. © 1993 Academic Press, Inc.

A basic distinction is made in the field of decision making between normative and descriptive models of choice behavior. A normative model is one that depicts how people ought to make decisions in order to maximize their personal outcomes and a descriptive model is one that depicts how people actually make decisions. The maximization model of microeconomic theory, a set of principles governing appropriate choice given the decision maker's assessment of costs and benefits (Mishan, 1976; Morgan & Duncan, 1982), has been advanced as both a normative and a descriptive model (Becker, 1976; see also Hirshleifer, 1985), but it has fared better as a normative model than as a descriptive one. A large accumulation of empirical evidence indicates that certain aspects of the microeconomic model do not describe people's ordinary decision processes (Arkes & Blumer, 1985; Hoskin, 1983; Tversky & Kahneman, 1986). The fact that the model often fails descriptively raises the question, If people do not commonly use cost-benefit reasoning, why should we believe that it is normative? Why should it guide our choices?

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Different methods are typically used to evaluate the normative versus the descriptive strength of a model. Normative adequacy has usually been tested by formal, mathematical proof, whereas descriptive adequacy has been tested by empirical means. To defend the normative adequacy of microeconomic models of choice, economists have argued that the model is based on a few assumptions about consistency that most people agree are intuitively reasonable criteria for good decision making. If one assents to the assumptions, economists argue, then one assents to the model because it is mathematically implied by the assumptions.

But there is also a tradition of justifying, and amending, normative models in response to empirical considerations. March (1978), for example, argues that the fact that clients are willing to purchase the services of experts with skills in the decision sciences speaks positively to the normativeness of the model employed by the experts. And Simon (1955) argued that "satisficing" due to time and energy constraints more nearly describes people's choice behavior than the optimizing posited by the normative model. Simon and others have reasoned that this suggests that a model is normative only if it is practicable.

Some people might be inclined to think that empirical arguments are not appropriately raised in connection with considerations of normativeness, viewing this as an instance of the *naturalistic fallacy*, or moving from an "is" to an "ought." But in fact there is a long-standing tradition in epistemology of treating pragmatic considerations as prior to purely reflective ones. Hume held that "reason is and ought to be the slave of passion," by which he meant that human needs and their most efficient means of solution dictate the mental procedures that underlie inference and choice. The modern inheritors of the Hume tradition in epistemology describe their position as *consequentialism*, by which they mean that the appropriate gauge of a putatively normative cognitive procedure is whether it produces consequences that are beneficial for the individual (Goldman, 1978, 1986; Stich, 1990; see also Stich & Nisbett, 1980; Thagard, 1982; Thagard & Nisbett, 1983).

A second respect in which empirical considerations affect normative assumptions concerns whether people's behavior is *corrigible* by a putatively normative model. Goldman (1978, 1986) has argued that a rule system cannot be held to be normative if people cannot actually use it, or be taught to use it. Applying these considerations to microeconomic, cost-benefit choice theory, we can generate three easily tested predictions that would reflect on the normativeness of the theory.

First, it should be the case that the consequences of using putatively normative rules ought to be superior. Economists claim that using the cost-benefit rules of choice will maximize (or at least improve) outcomes and lead to greater life success. The argument is that use of the rules makes people more efficient in their use of scarce resources such as time

and effort. As a result, one would expect that people who use cost-benefit rules would be more productive and thereby receive greater returns in school or work. We measured outcomes in two different ways—by grade point averages in the case of undergraduates and by salaries and raises in the case of professional academics. Of course, other explanations for a positive relationship would be plausible. Perhaps productive people seek optimal rules to help them manage their time and energy, or a third factor, such as motivation, leads to both greater productivity and the use of economic reasoning. Whatever the explanation, the finding is relevant to questions of normativeness. If it were to turn out *not* to be the case that people who use the rules have better outcomes, this would throw doubt on the claims of the model to normativeness.

A second expectation from present considerations is that intelligent people would be more likely to use cost-benefit reasoning. Because intelligence is generally regarded as being the set of psychological properties that makes for effectiveness across environments (Baron, 1985, p. 15; Sternberg, 1985, 1988), intelligent people should be more likely to use the most effective reasoning strategies than should less intelligent people. Evidence for a link between intelligence and use of normative inferential rules has been obtained by Jepson, Krantz, and Nisbett (1983) in the statistical reasoning domain. They found that, in a sample of untrained undergraduates, use of presumably normative statistical rules to solve problems drawn from everyday life was positively correlated with verbal and mathematical skills as measured by standardized test scores. In this paper, we examine the relationship between the use of economic reasoning and intelligence as measured by undergraduates' scores on the Scholastic Aptitude Test.

A third implication is that people ought to be trainable by the cost-benefit rules in the sense of coming to use them in everyday life choices once they have been exposed to them. If use of the rules leads to more desirable outcomes, people should be increasingly likely to use them both because they see the superiority of the rules in principle and because they experience improved outcomes when they use them. We have shown in a previous paper (Larrick, Morgan, & Nisbett, 1990) that professional training in economics is positively correlated with cost-benefit reasoning and that naive subjects who have been given brief training in one of the cost-benefit rules (the sunk cost rule) subsequently use the rule outside the laboratory. In this paper we attempt to extend the finding by examining the relationship between taking university economics courses and the use of cost-benefit reasoning. Once again, of course, we cannot assess the causal relationship between training in economics and the use of cost-benefit rules. Nonetheless, if people who were well-versed in economics failed to employ their knowledge, it would undermine our confidence that the cost-benefit rules were normative.

Cost-Benefit Rules

We envision microeconomics as a set of rules that can be used to maximize the outcomes of choices. We depict the model as a set of rules because the rule-based approach to reasoning has been influential in cognitive psychology and has received substantial empirical support in a range of reasoning domains (Newell & Simon, 1972; Holland, Holyoak, Nisbett, & Thagard, 1986; Smith, Langston, & Nisbett, 1992). The particular rules we consider serve as general guides for maximizing the benefits of a course of action (Mishan, 1976; Morgan & Duncan, 1982). When a person is confronted with a set of possible actions each of which can lead to some set of outcomes, the person should convert the benefits and costs of all possible outcomes to a single scale and adjust them for the probabilities that the outcomes will occur. In this calculation, the following three rules apply.

(1) *The net benefit rule.* The action that has the greatest expected net-benefit should be chosen from a set of possible actions.

(2) *The sunk cost rule.* Only future benefits and costs should be considered in current decisions. Past costs and benefits are not relevant, unless they predict future benefits and costs.

(3) *The opportunity cost rule.* The cost of engaging in a given course of action is the loss of the benefits of the next-best course of action.

We will attempt to distinguish use of rules such as these from mere preference or value differences. The question of whether different kinds of people are using different rules or simply hold different values arises in several contexts. One has to do with alleged differences between men and women in their use of economic rules of choice. There is a well-established finding in the literature on the teaching of economics that men perform better than women in economics classes and on tests of economic knowledge (Heath, 1989; Watts & Lynch, 1989). The most common explanations refer to the well-documented differences in socialization between boys and girls with respect to mathematics ability. Boys are more likely to be encouraged to be interested in math in general and financial matters in particular, whereas girls may be actively discouraged from such interests, or at least made to doubt their abilities. We propose that the difference between men and women in their use of economic rules may not be entirely due to differences in math socialization. It may be due at least in part to differences in moral reasoning between the sexes. This topic has received attention in the literature on moral development, following Gilligan's (1982) work, which holds that women tend to value compassion for others more than do men, whereas men tend to value justice more than do women. In the studies described below, we examined subjects' use of microeconomic rules both when they conflicted with humanitarian values and when they did not. If women differ from men in

their values rather than in their understanding of microeconomic rules of choice, their answers should differ from those of men primarily when the rules of choice conflict with a humanitarian value.

We also examined a second issue concerning values. It is sometimes contended that formal exposure to economics makes people more selfish or more concerned with money (Frank, 1988) or, alternatively, that more selfish people choose to make themselves familiar with economics. To examine this possibility, we measured the extent to which subjects were concerned with money, pleasure, and other benefits.

We present two studies in which we examined correlates of cost-benefit reasoning. In the first study, we administered an economic reasoning survey to a random sample of University of Michigan seniors and obtained information on economics training (number of economics classes), academic effectiveness (grade point average), intellectual skills (standardized aptitude test scores), and gender. In the second study, we surveyed University of Michigan faculty from three disciplines (economics, biology, and humanities) and obtained information on career effectiveness (salary and raises), gender, and age. Some of the discipline results from the second study have been reported previously in a paper on the effect of training (Larrick *et al.*, 1990).

STUDY 1

In Study 1, we examined whether academic effectiveness, intellectual aptitude, economics training, and gender of college students are related to economic reasoning. We surveyed seniors because they had had a greater opportunity for their reasoning about everyday choices to affect their academic performance.

We constructed four types of questions—questions about people's own behavior and choices, questions reflecting a recognition of what rules are recommended by economics, questions about social policy that involved a conflict between cost-benefit rules and other values, and questions about the salience of money and pleasure. If cost-benefit rules are normative, we would expect academic effectiveness, intellectual ability, and economics training to be associated with use of the rules in subjects' personal choices. If economics training is effective, we would expect that it would be positively related to the recognition of cost-benefit reasoning. Because we argue that it is reasoning about costs and benefits and not the sheer pursuit of money or pleasure that underlies the use of cost-benefit reasoning, we expected that the predictor variables would not be related to salience of money and enjoyment.

Method

Subjects. One hundred students who were listed as seniors at the be-

ginning of the 1989–1990 academic year were randomly selected from the student directory (56 men, 44 women). Near the end of the 1989–1990 academic year, they were contacted by mail and offered 5 dollars for filling out and returning a short questionnaire on decision making. Three follow-up contacts were made to encourage people who had not returned it to complete the survey. Eighty-six subjects completed and returned the questionnaire (48 men, 38 women).

Materials. Four measures were created by averaging the scores for each of several types of question. All questions were scored on a 0 to 1 scale, with 0 indicating reasoning counter to cost-benefit rules and 1 indicating reasoning in line with the rules. A lack of preference was assigned an intermediate score of .5. Questions were designed to cover a wide range of behaviors and opinions. The questions for each index were similar in that each contained a response that reflected the use of cost-benefit rules, although of course reasons for giving a particular response to a particular question may have been due in part to other considerations as well. Indices were constructed based on a priori, common-sense considerations about what sort of question was best regarded as a reflection of actual behavior, of recognizing economic principles, and so on. We took the precaution, however, of eliminating any items that were negatively correlated with the other items on the index.

1. OWN BEHAVIOR AND DECISIONS (6 ITEMS). The first set of questions was about reasoning subjects used in their own decisions and behaviors. These questions were intended to measure the extent to which subjects ignored sunk costs and attended to opportunity costs in their day-to-day decisions. An example of a question about decisions they had actually made was “In the past 3 years, have you ever started one of the following but not finished it?” The question was followed by a list of activities, such as a restaurant meal, a movie at a theater, or attendance at an athletic event. The item score consisted of the average across all of the questions.

Subjects were also asked open-ended questions about some common decisions they might make in their everyday lives. One question read, “You and a friend have each spent \$5 to see a movie that is turning out to be pretty bad. What are good reasons for staying to see the end? What are good reasons for leaving?” Stating that the spent money was a good reason for staying was scored as a failure to ignore sunk costs. Stating that the movie was a waste of time was scored as partial attendance to opportunity costs, and stating that there might be better things to do was scored as full attendance to opportunity costs. (All of the open-ended questions were coded by two coders who agreed on 90 percent of the classifications. The remaining 10 percent were coded through consensus.)

2. RECOGNITION OF ECONOMIC REASONING (3 ITEMS). The second set of

questions measured whether subjects could correctly identify the sort of reasoning that would be endorsed by economists. An example of a sunk cost recognition problem is the following. The multiple choice responses represented different combinations of behavior (continuing vs discontinuing an activity that involved a sunk cost) and rationale for the behavior (attending to sunk costs vs ignoring sunk costs):

Imagine that you have paid \$5 for a movie that is turning out to be pretty bad. If the movie had been free, you probably wouldn't stay. What do you think an economist would recommend doing?

(0.00)___Stay, even though it's bad, because you've spent the \$5 on it. Otherwise, you're wasting your money. (Sunk cost trap behavior, sunk cost trap rationale.)

(0.50)___Leave, because the boredom of a bad movie is worse than the \$5 you lose by leaving. It's more costly to stay than to leave. (Cost-benefit behavior, sunk cost trap rationale.)

(1.00)___Leave, because the movie is bad and the \$5 doesn't matter anymore. If you wouldn't stay for free, you shouldn't stay because it cost \$5. (Cost-benefit behavior, cost-benefit rationale.)

(0.50)___Stay, because the movie might get better. You should think of the \$5 as a gamble that might pay off. (Sunk cost trap behavior, cost-benefit rationale.)

The cost-benefit combination was given the highest score, the trap combination the lowest score, and the mixed combinations were given the same intermediate score.

3. VALUE CONFLICT (8 ITEMS). The third set of questions was about university and government policy issues for which cost-benefit reasoning led to a conflict with a salient humanitarian consideration. The following (from Larrick *et al.*, 1990) is an example of a net-benefit problem in which the cost-benefit answer conflicts with values against exploitation of another's weakness.

As you may know, there are continuing problems with assuring that blood supplies for patients are free of all viruses. The suggestion has recently been made to purchase blood from Asians for use in the West, on the grounds that many of the most dangerous viruses, including AIDS, are less common there. Many citizens of relatively poor Asian countries would be happy to have the extra cash; however, others have argued that such a practice would be an inappropriate form of exploitation. Do you tend to:

(1.00)___favor the idea strongly

(0.75)___favor it somewhat

(0.50)___have no preference

(0.25)___oppose the idea somewhat

(0.00)___oppose it strongly

The following is an example of an opportunity cost problem in which the economic answer conflicts with the knowledge of certain harm to individuals resulting from the choice.

The state of Michigan is anticipating a large budget deficit and is trying to find budget items on which it can reduce spending. One program that has recently been mentioned is funding for road and bridge repair. Experts estimate that a \$200 million cut in the highway fund would lead to only 5 to 10 more people dying each year in automobile accidents than do at the present. Many legislators have argued that it is morally wrong to let people die due to the state's negligence. Others have argued that this large savings would keep more beneficial programs funded. Do you tend to favor:

- (0.00)___spending the money to repair the state's highways and bridges
 (1.00)___spending the money on other programs
 (0.50)___no preference

4. SALIENCE OF MONEY OR ENJOYMENT (5 ITEMS). The fourth set of questions was about the importance of money or enjoyment in the person's own decisions and behaviors. This index was used to measure the pursuit of self-interest. For example, an open-ended question asked "Of the careers that you have decided not to pursue, what is the career that you liked the best? Why did you decide not to pursue it?" and was coded for (a) mention of pay or financial stability and (b) mention of anticipated enjoyment.

Questions about gender and number of economics classes taken were included at the end of the questionnaire. In addition, subjects were asked for permission to contact the University for college grade point average (GPA) and standardized test scores, which were either Scholastic Aptitude Test (SAT) or American College Test (ACT) verbal and mathematics aptitude scores.

Results and Discussion

The four cost-benefit reasoning measures were correlated with GPA, SAT Verbal score, SAT Math score, number of economics classes, and gender, which was coded as a dummy variable with males as 1 and females as 0. In these analyses, ACT scores were converted to SAT score form for subjects who had not taken the SAT.¹ SAT Verbal and SAT Math scores had zero-order correlations with the economic reasoning measures that were similar except that in every case the Verbal scores were more highly positively correlated with the reasoning measures than were the Math scores, in most cases substantially so. The same relationship held when the analyses were repeated using ordinary least squares multiple regression. The zero-order correlations are reported in Table 1

¹ There were no records of standardized test scores for seventeen subjects who had transferred to the university after their first year. We ran two regressions to test whether the complete sample of 86 was different from the sample of 69 for whom we had scores on all the predictor variables. We excluded the test scores from these regressions to determine whether the remaining predictors had the same relationship to the outcome measures in both samples. The results were essentially the same, so we report the analyses for the sample of 69 subjects for which we have values for all of the predictors.

TABLE 1
ZERO-ORDER CORRELATION COEFFICIENTS AMONG MEASURES OF ECONOMIC REASONING
AND GRADE POINT AVERAGE, VERBAL SCORE, NUMBER OF ECONOMICS CLASSES,
AND GENDER

Predictor variables	Own behavior and decisions	Recognition of economists' position	Value conflict	Salience of money and enjoyment
Grade point average	.40***	.20	.14	-.02
Verbal score	.13	.39***	.36**	-.12
Economics classes	.10	.27**	.33**	-.20
Gender	.25*	.14	.32**	-.24*

Note. All p -values are two-tailed.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

and the standardized regression coefficients are reported in Table 2 for all the predictor variables except SAT Math score. It may be seen that the two analyses yield very similar results.

The measure of academic effectiveness, grade point average, was positively related to choosing the cost-benefit response for own behaviors and decisions. Intelligence, as measured by SAT Verbal score, was positively related to recognition of economists' position on various economic problems. The SAT Verbal measure was also positively related to choosing the economic response for policy choices in which there was a conflict with humanitarian values. A similar pattern was found for the number of economics classes taken. The more economics classes the student had taken, the more likely the student was to recognize what the economists'

TABLE 2
STANDARDIZED REGRESSION COEFFICIENTS FOR MEASURES OF ECONOMIC REASONING
REGRESSED ON GRADE POINT AVERAGE, VERBAL SCORE, NUMBER OF ECONOMICS
CLASSES, AND GENDER

Predictor variables	Own behavior and decisions	Recognition of economists' position	Value conflict	Salience of money and enjoyment
Grade point average	.50***	.18	.15	-.06
Verbal score	.03	.39**	.50***	-.06
Economics classes	.15	.32**	.39**	-.09
Gender	.25*	.15	.43***	-.19

Note. Analyses also control for Math score. All p -values are two-tailed.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

position is on a variety of problems and to prefer the economic response in policy choices that had a value conflict.

Gender was related to choice of economic responses in own behavior and in choices on policy issues in which there was a conflict between cost-benefit rules and humanitarian values. Because the value conflict effect was of a larger magnitude than the behavior effect and there was no relationship between gender and recognition of economists' reasoning, we believe that the gender difference in behavior may be due to value differences that arise in everyday decisions rather than to differences in the understanding of economic rules. This interpretation is supported by results reported for Study 2, indicating that the gender difference for behavior is nonsignificant except when there is a value conflict.

None of the variables was related to our measure of the salience of money and enjoyment. What this indicates most notably is that we find no evidence that economics training is associated with an enhanced concern with money or pleasure. Thus the preference of economically trained students for economic answers to problems is probably related to their preference for the rule system and not to a greater concern with money or with maximizing pleasure.

It is important to note that the regression coefficients in Table 2 are in general quite similar to the zero-order correlations between predictor and outcome variables in Table 1. An interesting exception is the correlation between GPA and the own behavior and decisions index, which was .50—higher than the zero-order correlation of .40. What this discrepancy suggests is the conclusion that students who obtain higher GPAs than would be predicted by their intelligence are particularly likely to use cost-benefit rules in their own behaviors and decisions. The only zero-order correlation that loses significance in the regression analysis is the correlation between gender and salience of money and pleasure (a significant $-.24$). Female subjects are more concerned with money and pleasure than male subjects, although not, for reasons we do not pretend to understand, when their levels on the other predictor variables are taken into consideration.

Our major predictions are well supported by the data. The behavior and decisions of students with higher GPAs were more consistent with cost-benefit rules, and particularly so for students whose GPA exceeded what would be expected on the basis of ability measures. Cost-benefit reasoning was recognized more by more intelligent students and by students with training in economics, reflecting a better understanding of rules endorsed by economists. Cost-benefit reasoning was endorsed more by more intelligent students and more by students with training in economics when there was a policy choice in which there was a conflict between cost-benefit rules and humanitarian considerations. This pattern of results

suggests that there may actually be separate behavioral and attitudinal components underlying the use of economic rules that do not necessarily intersect (a distinction similar to the one Wagner and Sternberg (1985) make between practical intelligence and formal knowledge). Neither economics training nor the other predictor variables was associated with greater salience of money or pleasure in decision-making. Finally, the data supported our supposition that females' adherence to economic rules differs from that of males primarily in that it simply takes a backseat to humanitarian values. Females were significantly less likely to give answers in line with economic rules for problems for which the rules gave an answer in conflict with such values.

STUDY 2

In Study 2, we reexamined data collected in a survey of economic reasoning administered to University of Michigan faculty. Professors of economics, biology, and the humanities were asked two types of questions, one type measuring behavior reflecting economic choices and the other type measuring reasoning about university and international policy.

The other variables studied were salary, academic discipline, gender, and age. The study allows us to replicate the training and gender findings of Study 1 and to attempt a conceptual replication of the life consequences finding by examining salary instead of grade point average.

Method

Subjects. All of the professors in the economics, biology, art history, and modern languages departments at the University of Michigan were contacted by telephone and asked to participate in a 20 min telephone survey on university policy choices and personal choices. Overall, 88% of the professors agreed to participate, yielding a sample of 125 subjects.

Materials. Two types of reasoning questions were included on the faculty survey: reasoning about university policy and about international policy. Several of the questions were identical to those asked of the university seniors. For example, one of the policy questions was the one concerning buying blood from poor Asians. Policy questions were also asked in which economic reasoning led to the same conclusion as would the consideration of a humanitarian value. An example of an opportunity cost problem of this type (from Larrick *et al.*, 1990) is

Some financial planners for the university anticipate that jobs for young people may soon be much more plentiful than in the recent past, for the simple reason that a much smaller fraction of the population is in the younger age group. One implication is that pay will increase for entry level jobs in all kinds of industries. The argument has been made that the university should respond to this situation by offering more money for scholarships in order to lure low income students away

from starting work and toward continuing their education. Do you feel:

(1.00)____scholarships should be kept competitive with salaries

(0.00)____scholarships should simply maintain pace with inflation and not respond to competitive inducements

(0.50)____or you do not have an opinion?

An analysis of opportunity cost indicates that if students are expected to forego jobs in an improving market, universities will have to increase their financial aid in order to maintain their attractiveness to students. In this case, the cost-benefit recommendation is consistent with the salient humanitarian consideration that low income students should receive financial assistance for their education.

The policy questions were followed by questions about consumer and time-use choices that subjects had actually made. For instance, the faculty were asked a question similar to the one asked of the university seniors in Study 1: "In the past 5 years, have you ever started one of the following items and then not finished it?" This was followed by a list of seven consumer items. Discontinuing an activity for which one has already paid is an indication that one is willing to ignore sunk costs. Faculty were also asked, "Have you ever dropped a research project that was not proving worthwhile?" which measures willingness to ignore a sunk cost and to attend to opportunity costs. They were also asked about attempts to save time: "Do you own a microwave? A dishwasher? A VCR?" Freeing up time for other activities by investing in time-saving appliances was considered a measure of attending to opportunity costs.

The questions were subsequently reclassified into three types: no conflict with humanitarian values (for example, the scholarship question), conflict with humanitarian values (for example, the blood purchase question), and money and enjoyment maximization (for example, "do you own a microwave?"). It should be noted that the last index is not directly comparable to the salience of money and enjoyment index used in Study 1. The Study 1 index included questions asking subjects to describe the considerations that would enter into different decisions they might make, and then the responses were coded for the mention of financial or of enjoyment concerns. The Study 2 index consisted of questions that asked subjects about how they managed their money and about whether they owned creature comforts.

Subjects also provided demographic information regarding gender and age. Six years of salary data were obtained from published sources at the university.

Results and Discussion

The behavior and policy choice indices were correlated with salary, economics training, gender, and age, and are reported in the left side of

TABLE 3
ZERO-ORDER CORRELATION COEFFICIENTS AMONG MEASURES OF ECONOMIC REASONING
AND SALARY, ECONOMICS TRAINING, GENDER, AND AGE

	Behavior and policy indices		Value indices		
	Own behavior and decisions	Combined policy choices	No value conflict items	Value conflict items	Money- and enjoyment-directed behavior
Salary	.32***	.32***	.29***	.27**	.35***
Economics	.43**	.45**	.36***	.49***	.27**
Gender	.19*	.24**	.09	.21*	.26**
Age	-.11	-.21*	-.06	-.23**	.04

Note. The behavior and policy indices and the value indices are different ways of indexing the same items. They are not independent findings. All p -values are two-tailed.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3.² In addition, the analyses were repeated using ordinary least squares multiple regression to assess the independent effects of the predictors. It may be seen that the standardized multiple regression coefficients in Table 4 yield very similar conclusions as the correlations, with the zero-order correlations being in general higher.

The results show that higher salaries were significantly related to economic behavior and policy choices. It is important to note that all of these relationships also held when the salary-sensitive items were removed from the indices. In addition, the salary results were actually stronger when the economists were omitted from the sample. When the sample included only biologists and humanists, the standardized salary coefficients were .28 for behavior and .43 for combined policy choices. There was no effect of discipline among the noneconomists for any of the indices. The salary relationships were of a similar magnitude when examined entirely within a discipline, although the significance levels suffered due to the smaller sample size.

The variables on the right side of Tables 3 and 4 are recategorizations of the variables on the left. It may be seen that higher salaries were significantly related to cost-benefit reasoning both when it was and when

² Some of the items in the behavior index (e.g., discontinuing an activity for which a sunk cost was incurred) could be affected by consumption opportunities (e.g., how often the person sees movies, plays, concerts, and so on), so the analysis was repeated with consumption opportunities included as an additional predictor variable. It was not significant ($p > .20$) and did not change the significance levels of any of the predictor variables.

TABLE 4
STANDARDIZED REGRESSION COEFFICIENTS FOR ECONOMIC REASONING REGRESSED ON
SALARY, ECONOMICS TRAINING, GENDER, AND AGE

	Behavior and policy indices		Value indices		
	Own behavior and decisions	Combined policy choices	No value conflict items	Value conflict items	Money- and enjoyment-directed behavior
Salary	.26*	.33***	.26*	.26**	.30**
Economics	.32***	.27**	.24*	.34***	.16
Gender	.11	.20**	.02	.19*	.17*
Age	-.16	-.30**	-.12	-.27**	-.08

Note. The behavior and policy indices and the value indices are different ways of indexing the same items. They are not independent findings. All p -values are two-tailed.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

it was not in conflict with humanitarian values. And, as might be expected, salary was positively related to money- and enjoyment-directed behavior, which included such measures as owning labor-saving devices. The relationships were once again somewhat stronger when the economists were excluded from the sample (standardized regression coefficients of .30 for salary for all three value indices).

Another measure of effectiveness is the average size of raise, which may be regarded as reflecting changes in the rate of effectiveness. Average raise over the past 5 years, measured as an annual percentage change in salary, was (weakly) related to cost-benefit reasoning for policy choices (regression coefficient = .15, $p = .07$) when it was added to the full regression model. Again, the relationship is stronger—although not more statistically significant because of the smaller sample size—when the economists are excluded (coefficient = .19, $p = .11$).

As has been reported previously by Larrick *et al.*, (1990) economics training was significantly related to economic reasoning and behavior. It may be seen from the right sides of Tables 3 and 4 that economics training was significantly related to cost-benefit reasoning both when it did and when it did not conflict with humanitarian values. Economists, however, were not significantly more likely to engage in the pursuit of money and enjoyment when the other predictors were controlled in the analysis.

Gender was not related to behavior when the other predictors were held constant. Men were more likely to endorse cost-benefit reasoning for the policy index than were women, but this was due entirely to differences

when there was a value conflict. It may be seen that men and women showed no difference on the no-conflict items, but a significant difference on the conflict items. Men were more concerned with money- and enjoyment-related behavior, and this remained significant when the other variables were controlled.

Age was not related to economic behavior but was significantly related to economic reasoning such that younger subjects employed more cost-benefit reasoning. This difference was confined to problems in which cost-benefit reasoning conflicted with humanitarian values. Younger subjects were more likely to employ cost-benefit reasoning only for problems for which there was such a conflict. We cannot tell whether this is a developmental effect, leading us to expect that the younger subjects will eventually come to resemble older subjects, or a cohort effect, reflecting what may be a stable preference in the younger generation for cost-benefit reasoning even when its conclusions conflict with other values. An answer will have to await the arrival of another generation or two of academics.

GENERAL DISCUSSION

The present results greatly expand the empirically-based case for the normativeness of cost-benefit rules. As microeconomic theory predicts, the people who use these rules are more likely to have successful life outcomes. The college seniors who used cost-benefit reasoning in their everyday decisions had higher grade point averages, including higher averages net of their aptitude, and the faculty who used cost-benefit reasoning in their everyday behaviors had higher salaries. These data cannot answer questions of causality and tell us whether use of the rules leads to greater success, greater success leads to use of the rules, or some third factor causes both. However, Study 1 shows at least that the relationship between cost-benefit reasoning and academic effectiveness is independent of intelligence and of economics training.

Additional evidence for the normative claim of cost-benefit reasoning comes from the fact that it was positively related to intelligence in Study 1. As Baron (1985) and others have defined it, intelligence is the set of psychological properties that enables a person to achieve his or her goals effectively. On this view, intelligent people will be more likely to use rules of choice that are effective in reaching their goals than will less intelligent people.

Finally, our results show that people who are familiar with the economic rules use them to a large extent in the way they behave and think in their everyday lives. We found in Study 1 that the number of economics classes taken was positively correlated with cost-benefit reasoning and in Study 2 that economists were more likely to use the rule system both in

behavior and expressed choices than noneconomists. Unfortunately, we cannot assess whether these results are due to the effect of training, to self-selection, or some other combination of factors. But it should be recalled that we have elsewhere shown that laboratory-training in the cost-benefit rules has effects on behavior outside the laboratory.

The fact that effectiveness, intelligence, and training were related to cost-benefit reasoning even when it conflicted with certain humanitarian values raises interesting normative questions concerning the conflict between maximizing material well-being for society as a whole and concern with rules of fairness and compassion. These findings suggest that many of the people who know and use the rules in their own decisions believe that they are beneficial when applied to a larger social context, even when there are costs involving important values. On the other hand, the women in both studies and the older faculty in Study 2 tended to favor humanitarian considerations when they conflicted with the economic rules. Younger men seemed to be concerned with issues of maximizing material well-being to society in general. Women and older men seemed to be more concerned with avoiding inequalitarian or debasing outcomes for groups or individuals.

There is some evidence indicating that the age difference reflects at least in part a cohort effect. A fair amount of survey data indicate that members of the present younger generation hold more conservative values related to humanitarian concerns than their elder colleagues who were often found taking action to uphold those values when they were younger (Inglehart & Flanagan, 1987; American Council on Education, 1973–1986). But we also suspect, in this case in the absence of supporting data, that people become more concerned with individual welfare and more dubious of abstract utilitarian principles as they grow older. We believe that a complete set of normative rules for choice must include rules that can adjudicate between cost-benefit reasoning and moral questions reflecting such considerations as the rights of particular individuals and the avoidance of exploitation.

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