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EXPERIMENTAL ECONOMICS: A PSYCHOLOGICAL PERSPECTIVE

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Abstract: Two experimental paradigms are described. In the first, an economic equilibrium that would be predicted for rational agents is shown to occur with quite unintelligent behavior. The second paradigm demonstrates that the random allocation of a good alters its value for the recipients. The different values of owners and non-owners induce a reluctance to trade, which contradicts a standard assumption of economic analysis.

In a recent review BRUNO FREY (1986) listed three assumptions of standard economic analyses: economic agents are supposed to be rational, to be selfish, and to have unchanging tastes. These assumptions contradict common sense knowledge of human nature as well as the conclusions of other social sciences. Economists know this, of course. Their position of deliberate unconcern for the validity of assumptions about economic agents was brilliantly stated in FRIEDMAN'S (1953) classic essay, and additional arguments in its defense are added from time to time. For social scientists reared in other cultures, the intellectual position of economics presents a dual challenge. First, the position must be understood -- which is not easy to do across the cultural gap. Second, the limits of its validity must be established. The economic predictions sometimes succeed in ways that are surprising to other social scientists, and sometime fail in ways that are surprising to economists -- or would be surprising if the failure were admitted, which is not always the case.In the following comments I briefly describe two sets of recent experimental observations that bear on these issues. The first project is concerned with a situation in which an economic prediction is upheld, in a manner that is quite suprising for a psychologist. The second documents a failure of an important assumption in economic analyses of exchanges.

Rational Equilibrium without Rationality

Together with James Brander (the University of British Columbia) and Richard Thaler (Cornell), I was involved in a study of behavior in

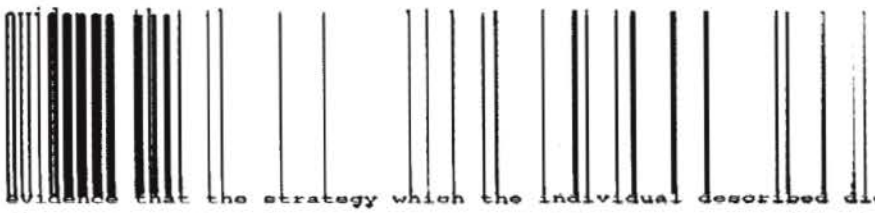
a simple situation, which we called the N* game. Participants (N=15 in one of the examples) sat around a table. On each trial a number was announced (3< N* <12), and each participant decided without communicating with the others whether or not to 'enter' the market. The payoff to non-entrants was 25 cents per period, representing a riskless rate of return. The payoff to entrants depended on their number, denoted by E, according to the following formula:

$$\$[0.25 + 0.50(N^*-E)]$$

If exactly N* participants chose to enter, they collected the same amount as the non-entrants. The rewards of entrants were positive when their number were smaller than N*, but entrants incurred losses if they were too numerous. The game was played for 20 periods, with N* varying randomly from period to period.

The results of the study are easily summarized: As N* varied, E varied with it, and on the vast majority of trials $N^*-2< E < N^*+2$. A simple equilibrium prediction provided a very good description of the data. Similar findings were obtained in several replications, with minor variations of procedure.

Observing the regularity of behavior in these markets was a bewildering experience -- to a psychologist, it looked almost like magic. The bewilderment was not eased by the debriefing conversations in which we engaged participants after the experiment. They described a large variety of strategies and expectations as guiding their behavior. Most of the strategies were completely unfounded (as they must have been, since the equilibrium effectively precluded any successful strategy). Furthermore, in at least one case there was



evidence that the strategy which the individual described did not in fact account for his choices. The equilibrium outcome (which would be generated by the optimal policies of rational players) was produced in this case by a group of excited and confused people, who simply did not seem to know what they were doing.

Psychologists are trained to believe that aggregate phenomena can be explained by finding some relevant regularity in individual behavior. The N* game provided me with first-hand experience of a clear failure of this belief. The only solid explanation of the results of the N* game belongs to a type that is quite familiar to economists, but not to other social scientists. As J. Brander pointed out, E had to be close to N* because there was no stable alternative. Any systematic deviation from near-equality would have been obvious to

the participants, and their attempt to take advantage of it would have cancelled it. The achievement of global equilibrium in such a situation requires very little intelligence from the participants: just enough to recognize apparent regularities in the group response to variations of N*, and to move to counter them. It is very likely that all the participants had the intelligence to detect arbitrage opportunities -- and as a result there were none.

In the particular situation of the N* game, assumptions about individual agents appear largely irrelevant to the explanation of the global outcome. This has some implications. On the one hand, the cognitive psychologist discovers that he has essentially nothing of interest to contribute, and that his bag of intelectual tools lacks the powerful instrument of equilibrium explanations. On the other hand, the assumption that the players are rational is not necessary to explain the finding of equilibrium, and gains no support from that finding. The boundaries of the result are unknown. It is worth noting that the 'magic of the market' was confirmed in a situation which associates a clear signal of profit opportunities with any substantial departure from equilibrium. Agents whose rationality is bounded might fail to take advantage of profit opportunities when the signals are less obvious.

These observations raise the more general question of how much intelligence is required to make a market work. I speculate that the enthusiasm of economists for the assumption of rationality derives at least in part from the fact that in the basic market situation rationality will almost certainly prevail: with full information in an open market, people will not pay more than necessary for what they buy, and will not sell to a low bidder. Robots programmed to obey simple dominance would establish the optimal market price. It could be a serious mistake, however, to extrapolate to the conclusion that people's behavior will also conform to rules of rational choice that impose greater cognitive demands, e.g., the axioms of von Neumann and Morgenstern (TVERKSY & KAHNEMAN, 1986).

Reluctance to Trade

The different assumptions that are made in psychology and in economics are associated with different methodological prescriptions and experimental controls. An obvious difference is in the importance that is attached to the use of real money in collecting experimental

data. Economists find it easy to dismiss much of the evidence collected by psychologists on the grounds that the subjects in psychological experiments are not motivated by financial incentives. The sharp distinction that is drawn between 'hypothetical' or 'introspective' decisions and 'real' experimental data is an article of faith supported by little evidence. Indeed, two large-scale replications of psychological work by experimental economists have failed to turn up evidence of a critical role for monetary incentives (GRETHER & PLOTT, 1979; GRETHER, 1980). Psychologists should nevertheless, accept as a fact of life that, to be believed by their economist colleagues, experiments must involve monetary payoffs contingent on the individual's decisions. In this section I briefly describe a series of market experiments, carried out in collaboration with Jack Knetsch and Richard Thaler, in which we sought to obtain acceptable evidence of a particular violation of the standard model.

The standard economic analysis implies that, except for income effects which can be usually be neglected, the highest price that an individual would pay for a good and the compensation that the same individual would demand to give up the good once acquired, should be very close to each other (WILLIG, 1976). Indeed, it is a common practice in surveys designed to measure the value of environmental public goods to use stated willingness to pay to retain the good (WTP) as a proxy measure of willingness to accept (WTA), the compensation that would keep an individual who gave up the good as well off as before (CUMMINGS ET AL, 1986).

My colleagues Knetsch and Thaler had done independent work demonstrating that the hypothesized equality of WTA and WTP is empirically false; selling prices are often much higher than buying prices (KNETSCH & SINDEN, 1984; THALER, 1980; see also BISHOP & HEBERLEIN, 1979). The discrepancy can be explained at least in part in terms of the value function of prospect theory (KAHNEMAN & TVERSKY, 1979; 1984), which has gains and losses as arguments. The value function is loss averse, i.e, substantially steeper in the domain of losses than in the domain of gains:
$v'(-x) >> v'(x)$ which in turn entails $-v(-x) >> v(x)$. A natural extension of loss aversion to the multi-attribute case entails different preferences for a potential seller who is to give up (lose) a valued good, and for a potential buyer who values the same good as a gain.

Because some doubts have been raised about the robustness and economic significance of the WTA-WTP disparity (COURSEY, HOVIS AND SHULZE, 1987; KNEZ, SMITH AND WILLIAMS, 1985) we set out to provide a new experimental demonstration of the effect. We employ a random allocation procedure, in which a randomly selected half of a group of participants (the experiments are usually conducted in a classroom) are endowed with a good. In many of our experiments, the good is a decorated mug, of a kind available in many University bookstores for about $5. A market is set up for the mugs. The owners of mugs (sellers) complete a questionnaire, in which they indicate for each of a list of possible prices whether they would wish to retain or sell the mug at that price. The potential buyers complete a similar questionnaire, in which they indicate whether they would buy a mug at each of the prices in the same list. A market price is then assessed by finding the intersection of the supply and demand curves, and the price is announced to the class. We usually repeat the procedure several times, informing the participants that their answers for one of these periods, randomly chosen, will determine their outcome.

The standard economic model entails a simple prediction for the outcome of these experiments. Assume that WTA = WTP for all individuals. Except for sampling variability, the supply and demand curves will then be mirror images of each other. The price will be at the joint median of the two distributions of values, and half of the mugs will be traded. The experiment therefore provides a non-parametric measure of reluctance to trade: the ratio of the observed volume of trade to the theoretical value, which is simply, that 1/2 of the units available.

We have conducted variants of this experiment in a dozen different groups, for a total of over 50 trading periods, involving over 300 participants and four different goods. The experiments were conducted at Simon Fraser University, the University of British Columbia, and Cornell. Most participants were students of business or economics. The essential results are easily summarized: the volume of trade was about 1/4 of the units, or 50% of the volume predicted for a fully efficient market. The median WTA was more than twice as high as the median WTP.

Similar results were also obtained in a variant of the same experimental situation, involving face to face bargaining. Participants were arranged in pairs. A mug was randomly assigned to

one of the members of each pair, and they were then given five minutes to negotiate a possible trade of that mug. The negotiations were successful in only 6 of 27 pairs, where the predicted value was 13.5. This result appears to be a direct refutation of the Coase theorem, which asserts that all potential benefits of trade will be realized when opportunities to trade are provided. A provocative conclusion of the research is that constancy of tastes cannot be taken for granted, if the mere fact that one has just received a mug substantially increases its value.

The reluctance to trade that we confirmed in these experiments is surely not universal. The trader who buys shoes from A and sells them to B does not experience the sale as a loss of shoes; the shoes are considered tokens for money, and the net profit or loss is the only carrier of value. A similar attitude can be produced in the laboratory by the induced value technique (SMITH, 1982) in which sellers and buyers trade tokens that are redeemable for cash at the end of the experimental session. In several of our experiments we combined the induced value approach and the random allocation design. Each individual was assigned a monetary redemption value for a (notional) token. Half the participants were actually endowed with tokens, and the others were given an opportunity to buy one in a market. The market was set up in precisely the same manner as for the mugs, but the results were quite different: there was little reluctance to trade. In a large majority of cases, a seller was willing to sell for any price higher than his/her induced value, and a buyer was willing to pay any amount up to it. The volume of trades was 85-90% of the theoretically expected value for money tokens, in sharp contrast to the value of about 50% observed for consumption goods such as mugs and binoculars.

The main conclusion of this series of experiments is that the assumed equality of WTA and WTP holds up quite well in some situations, but is clearly violated in others. The boundaries of the effect are not yet known: KNETSCH & SINDEN (1984), for example, observed reluctance to trade gambles with monetary outcomes -- not easily classified as either a money token or a consumption good. The observed reluctance to trade could arise from several causes: loss aversion, or ambiguity in the value of the good in conjunction with anticipated regret. The present results show that induced value experiments cannot simply be accepted as representations of all economically significant trades. The results also suggest an agenda

for future research: if the standard model of exchange is not accepted as universally valid, what are the boundary conditions within which it holds? And what are the economically significant consequences, if any, of reluctance to trade?

Discussion

The debate concerning the validity of the assumptions of the economic model has long had a certain fascination for students of the philosophy, anthropology and sociology of science. The debate has not been a major concern of economists, and has not been taken seriously as an empirical issue. This could perhaps change, if two conditions are met: (i) violations of assumptions should have consequences in the behavior of markets that are both predictable and substantial; (ii) the boundary conditions for the occurrence of such consequences should be specified with reasonable precision.

The two projects that I have sketched are part of a broader effort to investigate the significance of the contrasting views of human action held in economics and in other behavioral sciences. In the first of these studies a prediction of the economic model was handsomely confirmed, but apparently for the wrong reasons. The equilibrium that was observed could be generated by the application of sophisticated game-theoretic considerations -- but it could also be produced by agents that are only able to act on obvious regularities, such as "entrants have tended to make a profit when N* is large ". The dual moral of that study was (i) that violations of the common assumption of economic rationality may often be much less important than psychologists are prone to believe; (ii) that the observation of predicted equilibria lends little support to the hypothesis that people <u>are</u> rational. The results of the second project confirmed a standard hypothesis (WTA = WTP) for the case of trading in money tokens, but not for trades that involved consumption goods. The observation of reluctance to trade such goods suggests a particular way in which tastes (or values) are labile, and contradicts the common belief in the magical educational powers of the market. Here again, however, little can be said with confidence about the boundaries of the effect or about its significance for real markets. The state of play is much the same in critical studies of the alleged rationality of preferences (TVERKSY & KAHNEMAN, 1986) and of the alleged irrelevance of fairness (KAHNEMAN, KNETSCH & THALER, 1986a,b). There is much unexplored ground between psychology and economics.

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