

COMMENTS ON VERNON L. SMITH'S "REFLECTIONS ON SOME EXPERIMENTAL MARKET MECHANISMS FOR CLASSICAL ENVIRONMENTS"

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Many important problems in marketing, economics, psychology and in other sciences can be reduced to the study of how individuals make choices among competing alternatives. This conference has highlighted the breadth of research on such individual choice. Each represented discipline has its own approach based on its philosophy of research and on the specific choice problems that the discipline defines as relevant. In order to assess Smith's contribution to the study of individual choice

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it is useful to examine Smith's research within a broader paradigm of investigation.

If we view the goal of a body of research as the development and evolution of a set of theories that can be used to derive a model that abstracts the world (individual choice behavior) in such a way as to provide understanding, prediction, and control of such behaviors, then Figure 1 is one possible paradigm that can be used to assess Smith's contribution. Within this paradigm there are a number of directions that researchers can take. Some will observe behavior and postulate a theory that can explain the observations. Others will axiomatically derive models based on postulated theories, or reinterpret behavior based on the models, or compare the model's implications to (new) observations of behavior, or construct experiments and statistics in an attempt to falsify the axioms of the theories, or use the models normatively to solve problems and raise new issues. While the study of individual choice is best served by a variety of approaches and philosophies, any given piece of research need not address all aspects of Figure 1. In fact, the field may advance more rapidly through a cooperative division of labor. For example, falsification or comparative experiments may be best performed by those who have not developed the theories that are being tested.

In light of Figure 1, Smith's research can be characterized as the experimental observation of individual choice behavior and the comparison of observed behavior to that predicted by extant theories of such

Figure 1. Research Paradigm to Assess Smith's Research

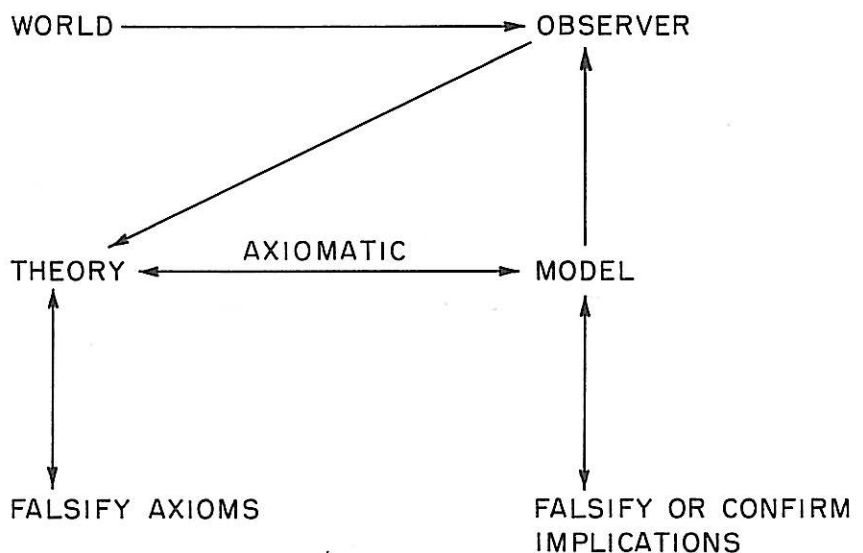
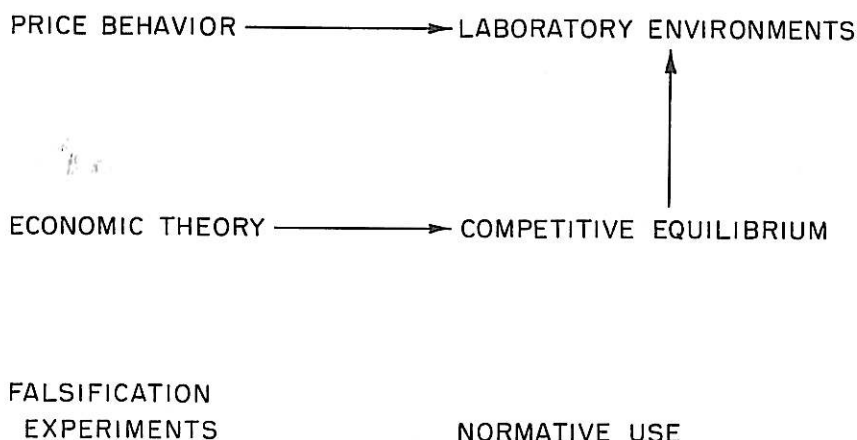


Figure 2. The Major Thrust of Market Mechanism Experiments



behavior. Smith does not conduct falsification experiments, develop normative implications, or postulate new encompassing theories. However, to the extent that his experiments are generalizable, he provides some important foundations for such research. In particular, the behavior he chooses to study is the market's response to alternative pricing institutions. (The basic assumption is that alternative pricing institutions provide different incentives, information, and capabilities for individuals to make buy or sell choices.) Smith observes behavior by laboratory experiments where each seller is given an individual supply curve (cost of producing a marginal item), and each buyer is given an individual demand curve (benefit of buying a marginal item). Outcomes are compared to models of competitive equilibrium as derived from economic theory. (See Figure 2.)

The remaining sections in this comment briefly summarize Smith's results and assess their contributions with respect to the paradigm in Figure 1.

ORAL DOUBLE AUCTIONS

Smith begins with the class of pricing institutions known as oral double auctions, where both the buyer and the seller are free to both quote and accept prices. The commonly cited examples of such institutions are the organized stock and commodity exchanges. However, from a marketing standpoint, such institutions are also important in consumer markets such as real estate and, to a lesser extent, some major durables.

Alternating Demand (Intertemporal Exchange)

Results. In this set of experiments, the buyers are given demand curves such that the market demand fluctuates between "high" and "low" levels. The main results are that: (1) When traders are allowed to buy in one period and sell in the next (speculation), (a) the price converges to the long run competitive equilibrium and (b) the speculators' earnings converge to a minimum level—their commission. (2) When no traders are allowed (autarky) the price oscillates between the short run (high and low) competitive equilibrium levels. Thus the market is less efficient without speculators.

Contribution. The major contribution of this set of experiments is confirmatory evidence of economic theory.

Suggested further work. One obvious suggestion is for more stringent experiments to attempt to falsify or find the limits of competitive equilibrium theory. Another extension, suggested by Smith's Chart 2 is that competitive equilibrium takes time to develop. Perhaps this learning curve could be further investigated empirically to develop norms on the rapidity of market convergence. Such investigations could have profound impact on the pricing of new products in a fluctuating economy such as the real estate market in 1980.

Price Controls

Results. In this set of experiments controls are imposed on the market to limit either the maximum price (ceiling) or the minimum price (floor). Economic theory suggests that if the controls are nonbinding they should have no effect on the competitive equilibrium while if they are binding, the price should be determined by the binding constraint.

Many of the experiments suggest that the economic model is a good long run representation of behavior (although some experiments were truncated before convergence). However, the experiments do identify some very interesting phenomena: (1) When a control is removed, there are some transient effects where the price increases (decreases) following the removal of a binding ceiling (floor), but overshoots the competitive equilibrium by a wide margin. (2) When nonbinding ceilings (floors) are near the competitive equilibrium, they lower (raise) the observed price.

Contribution. The major contribution of these experiments is that they raise the issue of the psychological impacts of controls that are above and beyond that explained by equilibrium theory.

Suggested further work. Smith raises a postulate to explain phenomena (2). He suggests that controls limit the natural bargaining ability of the

buyers and sellers. For example, a home seller would like to start high and settle somewhere above his reservation price, but when he is limited by a ceiling below his initial price he has less room to bargain. This postulate is interesting, has strong face validity, and suggests future research to test it. Statistical models could be developed to test whether Smith's postulate can explain a price that is lower than that which could be explained by a normal distribution (about the competitive equilibrium price) that is truncated at the ceiling.

Further theory development and testing might investigate the transient panic effects. These panic effects might also be a learning phenomenon that could be explained by an encompassing theory of market learning. For example, does the panic effect decay to competitive equilibrium and, if so, how rapidly? Do nonbinding (but almost binding) controls limit market learning? (Examine Smith's Chart 6.)

Monopoly Behavior

Results. Smith examines monopoly behavior as a limiting case of collusion. If a monopoly cannot achieve monopoly profits, then it would be even more difficult for a conspiracy to achieve excess profits. In this set of experiments there is one seller, five buyers, and four-minute auction periods. The experiments suggest that: (1) monopolies achieve more than competitive equilibrium profits, but less than monopoly profits; and, (2) buyers act as if they form a tacit agreement to withhold demand. In fact, multiple sellers (with equivalent supply curves) actually do better than monopolists.

Contribution. The most valuable outcome from these experiments is Smith's postulate that implicit or tacit collusion can counteract monopoly power. If this postulate stands up to falsification experiments it has very interesting implications for the value of informed buyers and the value of maintaining secrecy for effective collusion.

Suggested further work. If tacit collusion (boycotts?) is a real force in real markets, one effective anti-monopoly strategy is an information campaign. On the other side, a good way to overcome tacit collusion is to maintain the image of multiple sellers through the proliferation of brands. However, each of these strategies is dependent on the external validity of the monopoly experiments when there are literally millions of buyers.

ONE SIDED PRICING

The most common market mechanism is where there are one or a few sellers and many, many buyers. In these markets the sellers quote prices

which are either accepted or rejected by buyers. Equilibrium results from intertemporal learning as sellers adjust their prices in response to sales levels in previous periods. Smith calls this class of market mechanisms one-sided pricing institutions.

Oral Offer vs. Oral Bid vs. Double Auction

Results. The first set of experiments investigates the effect of posting the offer (bid) as compared to a market where both sides are free to bargain. Thus in the posted offer (bid) experiments the seller (buyer) states a price and the buyer (seller) can only accept the offer (bid) or remain silent. The main results are that: (1) silence helps the silent party, but the effect is small—the markets become 99–100% efficient; and (2) although not discussed by Smith, there is some lag in the market learning and, although the price looks like it will converge to the equilibrium price, there are some learning effects as the seller (buyer) experiments to infer the demand (supply) curve.

Contribution. Although the experiments are only run for a few periods, they are suggestive of the postulate that the long run difference between the pricing institutions might disappear as they all converge to competitive equilibrium. A second, equally important postulate, is that there are transient biases in the prices among the institutions with the bid-only price greater than the auction price which in turn exceeds the offer-only price. After all, there may be significant profit opportunities to exploit as a market adjusts to equilibrium.

Posted Price

Results. In most of the markets investigated by marketing scholars, the sellers establish an offer price which is posted in a take-it-or-leave-it manner. Although these prices are modified with periodic deals and coupons, there is little direct negotiation among the buyers and the (far fewer) sellers. The results for posted price are related to those for oral offers or bids: (1) the price is higher than competitive equilibrium when sellers post prices and lower when buyers post prices; but (2) the prices converge over time to competitive equilibrium.

Contribution. In this case there is a slight advantage to the posting side. I find this interesting and interpret it with one of the following postulates depending on how the posted price institution evolved: (a) restrictions on freedom help him who restricts, or (b) buyers (sellers) pay a premium when they (tacitly?) give up the right to bargain.

Suggested further work. If postulate (b) stands up to falsification experiments and if posted price institutions evolve because consumers

would rather be given a price than bargain, then Smith's experiments provide the start of some empirical evidence to develop new theories of consumer behavior that account for how economic rationality is modified by information processing. For related work on these issues see A. Tversky and D. Kahneman, "The Framing of Decisions and the Rationality of Choice," Working Paper, Department of Psychology, Stanford University, 1980. I would find it very interesting to know why these effects occur and whether they can be used normatively.

Monopoly Posted Offer

Results. Earlier, Smith discussed the power of a monopoly under double auctions with a few buyers. But the concern with monopolies arises when they produce products bought by millions of consumers. In Smith's experiments, this corresponds to a posted offer with only one seller. The very important result that Smith reports is that *under posted offer, the monopoly achieves monopoly prices and profits!*

Contribution. This series of experiments leads Smith to postulate that for monopolies, posted offer is the way to achieve monopoly power. In posted bid and double auction, buyers under-reveal demand and thus provide a decentralized restraint on monopoly power, but in posted offer there seems to be no such counter strategy available to buyers. Since the vast majority of markets faced by consumers are posted offer, Smith's experiments do provide some confirmatory evidence for economic theory.

Suggested further work. The initiative, learning, gaming, and prediction necessary to allow tacit collusion to occur represents a significant set of opportunities for further understanding of how consumers make choices. In posted offer, consumers have only a quantal choice and monopolies can achieve monopoly power. In posted bid and double auction, consumers have both choice of a quantal action (purchase/not purchase) and a choice of a continuous parameter (bid price). This added freedom, at least in Smith's experiments, allows consumers to partially counter the monopoly's power.

MAJOR CONTRIBUTIONS

Within the paradigm of Figures 1 and 2, Smith's research (and the experiments he reviews) provide a welcome addition to our understanding, prediction and control of individual choice behavior. By beginning with an observation of the world, Smith and his colleagues provide building blocks for the ultimate development of an integrated theory of market response.

Many of the experiments that Smith reviews provide confirmatory evidence for economic equilibrium theory. But the experiments also highlight some phenomena not addressed by equilibrium theory—phenomena of a more psychological and/or transient nature that are consistent with equilibrium theory, but which provide interesting postulates of consumer behavior. Among these are the observed effects of:

- tacit buyer collusion.
- learning, both transient effects and convergence,
- the psychological impacts of controls, both transient panics and restrictions on bargaining,
- the ability of a monopoly to achieve power when consumers have only a quantal, take-it-or-leave-it choice.

Many of these phenomena have been discussed by economists or psychologists. Smith's contribution has been to bring together the observational evidence in market mechanism experiments and thus improve the foundation for the evolution of a comprehensive market mechanism theory.

This is not to say that I accept Smith's experiments unequivocally. By choosing to emphasize results, Smith did not emphasize methodology. Before accepting Smith's results, a theorist would want to examine the selection, assignment and training of subjects, the control of confounding explanatory variables, demand effects, manipulation checks and other criteria of good experiments. Most importantly a theorist needs to know the external validity of the experiments. In particular, a theorist may need experiments to test how the results generalize to expert subjects (corporate executives), larger numbers of subjects, longer time periods, larger incentives, and more experienced subjects. But all that takes time, more research, and greater detail of exposition. In the meantime we can appreciate the positive contributions of Smith's review and the interesting issues that the market mechanism experiments raise.

FUTURE DIRECTIONS

Returning to Figure 1, the future directions are clear. Having observed the phenomena in alternative market mechanisms, we can begin to develop an integrative theory that includes the economic theory of competitive equilibrium, but also includes the psychological reasoning involved in information processing by the consumer and the transient effects of market learning. Once such a comprehensive theory is postulated, it can be tested via falsification experiments and can be used to axiomatically develop normative models for planning and control.