

Rational Roots of “Irrational” Behavior: Discussion

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The field of cognitive psychology studies how people make decisions and how these decisions are reflected in behavior. In contrast, neo-classical economics has pursued the economic conditions which are sufficient for decentralized resource allocation to achieve a Pareto optimal outcome. In pursuit of these conditions, neoclassical economists have identified those characteristics of economic behavior by consumers and by producers which along with other conditions are sufficient to power the economy to the bliss point of a social welfare optimum. The conditions are quite simple—1) consumers must maximize what has earned the label of a neoclassical utility function subject to income constraints and conditionally upon costless price information and perfectly elastic supplies of commodities, and 2) producers must maximize profits subject to what has earned the label of a neoclassical production function and similar of conditions as assumed for consumers. Neoclassical economics maintains these behavioral hypotheses not as reflections of empirical observation, but as elements of the sufficient conditions for Pareto optimal performance of decentralized economic activity.

To label these behavioral hypotheses as “rational” and all others as “irrational” is not only empirically indefensible to even the dullest observer, but most importantly, overlooks the origin of their role in a neoclassical economist’s vernacular. Instead, the neoclassical behavioral hypotheses fall within the set of all rational systems of behavior which all dictionaries consulted by this author limit only to “having reason or understanding.” In contrast, irrational behavior lacks reason or equivalently is not the result of a decision. The conclusion must be drawn that no great gulf lies between the neoclassical behavioral hypotheses and empirical findings of alternative

forms of rational behavior. Research in applied fields of psychology and studies of economic behavior by economists are directed to the same goal—understanding observed behavior. The results of these efforts provide a basis for testing the validity of neoclassical behavioral hypotheses, but more typically are valued as contributing to the prediction of behavior.

Opaluch and Segerson (O&S hereafter) confuse the concepts just discussed above by failing to define what they mean by neoclassical, rational, or irrational behavior. The mist created lingers throughout the paper obscuring and masking the paper’s contribution. To see this, the next section considers their comments on alternative approaches to modelling behavior. Despite the initial lack of clarity, O&S present an important reminder that if we hope to use empirical methods to predict economic behavior, or measure its characteristics, the empirical models must be well-grounded in knowledge of economic behavior. They illustrate this point by considering the usefulness of contingent valuation methods when decision-makers are ambivalent.

Alternative Perspectives from Which Behavior Can be Characterized

By common definition, irrational behavior can not be characterized by a decision model. Rational behavior follows from decision and, as O&S have noted, it is useful to establish a taxonomy of different perspectives from which the decision can be viewed. Weaver (1982) and Weaver and Stefanou (1985) choose a taxonomy which includes 1) the primal choice problem, 2) decision rules, and 3) the dual or conjugate function and its implications. For the neoclassical behavioral hypotheses, all three perspectives can be taken and, as is well-known to some, these three perspectives are equivalent in analytical power. For other behavioral hypotheses, Weaver (1982) notes

this equivalence may break down. Specifically, the one-to-one correspondence between decisions and determinants found equivalently in each of the three perspectives for neoclassical hypotheses follows from continuous differentiability, and quasi-concavity in the primal choice problem, integrability of decision-rules, and continuous differentiability and quasi-convexity of the dual function. In the more general cases which might be motivated by empirical evidence, this equivalence may not exist (Weaver, 1982) and as O&S recognize modelling of decision rules may be the only tractable approach.

The taxonomy chosen by O&S and illustrated in their Figure 1 confuses the rational behavior, irrational behavior, and the neoclassical behavioral hypotheses. They define a complete behavioral model as providing linkage among 1) motivation, 2) decision rules, and 3) observable behavior. In fact, as already noted, this linkage has little to do with completeness and more to do with the properties and characteristics maintained in the behavioral hypothesis. As noted, the neoclassical behavioral hypothesis implies such a linkage, but as Weaver (1982) notes hypotheses of rational behavior do not necessarily imply any such linkage. Instead, a complete behavioral model is more usefully defined as one which is fully consistent with all prior knowledge of or hypotheses concerning behavior. By way of clarification this is, in fact, the definition of consistent modelling adopted and used by Weaver (1977, 1982, 1983) and Weaver and Stefanou (1984).

In contrast to O&S's interpretation, neoclassical behavioral hypotheses viewed from the perspective of the dual representation do not place constraints on behavior, but instead represent a specific hypothesis which may or may not be consistent with empirical observation. Weaver (1982) and Weaver and Stefanou (1984) explore alternative means of empirical inquiry when priors are weak concerning behavior. Any of these alternatives can be interpreted as consistent modelling approaches to the extent that they incorporate all priors concerning behavior.

Methods for Learning About Economic Behavior

The decision rules associated with the neoclassical behavioral hypotheses are well-

known to be sufficient conditions for solution of the maintained choice problem. It is no surprise that the decision rules do not uniquely correspond to a particular choice problem, as O&S note. Indeed, decision rules represent useful means of stating behavioral hypotheses that may be confronted with empirical observation. If they specify continuously differential relations between choices and determinants, by inversion they imply a set of choice functions. In the most general case, they may represent the only basis for empirical inquiry. Having recognized this, O&S present a lengthy review of alternative specifications for the choice problem—subjective probabilities, regret/disappointment, etc.—and complete the paper with a discussion of the implications of ambivalence in choice for contingent valuation. However, before jumping to this issue, a brief comment on useful methods for empirical study of decision rules is in order.

Define a decision rule as a relation that specifies the actions or decisions to be taken given a set of exogenous determinants. The Kuhn-Tucker conditions are enough to remind us that decision rules need not define a one-to-one correspondence between decisions and determinants, and so, may not imply a set of choice functions. Where a specific decision rule can be hypothesized, empirical learning can be pursued through hypothesis testing. Discrete and polychotomous variable methods are well developed for both dependent and independent variables in applied statistics and have been adopted extensively in applied economics, see e.g. McFadden. Further, modelling virtual or shadow prices which are continuous even in the face of discontinuous choice has been adopted as an approach, see e.g. Maddala.

Where priors are weak, an alternative approach to learning through hypothesis testing is one which Leamer labels data dependent searching. In brief, this amounts to little else than learning through listening to the song of the data. Leamer has presented a variety of approaches to systematizing the relationship between observation and learning through hypothesis generation and model adaptation. These approaches seem particularly useful for characterizing economic behavior and the subject is reviewed in more detail in Weaver (1979). In terms of methods for econometric modelling which would accommodate these approaches to learning, the state-space meth-

od of identifying the structure of time series models outlined in Weaver and Stefanou has proven useful in other contexts (see Weaver and Banerjee) and should be pursued in the context of modelling economic behavior. For cross-sectional data, use of factor analytic methods followed by hypothesis construction and testing using independent data sets should be more seriously explored.

In each case these alternative methods allow for learning because they allow estimation to be free of the heavy masks of behavioral hypotheses which may be inconsistent with the data. The early literature in applied duality stirred interest in *flexible functional forms*. Ironically, the need for *flexible modelling* recognized in early applications of duality theory has been lost to some authors. While Christensen and Jorgenson and others (see Weaver 1977, 1983) carefully tested all possible restrictions implied by the behavioral hypothesis recent authors (e.g. Ball, Shumway and Alexander) shrink from this testing, and thereby limit the value of their efforts. In contrast, the methods just reviewed allow for flexible modelling by allowing all possible hypotheses to be tested rather than blindly imposed.

The Importance of Knowledge of Economic Behavior for Empirical Analysis—An Illustration for Contingent Valuation Under Ambivalence in Preferences

As noted above, neoclassical behavioral hypotheses have a role in rationalizing decentralized economic systems, and have no necessary role in economic analysis. While the hypotheses have been extensively tested in empirical studies, too little attention has been paid to the implications of alternative economic behavior for economic analysis. Although the risk and dynamics literature addresses this issue *ad nauseum*, risk and dynamics involve relatively minor variations of the neoclassical behavior hypotheses in comparison to issues raised by such observed behavioral characteristics as ambivalence. O&S break some new ground in their closing section by considering the implications of ambivalence for the usefulness of contingent valuation. While it should be obvious that usefulness of a method of analysis depends on the validity of the underlying assumptions, the casual use of contingent valuation and its heavy reliance on the neoclassical behavioral

hypothesis make it a good medium for an exploration of the obvious.

First, it is important to note that O&S explore ambivalence only in the special setting where decision makers hold clearly defined, yet independent, preferences over social values and personal payoffs. Other forms of ambivalence could certainly be imagined and would likely change their results. In fact, for O&S ambivalence is really no preferences at all, an extreme case far from the common connotation of ambivalence that preferences exist although they are fuzzy or fat, i.e. they fail to determine a unique decision.

O&S illustrate that for their case intransitive choice may occur. Further, compensation required for a reduction in personal payoffs is shown to fall within a range which expands as the extent of ambivalence expands. O&S note this may explain the often observed differences between willingness-to-pay and willingness-to-accept found in contingent valuation studies. The implication is said to be that unique contingent values would not exist and large divergences could be expected between WTP and WTA.

An important implication not noted by O&S is that values elicited in contingent valuation would not be one-to-one with the respondent's personal characteristics or with characteristics of the decision. The important conclusion is that if O&S style of ambivalence exists among a population, it would make little sense to survey them, asking how much they would pay or except for a public good or action. It would make less sense to attempt to explain variation in collected "contingent values" using respondent economic, social, or political characteristics.

O&S stop short of accessing empirical evidence which might support the existence and implications of their style of ambivalence. Before concluding, let me cite a bit of evidence which has emerged from the literature on purchase-of-development rights (PDRs) for rural land. These programs started in the 1970's. The laws extract development rights from the property rights bundle and typically offer rural land owners the right to sell the development right on a fee simple basis. The obvious question of interest to an economist is the value of the development rights and what mechanism could be used to identify that value. In the absence of this information, the programs typically proceed by valuing the DR at the difference between the open land market value

which assumes use for any purpose, and the present value of the land's value in agriculture.

Generally, the corps of contingent valuers has recognized the difficulties, if not impossibility of accurately eliciting private valuations of open access public goods. As we might expect, unless exclusion is perceived to be possible, neither users of open space nor respondents to surveys would reveal their preferences in terms of either WTP or WTA. However, stepping aside of this major logical flaw in use of contingent valuation methods for valuing DRs, according to O&S existence of ambivalence would be expected to further limit the usefulness of survey results. Nonetheless, a few surveys have been conducted of WTP by non-land owners. Halstead (1984) found WTP for preserving ag land in Massachusetts to be at a maximum only \$176 per person per year. Bergstrom, et al. (1985) used contingent valuation methods in Georgia and found a WTP of only \$13 per acre. In a study of Sweden, Drake (1987) found WTP of \$116/acre and \$258/acre for grain and wooded pasture land. These figures are extremely low compared to values of development rights estimated in the thousands of dollars per acre in PDR programs (market minus farm value) and markets for DRs created under transfer programs. The continued political feasibility of these programs suggests WTP may far exceed these elicited values, a result which is consistent with O&S's range of WTP and indeterminacy that would exist under ambivalence.

On the other side of the market is the seller's (of PDR) WTA payment for DRs. Here, our priors might suggest farmers are not ambivalent and, in fact, may demand a risk premium for participation. If farmers are ambivalent, then according to O&S we would expect them to require compensation based on WTA of the upper end of the range of acceptable compensation ($T' - T$ in O&S Figure 6). A bit of evidence from the DR literature comments on this. Specifically, in PDR programs participation is voluntary allowing the farmer to achieve a conservative (i.e. high) level of WTA, while for TDR programs participation is mandatory, and value of the DR is determined by bargaining that equilibrates the farmer's WTA and the developers's WTP. It is of interest to note that voluntary PDR programs have universally resulted in higher acquisition costs (or price) of the DR than have

mandatory TDRs.

Conclusions

O&S focus on two issues that have been of great interest to applied economists since the late 1950's. First, how can we investigate the empirical characteristics of economic behavior? On this issue O&S break no new ground, although they do join a faint chorus that has recognized the need for greater attention to be paid to learning about economic behavior, in contrast to an alarming tendency for recent applied work to mask data with behavior hypotheses that are maintained rather than tested (e.g. Ball's maintenance of convexity). Second, O&S raise the issue of whether it is important that economic behavior be accurately modelled for economic analysis? For the case of contingent valuation studies, O&S show that a particular form of ambivalence in preferences can imply elicited values are not in one-to-one correspondence with respondent characteristics. Their results suggest one more reason why results of surveys of contingent values may be of little use as fodder for econometric modelling of such values.

References

- Ball, Eldon V. "Output, Input, and Productivity Measurement in U.S. Agriculture, 1948-79," *American Journal of Agricultural Economics* (1985):475-486.
- Bergstrom, J. C., B. L. Dillman, and J. R. Stoll. *Public Environmental Amenity Benefits of Private Land: The Case of Prime Agricultural Land*. *Southern Journal of Agricultural Economics* 17:139-147, 1985.
- Christensen, L. and D. Jorgenson. "U.S. Real Product and Real Factor Input, 1929-1967." *Rev. Income and Wealth* 16(1970):19-50.
- Drake, L. *The Value of Preserving the Agricultural Landscape*. (unpublished manuscript) Department of Economics Working Paper, Swedish University of Agricultural Sciences, Uppsala, Sweden, 1987.
- Halstead, J. M. "Measuring the Nonmarket Value of Massachusetts Agricultural Land: A Case Study." *Journal of the Northeast Agricultural Economics Council* 13:12-19.
- Leamer, E. *Specification Searches*, Wiley 1979.
- Maddalla, G. S. *Limited-dependent Variable in Econometrics*, Cambridge University Press, 1984.
- McFadden, D. "Econometric Models of Probabilistic Choice," in C. Manski and D. McFadden (eds.) *Structural Analysis of Discrete Data: With Econometric Applications*, M. T. Press, Cambridge, Massachusetts, 1982.

- Shumway, C. R. and W. P. Alexander. "Agricultural Product Supplies and Input Demands: Regional Comparisons," *American Journal of Agricultural Economics* 70(1) Feb. 1988, 153-161.
- Weaver, Robert D. "Theory and Measurement of Provisional Agricultural Production Decisions," unpublished Ph.D. Thesis, University of Wisconsin, 1977.
- . "Survey of Promising Developments in Supply Response: Pre- and Post-Data Econometric Methods for Integration of Neo-Classical Theory with Sample Evidence," Staff Paper No. 18, The Pennsylvania State University, June 1979.
- . "Specification and Estimation of Consistent Sets of Choice Functions," Chapter 6, in *New Frontiers in Econometric Modeling and Forecasting*, ed. Gordon Rausser, North Holland: Contributions to Economic Analysis, 1982.
- . "Multiple Input, Multiple Output Production Choices and Technology in the U.S. Wheat Region," *American Journal of Agricultural Economics* 65(1):45-56, 1983.
- . "Sale of Farmland Conservation Easements: Pennsylvania's Purchase of Development Right Program." Staff Paper No. 165, The Pennsylvania State University, July 1989.
- Weaver, Robert D. and Spiro Stefanou. "Toward a Behavioral Approach to Modelling Dynamic Production Choice Structures," *Journal of the Northeast Agricultural Economics Council*, 1984.
- Weaver, Robert D. and A. Banerjee. "Does Futures Trading Destabilize Cash Prices? Evidence from the U.S. Live Beef Cattle Case," forthcoming *Journal of Futures Markets*, 1989.