

Bounded rationality and environmental policy

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1. Criticism on the standard model of economic behavior

Most insights of environmental economics are based on the standard (neoclassical) economic model of rational behavior: constrained maximization of utility or of profits (Baumol and Oates, 1988). The maximization hypothesis and its methodological foundation have, however, been criticized on many grounds – philosophical, theoretical, empirical and experimental (e.g., Caldwell, 1984; Hodgson, 1988; Kahneman and Tversky, 1979; Leibenstein, 1950, 1966; Loomes and Sugden, 1982; van Praag, 1991; van den Bergh and Gowdy, 2003)¹.

Rationality is in economics defined as consistent maximization of an well-ordered function. The main assumption is that individuals behave consistently. Whether the neoclassical behavioral assumptions can be actually tested, or whether their implications should be tested, has been debated for a long time. In particular, it has been argued that the main hypothesis of utility maximization can not be tested because preferences change and precise information about it cannot be obtained.

An important line of criticism states that the social context of individual behavior is not well represented in the neoclassical model. In other words, feedback from the system as a whole to individuals is very limited, so that the individuals in the model are in a sense “isolated”. An important example of a lack of social context is that the standard behavioral model does not take account of the fact that “welfare is relative”, i.e. that the utility of an individual depends on his

¹ See also the EE encyclopedia entry by Gowdy on “Welfare economics and ecological economics valuation and policy”.

or her relative income position in the relevant population (regional, national). Another example comes from experimental economics, which has found that many individuals are less egoistic and free-riding than predicted by the standard theory. For example, people reward and punish the behavior of others even when punishing the others imposes a cost. Explanations of this type of behavior include egalitarian feelings and reciprocal fairness. The latter means altruism that is based on the expectation that favors will be returned.

2. Alternative theories of economic behavior

There exist many alternative theories of individual behavior. Some of these have been referred to as, among others, homo creativus (Foster, 1987), hetero economicus (Potts, 2000), homo reciprocans, homo equalis and homo parochius (Gintis, 2000), which emphasize the social and evolutionary character of human behavior.

Well-known alternative theories can be shortly described as follows (see van den Bergh, 2000). The 'satisficing' principle states that individuals try to attain acceptable levels of welfare, profit or other indicators, given the existence of costs of information gathering and a limited capacity of the human brain. From a 'hierarchy of needs' (Maslow, 1970) or lexicographic preference perspective it is argued that needs have a hierarchical order. For instance, higher needs, such as the desire for music, would not appear before the lower needs, like satisfying hunger, are covered. Various theories describe behavior under uncertainty. 'Habits and routines' are often regarded as a straightforward approach to meet complexity and uncertainty. Prospect theory, motivated by experiments, stresses the asymmetry with which individuals perceive gains and losses. Finally, according to some theories, under highly uncertain conditions behavior takes the form of imitation, an example of which is panic selling. Such imitation leads to a reduction in the diversity of individual behavior.

Recently, Robson (2001, 2002) has written on the biological basis of economic behavior. Among others, he tries to found economic assumptions on biological insights. Boyd and Richerson (1985) have noted that evolution is the basis of behavior but that it should be extended with cultural acquiring or learning: cultural transmission of behavior. This is known as dual inheritance theory. It essentially argues that evolution has determined the human capacity for culture, so that the link between evolution and behavior is only very indirect. Robson argues, much in line with evolutionary psychology, that our behavior was shaped during millions of years living in small hunter-gatherer groups. This might imply that our behavior is inappropriate for, or not well adapted to, current circumstances, including the objectives of sustainable consumption and development (Jackson, 2000; Siebenhüner, 2000). Robson identifies three core features of economic beings: preferences or rankings over alternatives, beliefs about the likelihood of certain outcomes to occur, and a degree of rationality of making optimal choices. He, however, seems to fall in the same trap as some of the Chicago school economists (Alchian, 1950; Becker, 1976; Friedman, 1953;

Hirshleifer, 1977), namely simplifying evolution or selection to optimization, which has been convincingly criticized by Winter (1964).

Robson, nevertheless, makes several interesting observations:

- Time discounting follows from offspring having only part of the genes of the parents. Inclusive fitness optimization means that in principle a parent has an incentive to invest in offspring, but due to genetic dilution in sexual species own well-being is value higher than that of offspring, implying time impatience.
- Fitness suggests that relative success is more important than absolute success, which can translate to interdependent preferences and relative welfare as well as preferences over individual or idiosyncratic rather than aggregate or shared risks.
- Food and perhaps other preferences are long run adaptations to environmental circumstances, such as the presence or lack of certain types of plants serving as food. This suggests that these preferences are deeply rooted in our genes, and not amenable for change.
- The notion of relative success (fitness) explains why individuals adapt to higher absolute incomes without much change in a relative sense (income distribution) in a way that suggest no significant increase in happiness or welfare. It also explains why individuals seek for status.
- Intelligence (equated to rationality in Robson's treatment) and longevity of species are related because intelligence only pays off if there is sufficient time to enjoy the fruits of intelligence, namely through extended time-using learning. This is illustrated by showing for modern hunter-gatherers that the net production of food (after personal consumption) is negative for young and old people, and positive in a middle zone where learning has produced the capacity to effectively gather or hunt food.
- The evolutionary explanation of human intelligence as resulting from strategic, social interactions - through runaway selection, or an arms race of rational features - seems to have created a much greater capacity for rational behavior in social contexts than in abstract or laboratory situations. This can be explained by the evolution of a 'theory of mind' or advanced form of empathy. It in turn raises some doubt on findings by experimental economics that seem to counter neoclassical behavioral assumptions.

Some of these features are supportive of rationality while others of some type of bounded rationality. Robson argues that by considering the two hypotheses - ecological and social - explaining the evolution of human intelligence, more can be understood about the limits and anomalies of human intelligence.

Van den Bergh and Stagl (2003) discuss policy and institutions from an evolutionary angle. They regard institutions as coevolving with choices and behavior by individuals. Traditionally, economics has regarded institutions, notably norms and regulations, as fixed or exogenous. Surprisingly few insights on institutional evolution from natural and social sciences have made their way into economics. A perspective on policy is developed on the basis of evolutionary theories of institutions in biology, sociology, anthropology and economics. These

theories turn out to be fundamentally different from non-evolutionary theories of institutions. The notion of group selection is regarded as especially promising in improving our understanding of policy and institutional dynamics.

3. Application to ecological economics

A number of studies in the field of Ecological Economics have examined the criticism and analyzed the environmental policy implications of these alternative theories of economic behavior (Brekke and Howarth 2002; Daly and Cobb, 1989; Ferrer-i-Carbonell and van den Bergh, 2003; Gowdy and Ferrer-i-Carbonell, 1999; Jackson, and Marks, 1999; Janssen and Jager, 2000; Lintott, 1998; Martinez-Alier et al., 1998; Max-Neef, 1995; Munda et al., 1994; Norton et al., 1998; Roe, 1996; Røpke, 1999; Siebenhüner, 2000; Spash and Hanley, 1995; Stern, 1997; van den Bergh and Ferrer-i-Carbonell, 2000; van den Bergh et al., 2000).

Dropping the neoclassical maximization hypothesis and adopting alternative assumptions has serious implications for theories of environmental economics and policy. A selection of insights is as follows:

- 'Satisficing' and habitual behavior imply that price-based policies are less attractive than judged by standard policy theory.
- Since there is more support for profit maximizing firms than utility maximizing consumers, effectiveness would require policies focusing on producers rather than consumers.
- Policies aimed at changing consumer preferences make sense when sovereign preferences are inconsistent with long-run goals of sustainability; sustainability as a policy goal requires that more attention is given to the social context and preference change.
- A 'hierarchy of needs' perspective relates to the notion of strong sustainability in that it emphasizes uniqueness and non-substitutability of goods and services provided by nature; it suggests that individuals may be unwilling to make a trade-off between economic and environmental goods or services.
- Prospect theory affects views on how individuals negotiate about compensation, vote on environmental policy issues, and value environmental change in monetary terms.
- Policy under uncertainty should reckon with strategies like imitation and pursuit of wealth, and aim at increasing or maintaining diversity of knowledge, technology and behavior.

Of course, more can be learned from further study of the various alternative theories. This would require research based on formalized approaches, experiments and empirical testing.

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