Game Theory in Public Choice

> Game theory is for proving theorems, not for playing games. (Reinhard Selten, quoted in Goerre and Holt, 2001:)

> Game theory … has introduced a rigor in the analysis of rational behavior that was missing … [but] skepticism about the marginal value of recent theory is warranted … [because] conclusions drawn … tend to be very sensitive to the way problems are defined and to the assumptions that follow. (Sam Peltzman 1993:206)

Peltzman's critique, quoted above, was directed at uses of game theory in industrial organization, but could as well have been directed at uses in public choice. When compared to an earlier theoretical tradition, exemplified by Becker (1983), public choice models today tend to be more explicit about the timing of actions, and about who knows how much about what. And, as in industrial organization, this detail has come at the cost of an increased sensitivity of conclusions to assumptions, and at the cost of increased investments to become proficient in such tools.

One might also criticize public choice theory for making too *little* use of developments in game theory, however. While the theory of games has continued to advance in detail and realism over the last fifty years, the last major game theory innovation used widely in public choice theory, sequential equilibrium, was developed twenty years ago (Kreps and Wilson., 1982), and many older innovations still face widespread resistance.

One example of an older innovation still facing resistance is mixed strategies. While some public choice models allow mixed strategy equilibria (Myerson, 1993; Besley and Coate, 1997), there remains a widespread reluctance to consider such equilibria in electoral games (Ordeshook, 1986). While mixed strategy equilibria of the "divide the dollar" electoral game were described over fifty years ago (Gross and Wagner, 1950), many in public choice still consider this game to be without a satisfactory theory.

Another long-available yet little-used modeling tool in public choice is altruism. A great deal of evidence suggests that voters consider their personal benefits from policies less often than they consider benefits to their society as a whole, or to groups with which they are affiliated (Mansbridge, 1990; Caplan, 2002). Yet public choice models still typically describe selfish voters.

Public choice theory has also made little use of most of the major developments in game theory in the last twenty years. For example, signaling models in public choice (Rogoff, 1990; Lohmann, 1994) continue to favor the separating equilibria favored by the first papers on signaling, and typically justify this choice by reference to the "intuitive" equilibrium refinement (Cho and Kreps, 1987). This ignores the no less compelling "undefeated" equilibrium refinement which favors pooling equilibria (Mailath, Okuno-Fujiwara, and Postlewaite, 1993). Public choice theories also make little use of new generalizations of equilibrium concepts, such as rationalizable strategies, computational approaches to agent modeling (Kollman, Miller, and Page, 1997), and non-expected utility models (Starmer, 2000; Ghirardato and Katz, 2000).

Game theorists have made substantial progress in the last twenty years in identifying deviations between older game theory and experimental game play, and in developing new games theories to close this gap (Goeree and Holt, 2001). Noisy game theories, such as quantal response equilibria (McKelvey and Palfrey, 1995; McKelvey and Palfrey, 1998), where players make and anticipate utility-dependent mistakes, have seen impressive empirical successes, but no public choice applications. Behavioral economics (Rabin, 1998) has been widely applied, including in law and finance (Aaron, 1999; Shleifer, 2000), but has been only rarely applied in public choice (Frey and Eichenberger, 1991).

Public choice theorists have adopted some, but far from all, of the conceptual tools developed by game theorists in the last half century. So have public choice theorists gone too far in adopting game theory tools, as many admirers of the older public choice tradition might suggest, or have public choice theorists not gone far enough in adopting game theory tools, as many game theorists might suggest?

Unfortunately, given the impoverished current state of the economics of academia, the available evidence seems roughly consistent with either conclusion. The game theory innovations that have been adopted have tended to make public choice models more complex, and the innovations that have not been adopted would have tended to make public choice models even more complex. Even if we want to evaluate the adoption of game theory in public choice only in terms of how well it promotes our understanding of public choice, ignoring other welfare effects on academics and their patrons, our main problem is that it is hard to judge the proper weight to place on model simplicity

If we consider not just choices of basic game theories, but also the many other modeling choices made in game theory based models in public choice, we can see that modeling choices are constantly, perhaps even usually, made for reasons other than conforming to reality. Most papers with a model justify some choices by saying things like "too keep the model tractable, we assume" (Laffont and Tirole, 1991:1092), or "the restriction to single-peaked voting is to avoid complications with equilibrium behavior under incomplete information." (Austen-Smith, 1990).

For example, unless there is a particular reason to do otherwise, models in public choice, like most economic models, tend to assume risk-neutrality, selfishness, separable or transferable utility, simultaneous actions, convexity for unique interior optima, and binary choices, cues, and signals. "Reduced form" expressions are often given as summaries of unmodeled behaviors, such as of how advertising influences voter opinion (Mueller and Stratman; 1994). Usually, multi-period games are given identical action sets, and voters are given identical information, identical preferences, or both, as in retrospective voting models (Austen-Smith and Banks, 1989; Coate and Morris, 1995).

Given the rate at which modelers make various other assumptions for tractability, it should then not come as a surprise that game theory assumptions are made for similar reasons. So most probabilistic voting models assume convex signal distributions for no other reason than to obtain pure strategy equilibria (Coughlin 1992), rather than the more complex mixed strategy equilibria one otherwise obtains (Hanson 1996). Models of repeated play typically assume stationary equilibria (Austen-Smith and Banks, 1989; Baron and Ferejohn, 1989), and models with many voters typically assume voter-symmetric equilibria (Baron and Ferejohn, 1989; Feddersen and Pesendorfer, 1996). Though some have argued that such equilibria are actually more empirically plausible (Baron and Kalai, 1993), it seems clear that modelers would prefer the simplicity of such equilibria even if they were less empirically plausible.

Philosophers have long wrestled, without great progress, with the question of what level of model complexity best promotes understanding (Sober, 1975; Swinburne, 1997). On the one hand, those who favor more complex models suggest that such models tend to be closer to the truth, and suggest that excess simplicity often comes from habit and laziness. On the other hand, those who favor simpler models express concerns that more complex models hinder communication across diverse academic communities, are used to exclude those who have not mastered certain techniques, and give modelers more opportunities to select assumptions in order to obtain preferred conclusions.

In a public choice academia optimized for maximizing our understanding of public choice, modeling choices would probably weigh not only closeness to reality, but also ease of computing results, ease of summarizing the main results in simple words, comparability with other results, difficulty of biased selection of desired results, and perhaps even ability to signal the modeler's technical proficiency. Whether this would result in a faster or slower rate of adoption of game theory innovations is difficult to determine, though I suspect the reader has an opinion nonetheless.

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