Games and Economic Behavior 109 (2018) 452–464

Contents lists available at ScienceDirect

Games and Economic Behavior

www.elsevier.com/locate/geb

Equilibrium play in voluntary ultimatum games: Beneficence cannot be extorted ☆

Vernon L. Smith, Bart J. Wilson *

Economic Science Institute, Smith Institute for Political Economy and Philosophy, Chapman University, Orange, CA 92866, United States

ARTICLE INFO

Article history:
Received 6 November 2017
Available online 5 February 2018

JEL classification:
C91

Keywords:
Ultimatum games
Voluntary play
Adam Smith
Experimental economics

ABSTRACT

An exceptionally robust result in experimental economics is the failure to observe equilibrium (subgame perfect) play in the ultimatum game. A heretofore unnoticed feature of the game is that neither player voluntarily chooses to play. Motivated by Adam Smith's proposition that beneficence—like that of non-equilibrium play in the ultimatum game—cannot be extorted by force, we offer the responder the opportunity to opt out of the game for a mere $1 payoff for both players. We observe far higher rates of equilibrium play, including highly unequal splits, than heretofore reported in binary choice versions of the game.

Motivated by Adam Smith's propositions on beneficence in *The Theory of Moral Sentiments* (1759, pp. 78–81; hereafter TMS), we study choice in new ultimatum games (UG) in which Player 1 can voluntarily signal a willingness to play the role of the Responder in a UG, and thereby enable play of the subgame.[1] We examine two new UG environments: (1) the standard UG for the division of a fixed sum, where the choice is between an equal split and a 1:11 (responder:proposer) equilibrium division—much higher than the 1:4 splits normally reported and in which, if offered, about half are rejected; (2) a variable-sum version in which Player 2 as the Proposer chooses between an equal split of a fixed sum and an investment option, with an equilibrium outcome that doubles the original stakes. In both games, based on a proposition in Smith (1759), we predict and find substantially increased support for equilibrium play relative to the received literature known to

☆ We thank Megan Luetje for recruiting our experiment participants, Jeffrey Kirchner for his professional software programming, Werner Güth and the Editor for comments, and Chapman University for financial support to conduct the experiment. Unusually, the status of this paper was changed from "revise and resubmit" to acceptance based on an editorial assessment that the issues raised are "intriguing … (and) … that both the profession and GEB would benefit …" from publication. And we bear unusual responsibilities. We wish to emphasize that we believe the comments, questions, and concerns raised by our reviewers are very good. They represent positions that will surely be widely shared by readers of *Games and Economic Behavior*. We entirely sympathize with referees' views. We have been there, and such views are why after some 25 years of exploration we have written Smith and Wilson (forthcoming). Our hope is to articulate more fully Adam Smith's model of human sociability and its promising application where the traditional economic models have prominently failed. We will use footnotes, where appropriate, to indicate reviewer concerns, and offer our own commentary and elaboration in context.

* Corresponding author.
E-mail addresses: vsmith@chapman.edu (V.L. Smith), bartwilson@gmail.com (B.J. Wilson).

[1] In our experiment an outside option allows self-selection to play or not a UG, whereas in the literature outside options have been used extensively to study expectations, offers, and rejection rates by players while engaged in a UG that is required-play by the experimenter. This distinction illustrates how orthogonal the standard utilitarian model is to TMS, which is refreshingly new and predictively rich in empirical content. So far as we are able to determine, none of the literature in experimental psychology or economics was inspired by Adam Smith, but see the early treatment by Ortmann and Meardon (1995).

https://doi.org/10.1016/j.geb.2018.01.006
0899-8256/

us in one-shot, direct-response games.[2] In the investment version we find that over three quarters of the Player 2s select the equilibrium option, and only 6 percent of the Player 1s veto the proposal. These data support the interpretation that the standard UG is played by what Daniel Ellsberg (1956) calls "reluctant duelists," a non-trivial condition relevant to predicting decisions, and embraced by Adam Smith's model of human sociability.

1. The ultimatum game and its background

In an ultimatum game the experimenter randomly assigns $2N$ subjects to matched pairs, and in each pair one is randomly designated the Proposer and the other the Responder. In early versions of the UG, a fixed sum, say M dollars, is then divided by action of each of the paired players in a sequential extensive form (or simultaneous-play, strategic form) procedure. The Proposer offers a division of the M dollars in which the Proposer receives $M - x$, and the Responder receives x, where $0 \leq x \leq M$; the Responder then can accept this division yielding the proposed payments, or can veto the proposal, in which case each receives a payment of zero. The equilibrium of the game is $M - 1$ dollars for the Proposer, \$1 (the minimum unit of account) for the Responder, with the Responder accepting the proposal because it strictly dominates rejection.

Since it was first introduced by Güth et al. (1982) the UG seems to have no rival exceeding it in popularity with experimentalists (Güth and Kocher, 2014). Equilibrium (subgame perfect) theory massively failed to predict player choices in standard versions of the game based on utility maximization models, leading to its being lauded as the death blow to simplistic theories based on individual self-interest (Camerer, 2003, p. 43):

> The ultimatum game could hardly be simpler. If Responders maximize their own monetary payoffs, they should accept any offer. If Proposers also maximize and expect Responders to maximize, they should offer the smallest amount... The data falsify the assumption that players maximize their own profits as clearly as experimental data can ... (and) is a crisp way to measure social preferences rather than a deep test of strategic thinking...

Not only ultimatum games, but also trust games, yield results that are commonly interpreted as a rejection of the assumption that agents are strictly self-interested. Literally, though, what we observe in ultimatum and trust games is support for other regarding choices; but *it does not follow from this observation that such a choice is only and simply attributable to other regarding utility* (*social preferences*). In the above quotation, Camerer's interpretation of the data has imposed the unexamined assumption that *other regarding behavior occurs if and only if preferences are other regarding.*[3] Suppose, however, that there exists a model of agent choice that predicts other regarding behavior in social interactions, such as two-person ultimatum and trust games, and is based on common knowledge of strictly self-interested agents.

Adam Smith offers such a model in TMS. The short answer as to why self-interested agents exhibit other regarding behavior is that everyone matures in a social world and learns to "humble the arrogance of his self-love, and bring it down to something which other men will go along with" (Smith, 1759, p. 83). Smith's rich and articulate use of 18th century English makes plain his non-utilitarian vision of human conduct driven by "fellow-feeling."[4] When our conduct resonates with others, we naturally feel their approval, and such approval reinforces the ties that bind us together. But when our conduct is at variance with others, we naturally feel their disapproval, and such disapproval provokes our adaptive propensity to correct the disharmony. General rules of conduct emerge out of these powerful socializing experiences. In TMS Smith uses "fellow-feeling" 39 times, "harmony" or "disharmony" 28 times. "Harmony" appears conjunctively in forms such as: "harmony of sentiments and affections," "harmony and correspondence," "harmony and contentment," and in his explicit diminishment of a role for utility: "[T]hese affections, that harmony, this commerce, are felt ... to be of more importance to happiness than all the little services that could be expected to flow from them" (Smith, 1759, p. 39). Smith's concept of conduct clearly constitutes patterns that embrace all manner of useful "little services," and it is these rule-governed patterns, not the attendant little services, that define our humanity. We might add that these rule-governed patterns also define the "types" that we use in game theory to implement the maximization calculus.

Think of rules, rooted in social approval and disapproval, as mappings from specific circumstances and context into actions. "Circumstances" *include* potential payoffs because without knowing who self-interestedly benefits or is hurt by alternative feasible actions we cannot judge the propriety of a rule. Smith implicitly postulates common knowledge that

[2] Equilibrium play has been observed in "primitive" societies: "In some of these cultures, people did not think that sharing fairly was necessary ... and Responders accepted nearly every offer. Ironically, these simple societies are the *only* known populations who behave exactly as game theory predicts!" (Camerer, 2003, p. 11). Smith's model of human sociability seems to be consistent with these findings: "If our own misery pinches us very severely, we have no leisure to attend to that of our neighbor" (Smith, 1759, p. 205).

[3] This interpretation is common because economists do not consider non-utilitarian models of choice, including even those that reject self-interested models. (By "utilitarian" we mean "pertaining to utility," not "pertaining to the philosophical doctrine of utilitarianism.") For example in Fehr and Fischbacher (2002, p. C1): "A substantial number of people exhibit social preferences, which means they are not solely motivated by material self-interest but also care positively or negatively for the material payoffs of relevant reference agents."

[4] A reviewer says, "I have problems seeing much room for the deep 'sentiments' elaborated on in situation in which two anonymous subjects meet via computer terminals to play an UG." Yet we take seriously the venue of experiments for testing equilibrium theory, as well as expressed concerns about generalizability to other environments (so-called "external validity"), stake effects, and so on. Adam Smith offers general propositions, independent of particular cases, wherein our sociability is an ingrained feature that defines our humanity. Of course, "it's just a game" may well be a source of error in applying this or any model to predicting participants' behavior. In Smith and Wilson (forthcoming) we primarily use variations on trust games to test these propositions, but they should also apply to the UG.