

Food or Fairness? An Ultimatum Game Concerning A College Student's Budget

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Abstract: The influence of personal establishment and satisfaction has been the theoretical influence underlying conventional economics since proposed by Adam Smith. Results from many previous ultimatum experiments, which dictate that both parties must mutually agree on an ultimatum in order to win the game, often contradict the theories and ideals presented by conventional economic models. In this replication of the ultimatum experiment, instead of a minimal amount of \$10 as the evaluating increment as used by past experiments, we have examined college students' allocation decisions when presented the estimated cost of food for an entire month. This data will then be compared to traditional experiments to determine if students continue to value the social perceived characteristic of fairness when offered a financially significant amount of money.

Key Words: Budgeting, Ultimatum Game, Game Theory

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Introduction

The value and pursuit of self-interest opposed to conforming to societal expectations has been theorized and tested throughout the tenure of conventional economics. It has been predicted that it is human nature to prioritize their needs and interests before providing for another. It is upon this theory, otherwise known as individual utility maximization, to explain the choices influencing economic behavior. This experiment is designed to test the allocation and perceived value of “fairness” against the value of self-interest when offered \$400, which is slightly more than the \$367 that the USDA estimates college age males spend on food every month (United States Department of Agriculture, 2020).

As traditional economic theory suggests, the students will place the most consideration and value upon self-interest. However, past experiments in the ultimatum game format have produced outcomes that contradict the orthodox conception of ‘economic man’ . Although many previous tests have contradicted the theories expressed by historical economic literature, it is still the accepted theory and practice in economic predictions to adhere to self-interest priorities above all others. This disparity between economic theories presented and multiple intuitive tests that contradict those theories provide the topic of discussion for our rendition of the ultimatum game.

The experiment has been designed and conducted to evaluate if a higher value of allocatable funds provide a higher influence and retention of self-interest, which aligns with conventional economic theory. A modified version of this study concluded the size of the payoff does not change the results (Hoffman, McCabe, & Smith, 1996), but the values presented in their study were still deemed minimal. This study will analyze economic behavior with relevant, more critical values. Essentially, will business students at a mid-size public university retain more than deemed a ‘fair’ value rather than splitting funds evenly with their roommate when offered the estimated amount of monthly food expense? It is our hypothesis that when presented the role of allocator, they will contradict traditional

conclusions of the ultimatum game and will offer a less than equal amount. Our findings suggest that the students in question will often decide to allocate the funds evenly with their roommates, even though the allocator will potentially struggle with food expenses for the month. These results further complement the results of previous experiments that suggest humans value the social perception of fairness as opposed to the economic principle of self-interest.

Ultimatum Game Theory and History

The experimentation and study of the ultimatum game has perplexed economists since Guth, Schmittberger, and Schwarze (1982). The ultimatum game is quite simple, but has the flexibility to encompass and analyze a manner of different variables and their influence on player choice. The only positions in the game are the “allocator” and the “recipient”, but in games such as ours, they happen to be the same player. In traditional experiments, \$10 is given to the designated allocator (although any test material that can be dispersed in varying increments is suitable) and it is that player’s responsibility to decide how to allocate funds to the recipient. The obvious choices are to keep the entire amount for personal use, allocate the money in various increments of \$.01 to the recipient, or donate the entire amount to the recipient. In turn, the receiver must decide whether to accept or decline any offer presented by the allocator. The strategy of the game is for the allocator and recipient to mutually accept the offer. If both players agree, the money is allocated and the players win. On the contrary, if the players do not agree on the offer, no money is given to either player and the game is lost.

When analyzing the possible allocation disbursement possibilities, conventional economic reasoning implies that it is optimal for the allocator to offer as little as possible (Stanley, T. D. & Tran, Ume, 1998). It is further suggested that the recipient accept any beneficial contribution, since even \$.01 is theoretically more beneficial than nothing. However, multiple experiments result in fairly even monetary distributions, with offers of less than 20% consistently being rejected. (Thaler, 1998). It has been suggested by Thaler (1998) that allocators could either have a taste for fairness and/or could be worried that unfair offers will be rationally or mistakenly rejected” (Stanley and Tran, 1998).

It is the philosophical question regarding whether fairness and social perception matter more to socially susceptible college students than a significantly impactful amount of money. Rabin (1993) states that fairness dominates self-interest because there is a perceived punishment distributed from the recipient demonstrated by refusing the offer. This rejection and implied selfishness of the allocator would tarnish the social perception of the allocator (Camerer and Thaler, 1995). However, it is possible that the allocator's disbursement offer is based on the social perception of the standard of fairness and its' impact on the allocator's reputation instead of fairness being the true intention (Pillutla & Murnighan, 1995). In order to disprove this theory, Kahneman, Knetsch, and Thaler (1986) conducted tests to evaluate the allocator's disbursement when receivers accepted any offer. Still, 76% of the 161 allocators dispersed equal amounts to recipients. So, to answer the question of perceived fairness or legitimate intentions of fairness, Thaler (1998, p 198.) concludes that "part of the explanation for the generous offers observed in the ultimatum game does appear to be explained by a taste of fairness on the part of the allocators".

Design

This experiment was designed and conducted in an ultimatum game structure to determine if undergraduate students would contradict results from previous experiments when a larger financial variable is presented. In this experiment, 208 freshmen and sophomore students at the University of South Alabama, a mid-size public institution, were chosen to participate due to class enrollment. These students had no previous game theory education or exposure, so all answers provided can be presumed to have been influenced by instinct alone.

The students involved in this experiment assumed the roles of both the allocator and the recipient. In order to evaluate the students' positions as both allocator and recipient, each participant was tasked with answering two questions. First, given a \$400 refund, how much would they offer to their roommate, and secondly, given an offer from their roommate, what is the minimum they would accept? Answers were required to be in \$100 increments. Each answer provided was kept confidential,

and there was no discussion between participants until the experiment was over. 207 responses were recorded and compose the entirety of our data.

Results

The following chart displays the distribution of recorded responses:

Table 1

	\$0	\$100	\$200	\$300	\$400
Keep	2	10	132	39	24
Demand	11	31	140	6	19

We then analyze the interaction between all possible combinations of responses, giving the following distribution table:

Table 2

		Amount Demanded				
		\$0	\$100	\$200	\$300	\$400
Amount Offered	\$400	264	744	3360	144	456
	\$300	429	1209	5460	234	741
	\$200	1463	4123	18620	798	2527
	\$100	110	310	1400	60	190
	\$0	22	62	280	12	38

In order to find the distribution values displayed above, the recorded responses from Table 1 were multiplied by each other. For instance, the “Amount Offered” of \$400 and the “Amount Demanded” value of \$0 has a distribution of 264. To find the distribution value, The 11 recorded responses for the “Demand” value of \$0 in Table 1 were multiplied by the 24 responses of students who offered \$400. Although the allocators offered \$400, the recipient only demanded \$0, so this is an acceptable situation. The shaded cells are those where the combined amounts kept by the proposer and demanded by the

receiver total more than \$400, and thus neither participant receives anything. While this is an unfortunate yet necessary outcome of game theory experiments, it is instrumental to identifying the monetary value per each valid solution by the allocator and recipient. The omitted solutions occur 34.038% of the time. Given these numbers, we can then calculate the expected value for each proposal. An initial offer of keeping all \$400 has an expected value of \$21.26, an initial offer of \$300 has an expected value of \$60.87, an initial offer of keeping \$200 has an expected value of \$175.85, and keeping \$100 has an expected value of \$90.82. Thus keeping \$200 and offering \$200 clearly has the best result, however, this contradicts what we would expect from game theory.

In theory, the receiver should accept any amount of money, as this will be better than rejecting the offer and having nothing. Given the \$100 increments, we would thus expect to see the proposer keeping \$300 for themselves and the offer of \$100 being accepted. Thus, the question is why we see such a different result here.

One possibility is that this is being driven by the phrasing of the question regarding their roommates. Presumably, even if not close, most students would not want to deliberately antagonize their roommate. Taking \$100 less for the sake of keeping the peace at home would seem a reasonable choice. The difficulty with this explanation is that although it would explain offering an even split, it would not explain the insistence on receiving \$200, rather than accepting \$100. Being willing to accept the \$100 would not only increase the amount of money received themselves, but also increase the amount of the money their roommate gains. Thus, it would increase both financial positions and roommate harmony.

A related explanation is that the students care about looking nice in front of their classmates. Given they won't actually obtain the money, they very well may lie about what they would do in order to look better. The fact the answers are anonymous argues against this explanation however. Similarly, explanations involving repeated interactions or the like do not seem to apply. Thus, there are two reasonable explanations for the behavior observed. One possibility is simply that the students care

somewhat about fairness. Although they might be willing to make and accept slightly unfair offers, the \$100 increments mean that any unfairness results in a very unfair division.

Another, more interesting, possibility is that this is due to commitment. Players are being given the option to declare that they will not accept too small of an offer before the offer is ever made. As we see in many extensive form games, the ability to credibly commit to a course of action is extremely valuable. By having this ability, we see players making different choices than they would without the ability to make a prior commitment. In particular, a situation in which all players commit to only accepting offers where they receive \$200, and only make offers of an even \$200/\$200 split of the money is an equilibrium, although a high level of variance is found. Attempting to retain more than \$200 reduces the payoff for the player dividing the money, as they will now receive nothing, while retaining less than \$200 will also obviously have a payoff of less than \$200. If all offers are to evenly split the money, no player has an incentive to change their demand to receive \$200, and thus we have an equilibrium.

This gives us the usefulness of the result as well. Most games that can be run in class either have such obvious answers as to be boring, or such difficult answers that an introductory level class is unlikely to find them. This ultimatum game thus provides a good example to use in class, showing clearly a case with multiple equilibria, and giving a reason why one of those is more likely in practice, even if not the one pure theory would indicate.

Conclusion

The results of this experiment further suggest that the values of fairness and social perception are regarded as more intrinsic than the individualistic principle of self-interest, which is the primary proponent of conventional economic theory. However, the desire for peace does not serve as a mutually exclusive to self interest. We can further conclude that the amount of dispersive test material does not have a significant influence on the decisions of the allocator and recipient. While the amount of dispersive funds in our experiment were deemed credible, our results coincide with the conclusions of

Hoffman, McCabe, & Smith, (1996). Although it could be argued that the presentation of hypothetical currency highlights the perceived moral decisions, while a literal ultimatum game using real currency with literal implications could have drastically varying results (Feldman, Hall, Mobbs D, Evans D, Hiscox L, Navrady L, Dalgleish T, 2012). Nonetheless, the results of this experiment contribute further support to the value of fairness and social perception as opposed to conventional economic theory.

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