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THE PERCEPTION OF ECONOMIC VALUE LIMITS: A STUDY ON THE ULTIMATUM GAME DECISION PATTERNS

Abstract:

Research on dominant decision patterns within the field of economic psychology has revealed that some of the scientific expectations on human decision and behavior were not confirmed. The results of ultimatum decision games are recurrently used in the identification and description of dominant patterns in value related economic decisions. The study includes an initial review of the literature and the results of a sample of individual decision questionnaires based on the ultimatum game, with parallel questions directed to money proposals and time proposals. Initial conclusions indicate that, after an isolated analysis of the two formats (questions related to money proposals and questions related to time proposals), the results within the money format and within the time format revealed high and significant correlations. In contrast, the comparison between formats produced low and non-significant correlations, suggesting that the object of the proposals may influence the value perception and the response patterns. The study is relevant to pricing and revenue management in no-negotiation settings, as is the case of Internet or online website based e-business. Possible applications in the travel and tourism industry are airline e-tickets, and hotel, tours and events e-bookings.

Keywords:

Economic decision patterns, ultimatum game, pricing and revenue management, airline e-tickets, hotel e-reservations, website based e-business.

Introduction

"economic analysis of economic behavior relies heavily on decisions made by rational units" (Alchian, 1950, p.211)

"considering the millennia of human development, market interaction is a relatively recent development, and it would be surprising if we were well-adapted to this new environment" (Beckman, Chen, DeAngelo, Smith and Zhang, 2011, p.264)

The ultimatum game is a decision simulation research game that under a minimalist design captures the fundamental of economic decisions and the perception of economic value limits. The original formulation involves two players, with player 1 as the proposer and player 2 as the responder. From a given amount of money, player 1 is expected to propose a division of the amount to player 2. If player 2 responds positively accepting the proposal, the money is divided as proposed. If player 2 responds negatively refusing the proposal, neither player receives any money. The following is a mathematical description of the game formulation: "In an ultimatum game, player 1 makes an offer of $\$X$ from a total of $\$M$ to player 2. If player 2 accepts the offer, then player 1 is paid $\$(M-X)$ and player 2 receives $\$X$; if player 2 rejects the offer, each gets zero" (Hoffman, McCabe and Smith, 1996, p.289).

The theory predicted competition patterns seem to contrast with the cooperation patterns found in research tests. With different versions of the ultimatum game, what has been recurrently found is a pattern approaching the equal division rather than the predicted perfect equilibrium.

Literature Review

A non-competitive decision tendency may be argued as a behavior alternative to the fundamentally competitive rational decision as "nature randomly pairs us with individuals in a field setting that suggests we are responsible for their well-being" (List, 2007, p.491). The apparent contradiction between the competitive mechanism which is the fundamental argument of the Darwinian theory of evolution and the evidence of frequent cooperative behaviors between members of the same species and even different species is explained by Axelrod and Hamilton (1981) by arguing that the evolution of cooperation occurs in conditions of reciprocity between individuals involved in repeated interactions.

Perception is a core element in human decision processes (Moreira, 2015, 2013, 2012a, 2012b, 2011, 2010a, 2010b, 2010c, 2009a, 2009b, 2009c, 2007a, 2007b, Moreira and lao, 2014, 2013). As a generator of pre-decision information, perception is not only important in terms of the perception of the economic value limits acceptable to the players but also in terms of the perception of the decision intention of the other player. If a player is perceived as fair or hostile this perception is expected to influence the decisions, even if the perception is incorrect (Moreira, 2007a, 2007b). The standard

utility theory however, considers that the utility of a decision or behavior is determined exclusively by its consequences and is independent of the intentions behind it (Falk, Fehr and Fischbacher, 2003). In a study on the influence of the perception of the proposer in the ultimatum game Marchetti, Castelli, Harle and Sanfey (2011) found that monetary self-interest is overruled by the positive or negative information available about the proposer. The fair offers of proposers presented negatively (described as selfish and suspicious) were statistically indistinguishable from the unfair offers in the control condition (no description) and in the physical condition (neutral physical description). In parallel, unfair offers of proposers presented positively (described as generous and altruistic) were not statistically different from the fair offers of other types of proposers (negative description, neutral physical description, or no description). Marchetti, Castelli, Harle, and Sanfey (2011) suggest that the framing effect found is originated by the attempt of the responders to make sense of the situation by mentalizing about the primal motivation and rationale of the proposer. The inferred intentions of the proposer matter, especially in the case of two human players, and the same human responders that reject low offers from human proposers will very rarely reject offers from a computer (Blount, 1995). In experimental tests with a machine proposer, where the responder is informed that the proposal is generated by a computer, intentions are made irrelevant by the neutral perception of a non-human proposer and the rational decision mode becomes prevalent.

The rational solution to the ultimatum game is a proposal as near to the limit as possible. A proposal of limit minus one or zero plus one is a proposal that should still be accepted as a positive proposal preferable to zero. "A rational responder bent on maximizing his utility should accept even the smallest positive offer, because the alternative is getting nothing. A rational proposer who believes that his opponent is rational should therefore claim almost the entire sum." (Page, Nowak and Sigmund, 2000, p.2177). Theoretically, it can be argued that a complete acceptance rational decision pattern is possible as a proposal of zero could be either accepted or rejected with an equal economic result to the responder (Moreira, 2015).

Nevertheless, as research results consistently demonstrate (Thaler, 1988, Rappoport, Sundali and Seale, 1996) human players on the proposer side decide to propose away from the limit and on the responder side consistently reject proposals perceived as too low or away from the central value.

There is some evidence of the effect of gender in the responder decisions, with female players deciding closer to the rational pattern and rejecting significantly fewer proposals than male players (Eckel and Grossman, 2001, Rappoport, Sundali and Seale, 1996). The time available for the decision is also a variable to consider and there is evidence that under time pressure the proposals are significantly higher (Cappelletti, Guth and Ploner, 2011).

The ultimatum game is a model for economic transactions (Croson, 1996) with extensions to the study of competition and cooperation in evolutionary psychology and evolutionary economics as "while the experimental situation of an isolated, anonymous ultimatum game is somewhat artificial, it is very likely that situations similar to it have shaped the fairness instinct for millions of years" (Page, Nowak and Sigmund, 2000,

p.2178). There is of course a difference in the rational pattern of decision if the game is played one time only or if it is repeated as a series of games and if there is player anonymity or not, but experimental evidence suggests that humans tend to decide as if the game is always repeated and not truly anonymous (Gigerenzer and McElreath, 2003).

In economic game settings the agents are by definition competitive (Tzafestas, 1995) and the theoretic solution of the ultimatum game assigns nearly all the wealth or available resource to the proposer (Guth, 1995), but that does not explain the central tendency of the proposals and the negative responses to low proposals found in empirical tests. Bolton and Ockenfels (2000) identify behaviors of equity, reciprocity and competition to present a model based on the premise that decisions and behaviors are influenced both by the pecuniary payoff and the relative payoff standing, in line with the perspectives that cooperation can be considered a form of social intelligence (Gigerenzer and McElreath, 2003) and that humans evolved in the direction of conditional cooperation (Zak, 2011, Tzafestas, 1995).

This study involves a comparison of the maximum limit values offered by an individual as the proposer with the minimum limit values acceptable by the same individual as the responder. The base resource is presented in two formats, a monetary format and a time format. Relevant applications of this line of research are possible in the areas of pricing and revenue management in no-negotiation settings, as is the case of website based e-business. When an organization presents a price on a website it becomes the proposer, with the potential e-client deciding as the responder in an ultimatum game simulation. Website transactions are predominantly no-negotiation settings and pricing is critical. If the price is set too high above the acceptable economic value limit there will be no positive responses, a loose-loose end with no sale conclusion and the e-client lost and probably moving towards alternative services offered by the competition. If the price is set too far below the economic value limit there is a profit loss, and each dollar cut from the price beyond the tolerance level of acceptance is a revenue dollar unnecessarily lost. Considering the range and the magnitude of the online economy and the expansion expected in the future for this business platform in terms of airline e-tickets, hotels e-reservations, and tours and events e-bookings, further research in the ultimatum game and the perception of economic value is important to develop our understanding of the factors that influence travel and tourism economic decisions in online markets.

Methods

The research data was collected from a sample of 55 college students. The gender distribution was of 31 percent male and 69 percent female, and the age mean was 19 years old with a standard deviation of 1.5 years. The research questionnaire is presented below. There was no time limit and in general the participants finished the questionnaire under 5 minutes. The data set did not present any missing or invalid values.

Instructions

Imagine you are about to play a game with another person you don't know.

The two players are defined as Player 1 and Player 2.

According to the game rules, the situation is the following.

You will be Player 1 and to the purpose of the game you are given \$100.

You have to make Player 2 a proposal to divide the \$100.

If Player 2 accepts the proposal the money is divided as proposed.

If Player 2 refuses the proposal both players will receive nothing.

You can make a proposal between \$1 and \$99.

(\$0 and \$100 are not included because if you offer \$0 Player 2 will obviously refuse, and you surely have no interest in offering the total \$100)

Question 1

Q1. How much will you offer Player 2?

Question 2

Q2. Imagine now that you are Player 2.

What is the minimum proposal you would accept?

Question 3

Q3. If instead of \$100 you have 100 hours of work time off, how many hours will you offer Player 2?

Question 4

Q4. Imagine now that you are Player 2.

What is the minimum proposal of work time off hours you would accept?

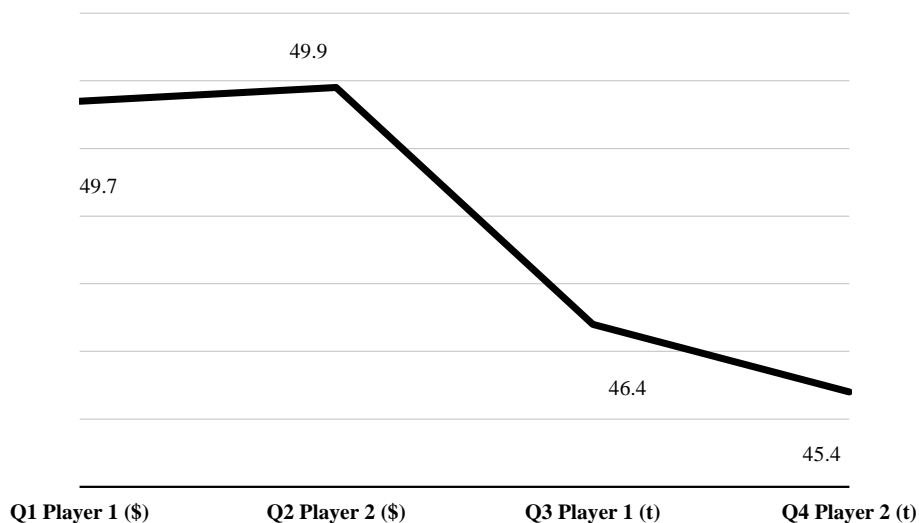
Results

The results indicate that the means for the proposer and the responder were consistent within the money (\$) and time (t) formats and apparently higher for the money format than for the time format (Table 1, Figure 1). There was no significant effect of gender on the decision patterns of the proposer and of the responder in the money and in the time formats.

The comparisons of the proposer and the responder limits within the money format, within the time format, and between the two formats revealed no significant differences. As expected, the correlations found within the money format and within the time format for the proposer and responder limits were high and significant, with $r=.51$, $p<.01$ for the money format and $r=.73$, $p<.01$ for the time format (Table 2).

Table 1: Ultimatum proposals descriptive statistics

	<i>Valid n</i>	<i>Mean</i>	<i>SD</i>	<i>Range</i>
Maximum proposal (\$)				
Q1. How much will you offer Player 2?	55	49.7	11.6	20-92
Maximum proposal accepted (\$)				
Q2. Imagine now that you are Player 2. What is the minimum proposal you would accept?	55	49.9	12.7	30-90
Maximum proposal (t)				
Q3. If instead of \$100 you have 100 hours of work time off, how many hours will you offer Player 2?	55	46.4	18.7	2-100
Maximum proposal accepted (t)				
Q4. Imagine now that you are Player 2. What is the minimum proposal of work time off hours you would accept?	55	45.4	17.8	2-100

Figure 1: Ultimatum proposals means

Source: *Ultimatum proposals descriptive statistics (Table 1)*

Table 2: Ultimatum proposals correlations and comparisons

	<i>Valid n</i>	<i>Mean</i>	<i>SD</i>	<i>Pearson r correlation</i>	<i>sig.</i>	<i>t-value</i>	<i>df</i>	<i>p</i>
Maximum proposal (\$)	55	49.7	11.6					
vs.								
Maximum proposal accepted (\$)	55	49.9	12.7	.51	.01	-.14	54	n.s.
Maximum proposal (t)	55	46.4	18.7					
vs.								
Maximum proposal accepted (t)	55	45.4	17.8	.73	.01	.59	54	n.s.
Maximum proposal (\$)	55	49.7	11.6					
vs.								
Maximum proposal (t)	55	46.4	18.7	.11	n.s.	1.15	54	n.s.
Maximum proposal accepted (\$)	55	49.9	12.7					
vs.								
Maximum proposal accepted (t)	55	45.4	17.8	.16	n.s.	1.67	54	n.s.

Discussion

Previous evidence of the effect of gender in the responder decisions (Eckel and Grossman, 1992, Rappoport, Sundali and Seale, 1996) was not confirmed by our data. Although the lower acceptable proposal means were lower for the female responders than for the male responders as expected, both in the money and time conditions, the differences were not sufficient to be considered statistically significant.

Research in the ultimatum game is frequently based on an initial amount of \$10 (Croson, 1996, Straub and Murnighan, 1995, Kahn and Murnighan, 1993). Following Hoffman, McCabe and Smith (1996) the initial amount in this study is \$100, as the lower significance of an amount of \$10 could support reasonable arguments about the possibility of a lighter consideration of the decisions of the proposer and of the responder. For the time format, the base value in this study was 100 hours of work time off. In future studies 100 minutes of work time off are to be tested instead of 100 hours, along with the exploration of the effect of other meanings or utilities of time in addition to work time off.

The study is relevant to pricing and revenue management in no-negotiation settings, as is the case of online or website based e-business. The most evident examples in the travel and tourism industry are airline e-tickets, and hotel, tours and events e-bookings. Initial conclusions indicate that, in an isolated analysis of the two formats, the questions related to money proposals and the questions related to time proposals correlated significantly, but the correlation values drop and become non-significant when the

questions directed to money proposals are compared to the parallel questions directed to time proposals, suggesting that the object of the proposals is a moderator of the decision patterns. The roles of proposer and responder did not reveal significant differences in the results in either the money format or the time format of the questions. At this point the overall conclusion is the following: The decision pattern may be stable independently of the role of an economic agent as a proposer or a responder and mainly dependent of the decision conditions related to the resource offered in the ultimatum game.

The ultimatum game can be considered as a simulation model of economic decision and behavior for all economic transactions after the negotiation period when a price is decided upon and presented as a final proposal and for economic transactions in no-negotiation settings. In no-negotiation settings pricing is critical to the market success and survival of products, services and organizations, in the limit influencing the attraction success and the survival of travel and tourism destinations.

Finally, other possible applications of a better understanding of fundamental patterns of human decision and behavior extend to consumer markets, work markets, and competition risks to the sustainable economic development of international travel destinations.

References

- ALCHIAN, A. (1950). Uncertainty, evolution, and economic theory. *Journal of Political Economy*. 58 (3). p.211-221.
- AXELROD, R. & HAMILTON, W. (1981). The evolution of cooperation. *Science*. 211. p.1390-1396.
- BECKMAN, S., CHEN, L., DEANGELO, G., SMITH, W. & ZHANG, X. (2011) Microeconomics and Psychology. *Journal of Economic Education*. 42 (3). p.255-269.
- BLOUNT, S. (1995). ERC – A theory of equity, reciprocity and competition. *American Economic Review*. 90. p.166-193.
- CAMERER, C. (2003). *Behavioral Game Theory: Experiments in Strategic Interaction*. Princeton: Princeton University Press.
- CAPPELLETI, D., GUTH, W., & PLONER, M. (2011). Being of two minds: Ultimatum offers under cognitive constraints. *Journal of Economic Psychology*. 32. p.940-950.
- CROSON, R. (1996). Information on ultimatum games: An experimental study. *Journal of Economic Behavior and Organization*. 30. p.197-212.
- DANA, J., CAIN, D. & DAWES, R. (2006). What you don't know won't hurt me: Costly (but quiet) exit in dictator games. *Organizational Behavior and Human Decision Processes*. 100. p.193-201.
- DECLERCK, C., KIYONARI, T. & BOONE, C. (2009). Why do responders reject unequal offers in the ultimatum game? An experimental study on the role of perceiving interdependence. *Journal of Economic Psychology*. 30. p.335-343.
- ECKEL, C. & GROSSMAN, P. (2001). Chivalry and solidarity in ultimatum games. *Economic Inquiry*. 39. p.171-188.
- FALK, A., FEHR, E. & FISCHBACHER, U. (2003). Reasons for conflict: Lessons from bargaining experiments. *Journal of Institutional and Theoretical Economics*. 159. p.171-187.
- GIGERENZER, G. & MCELREATH, R. (2003). Social intelligence in games. *Journal of Institutional and Theoretical Economics*. 159. p.188-194.
- GINTIS, H. (2010). Towards the renaissance of economic theory. *Journal of Economic Behavior and Organization*. 73. p.34-40.
- GUTH, W. (1995). On ultimatum bargaining experiments – A personal review. *Journal of Economic Behavior and Organization*. 27. p.329-344.

- HOFFMAN, E., MCCABE, K. & SMITH, V. (1996). On expectations and the monetary stakes in ultimatum games. *International Journal of Game Theory*. 25. p.289-301.
- KHAN, L. & MURNIGHAN, K. (1996). A general experiment on bargaining in demand games with outside options. *American Economic Review*. 83. p.1260-1280.
- LIST, J. (2007). On the interpretation of giving in dictator games. *Journal of Political Economy*. 115 (3). p.482-493.
- MARCHETTI, A., CASTELLI, I., HARLE, K. & SANFEY, A. (2011). Expectations and outcome: The role of proposer features in the ultimatum game. *Journal of Economic Psychology*. 32. p.446-449.
- MOREIRA, P. (2015). The ultimatum game and the nature of the distance of the economic agents. *Skyline Business Journal*. 10 (1). p.9-16. Available from www.skylineuniversity.com/FlipBook/SBJ-AY-14-15/index.html#/12. [Accessed: 08 April 2015].
- MOREIRA, P. (2013). Economic competition and survival endurance: The efficiency losses of competition. *International Journal of Economic Sciences*. 2 (3). p.121-130. Available from www.iises.net/download/Soubory/soubory-puvodni/pp121-130_ijoes_2013V2N3.pdf. [Accessed: 08 April 2015].
- MOREIRA, P. (2012a) Economic competition, sustainability and survival endurance: The extinction of the Dodo, the Easter Island case and the Tragedy of the Commons effect. *Higher Learning Research Communications Journal*. 2 (4). p.23-36. Available from journals.sfu.ca/liu/index.php/HLRC/article/download/84/84. [Accessed: 08 April 2015].
- MOREIRA, P. (2012b). Economic competition and survival endurance: Decision dilemmas under uncertainty. *Proceedings of the International Research Conference ESD 2012*, pp. 546-554. 12-13 April 2012, Frankfurt, Germany.
- MOREIRA, P. (2011). The perception of the underlying equilibrium between rapid economic growth and environmental sustainability: A study on primary city indicators. *Proceedings of the International Conference on Tourism and Technology ICTT 2011*, pp. 49-55. 07-09 July 2011, New Delhi, India.
- MOREIRA, P. (2010a). On the perception of the impacts of economic growth and travel and tourism development. *Proceedings of the International Conference Tourism Outlook ITSA 2010*, 30 November-03 December 2010, Kuala Lumpur, Malaysia.
- MOREIRA, P. (2010b). Destinations as travel attractors: Economic growth, the perception of access, and the importance of transportation networks. *Proceedings of the International Research Conference NZTHRC 2010*, 24-26 November 2010, Auckland, New Zealand.
- MOREIRA, P. (2010c). Effects of the exposure to marketing neutral information from media news: Impacts on risk perception, travel decisions and on the travel attraction of tourism destinations. *Proceedings of the International Research Conference EuroCHRIE 2010*, 25-28 October 2010, Amsterdam, The Netherlands.
- MOREIRA, P. (2009a). The value of air access: First empirical results of a contrast model comparing objective access and access perception. *Proceedings of the Pacific Science International Research Conference 2009*, 02-06 March 2009, Tahiti, French Polynesia. Available from webistem.com/psi2009/output_directory/cd1/Data/articles/000612.pdf. [08 April 2015].
- MOREIRA, P. (2009b). Economic change, prices and the adherence effect: Information, rationality and human decisions. *Proceedings of the International Research Conference CAUTHE 2009*, pp. 348-363, 10-13 February 2009, Perth, Australia. Available from informit.com.au. [08 April 2015].
- MOREIRA, P. (2009c). *Mental Frames and Human Decisions: Determinants of Stable and Unstable Patterns of Decision*. Beau-Bassin: VDM Verlag.
- MOREIRA, P. (2007a). Stealth risks and catastrophic risks: On risk perception and crisis recovery strategies. *Journal of Travel and Tourism Marketing*. 23 (2/3/4). p.15-27. Available from www.tandfonline.com/doi/pdf/10.1300/J073v23n02_02. [Accessed: 08 April 2015].
- MOREIRA, P. (2007b). Aftermath of Crisis and Disasters: Notes for an Impact Assessment Approach. In LAWS, E., PRIDEAUX, B. & CHON, K. (eds.). *Crisis Management in Tourism*. Oxford: CAB International.
- MOREIRA, P. & IAO, C. (2014). A longitudinal study on the factors of destination image, destination attraction and destination loyalty. *International Journal of Social Sciences*. 3 (3). p. 90-112.

Available from www.iises.net/download/Soubory/soubory-puvodni/pp90-112_ijossV3N3.pdf
[Accessed: 08 April 2015].

- MOREIRA, P. & IAO, C. (2013). A study on destination image and the behavioral factors of destination loyalty. *International Journal of Social Sciences*. 2 (2). p.76-94. Available from www.iises.net/download/Soubory/soubory-puvodni/ijoss-2013-v2n2.pdf#page=77 [Accessed: 08 April 2015].
- NOWAK, M., PAGE, K. & SIGMUND, K. (2000). Fairness versus reason in the ultimatum game. *Science*. 289. p.1773-1775.
- OCKENFELS, A. & WERNER, P. (2012). Hiding behind a small cake in a newspaper dictator game. *Journal of Economic Behavior and Organization*. 82. p.82-85.
- OXOBY, R. & SPRAGGON, J. (2008). Mine and yours: Property rights in dictator games. *Journal of Economic Behavior and Organization*. 65. p.703-713.
- PAGE, K., NOWAK, M. & SIGMUND, K. (2000). The spatial ultimatum game. *Proceedings of the Royal Society Biological Sciences*. 267. p.2177-2182.
- RAPOPORT, A., SUNDALI, J. & SEALE, D. (1996). Ultimatums in two-person bargaining with one-sided uncertainty: Demand games. *Journal of Economic Behavior and Organization*. 30. p.173-196.
- STIBEL, J. (2005). Mental models and online consumer behavior. *Behavior and Information Technology*. 24 (2). p.147-150.
- STRAUB, P. & MURNIGHAN, K. (1995). An experimental investigation of ultimatum games: Information, fairness, expectations, and lowest acceptable offers. *Journal of Economic Behavior and Organization*. 27. p.345-364.
- THALER, R. (1998). Anomalies: The ultimatum game. *Journal of Economic Perspectives*. 2 (4). p.195-206.
- TZAFESTAS, E. (1995). Beyond cooperation and competition: Explorations with a quantitative tit-for-tat model. *LAFORIA Research Report 95/34*.
- YAMAMORI, T., KATO, K. & MATSUI, A. (2010). When you ask Zeus a favor: The third party's voice in a dictator game. *The Japanese Economic Review*. 61 (2). p.145-158.