# ANALYSIS TOOLS OF POSITIONAL INVESTMENTS AND THE ULTIMATUM GAME

Petr Mach[1]*, Jan Pokorný[2], Radim Valenčík[1]

[1]University of Finance and Administration, Estonská 500, Prague 10, 101 00, Czech Republic

[2]Prague University of Economics and Business, W. Churchilla 1938/4, Prague 3, 130 67, Czech Republic

**Abstract**

*This paper deals with the analysis of players' decision-making, using tools describing the role of positional investing. It discusses the differences between predicted and empirically observed decision-making in the ultimate game (UG). Empirically observed behavior has its rational basis in evaluating the bargaining position of future conflicts. We extend Nash's bargaining problem with a positional neutrality function. The positional neutrality function identifies an area of possible agreement in which one player's position in future games is not improved at the expense of the other. We used this analytical tool in a pilot UG experiment with 64 participants. We study the player's reactions in the experiment after adding additional information on future investment possibilities. Findings from the seven-rounded UG experiment support the predictive ability of positional neutrality functions. Hence, we assume that the "notion of fairness" can be explained as the "notion of positional neutral pay-off division."*

**Keywords:** *Nash bargaining problem, game theory, ultimatum game, positional investment neutrality function*

## 1. INTRODUCTION

The role of positional investing can be understood in several ways, which are interrelated:

1. The most obvious way is to explain the paradox that arises in ultimatum games. Why does a player who is offered a split of, say, 10 for him usually disagree with the 90 bidder (or 20:80)?[1] Is it just a matter of psychology, e.g., envy or a sense of injustice from unfulfilled expectations (Vavra, Chang, and Sanfey, 2018), or is there a deeper cause that a model of positional investing can uncover? (We discuss this in this paper).

2. There is also a path to discovery through the economics of productive consumption, i.e., an economics in which the goal of consumption is not utility in the sense of experience, but the creation and operation of assets that generate future income, including investing in skill development or social positioning (Černík, Valenčík, and Wawrosz 2020).

3. Marx's analysis of the capitalist's conception of personal consumption in his Capital II (Marx 1885), which he was unable to complete, is significant. He considered the capitalist's consumption as only unproductive, serving to achieve utility. This brought him up against the question of why competition does not lead the capitalist to reduce not only the consumption of the workers but also his own. He knew that this was an important question, but he could not give an answer because he could not distinguish between two types of investment: a) in the expansion and innovation of production, b) in position.

4. Another way is the gradual discovery of the role of positional investing from T. Veblen (18991934) (conspicuous consumption) through J. Clark (1915/2007) and others to R. Reich (1991). Here we find many brilliantly and attractively formulated views, but we do not find their organic integration into the core of the economic theory.

5. Building on the distinction between short-run and non-short-run equilibria, which has been fairly well explored by game theory (Madani, Hipel 2011). What future horizon to consider, and what is important in current decision-making regarding future developments?

[1] This paradox has been experimentally verified many times, see Güth and Kocher (2014)

6. Using Nash's (S, d) model of the bargaining problem, which some theorists (Thomson, 2010), (Thomson, Lensberg, 2006) have tried to extend to incorporate the possible reactions of the other side based on the estimated consequences of partition.

7. Analysis of the role of positional goods (Hirsch, 1976) in their effect on future income. Weiss and Fershtman (1998) provide many examples of how social status affects the market and non-market goods distribution. Experimental results also support this, according to which people expect higher status to influence the acquisition of certain additional resources (Ball et al., 2001).

All seven contexts are relevant for understanding the role of the two-component model of positional investment (the model of the impact of positional investment on the realizability of investment opportunities and the neutrality function of positional investment within the concept of productive consumption economics) and play an important role in its specific applications.

## 2. MATERIALS AND METHODS

### *2.1. Materials*

This paper aims to present the neutrality function of positional investing as a tool for analyzing conflicts arising in problems that are extensions of Nash bargaining problems. The object of the investigation is to express and analyze the role of positional investing. Positional investing means using the earned income to gain an advantage over the others in future games. It is a problem when the currently earned pay-off may affect the outcome of subsequent games.

### *2.2. Methods*

As methods, we will use:

* Interpreting the apparent differences between the player's predicted and empirically observed behavior in the so-called ultimatum game.

* Analyzing the assumptions of the Nash bargaining problem and extending this problem to situations where the distribution of the gains from joint action can be a source of conflict.

* Identifying and defining the concept of "positional investing."

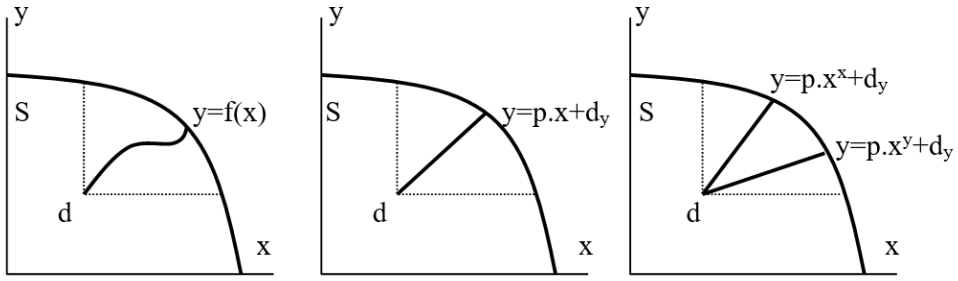
* Developing and presenting the neutrality function (line) of positional investing as an important tool for analyzing conflicts arising in games that are some extensions of the Nash bargaining problem.

## 3. THE BASIC TYPE OF NASH BARGAINING PROBLEM AND ITS EXTENSION

The Nash bargaining problem is a generally formulated mathematical problem with many important interpretations. Concrete cases are, for example, every act of exchange, every creditor-debtor relationship, most contracts, the division of profits among partners, loot among robbers, and many others.

The distribution of payouts in a particular round may not be neutral to what happens in the future. For example, one player may gain an advantage over another player. This phenomenon has been called positional investing. It is the ability to turn a higher payoff into an advantage that discriminates against the other player. The mechanism of this transformation consists in increasing the yield of one's own investment opportunities by reducing the yield of the investment opportunities of the other player(s) while reducing the efficiency of the respective economic system (Valenčík, Černík 2021, p. 226), (Valenčík, Frank, Schulz 2022).

Thus, we extend Nash's bargaining problem to include a positional investment neutrality function, which can be simplistically expressed as a positional investment line. In some cases, it is important to consider the fact that players may view the positional investing function (line) differently.




The neutrality function of positional investing

Simplification in the form of positional investing, the neutrality line

Different perceptions of the neutrality line by individual players

**Fig. 1.** Basic type of Nash bargaining problem

Source: (Frank. Schultz, Valenčík 2022)

- x, y player payouts
- S set of available payouts
- d point of disagreement (starting point)

From left: the neutrality function of positional investing, simplification in the form of the neutrality line of positional investing, different perceptions of the neutrality line by individual players.

In the case of ultimatum games, the rejection of an offer by the other player is always a manifestation of the players seeing the positional investment neutrality line differently. That is, they are players with bounded rationality.

## 4. POSITIONAL INVESTMENTS IN THE ULTIMATUM GAME

We experimentally verified the usefulness of neutrality lines as a tool for predicting the set of admissible solutions to a negotiation problem using the ultimatum game (UG). UG was chosen for the following reasons:

- UG simplifies the otherwise complex reality of negotiation into a finite set of possible solutions in which respondents can more easily navigate,
- for experimental validation, it provides a standardized protocol that can be compared with other experiments and is easily understood by the experiment participants,
- there are a large number of experiments already conducted against which the results can be compared.

In this section of the paper, we present the results of the experimental investigation, relate them to previous experiments of the ultimatum game, and explain the nature of the difference in UG behavior from a prediction based on the assumption of rational player behavior.

The theoretical solution to the ultimatum game assuming rational players occurs by backward induction. The offering player offers the lowest indivisible unit payoff to the accepting player who accepts such an offer (Rubinstein, 1982).

Empirical results from the first experimental investigation already concluded that players do not make decisions consistent with the prediction. The second player, who decides to pay the proposed reward, rejects a share of the payoff that deviates too negatively from equal sharing. Therefore, already based

on the first experiment, perceived fairness was identified as an influential factor (Güth, Schmittberger, & Schwarze, 1982).

More than thirty years of experimental work with the ultimatum game in different cultural settings is summarized as follows: the most frequent offers to the first player are in the range of 40-50% share, and these offers are almost always accepted, while offers of less than 20% share are almost always rejected (Güth & Kocher, 2014).

The perception of fairness is considered to be the main difference from the rational solution assumption. A player will reject a distribution that he considers unfair. The offering player pre-calculates this behavior. Hence, in most cases, it presents an ultimatum that it assumes the counterparty will consider fair. (Eckel 2014, p. 346), (Güth and Kocher, 2014)

Across developed countries, experiments have minor differences explained by different cultural perceptions of fairness (Roth et al., 1991). However, so far, it has not been possible to demonstrate these differences using the cultural dimensions of Hofstede or Inglehart (Oostrebeek et al., 2004).

Significantly different results from those commonly observed are presented by Henrich (2000) in an experiment with the Machiguenga Indian tribe, where a lower than 20% share of the second player's payoff was often accepted. His experiment was based on the distribution of a sum of money, even though money is not such a common medium of exchange in that tribe.

The perception of fairness and the influence of this aspect on behavior in the UG is difficult to grasp. If the bidding player were influenced only by an internal compulsion to offer a fair distribution of the payoff in the ultimatum game, then the amount offered would be the same in the dictator game. In the dictator game, however, significantly lower shares are offered, so the bidding player's actions are not influenced solely by his perception of fairness (Forsythe et al., 1994).

The perception of fairness may be related to the entitlement effect. In this case, experiments do not provide a clear-cut answer on the effect of entitlement on the distribution of game roles. While one experiment found an effect on the amount offered (Hoffman et al., 1994), a replication experiment did not confirm the effect (Demiral & Mollerstrom, 2018).

Based on the established theoretical development of the bargaining problem on the line of neutrality of positional investing, we assume that the other player accepts a payoff distribution proposal that he considers at least positionally neutral. Thus, we do not accept a proposal that might endanger him in future games.

Suppose we were to build on the notion of perceived fairness used so far. In that case, it can be defined as follows: a fair distribution is considered by each player as one that is positionally neutral concerning future conflicts.

From the knowledge gained so far about human decision-making in the ultimatum game, the following assumption can be made:

In the absence of additional information about players' initial bargaining position and the absence of information about future investment opportunities and potential conflicts, most players consider it positionally neutral to receive a payoff of 40-60% of the distribution.

This assumption can also be illustrated graphically by the following figure, which adjusts the bargaining problem according to the characteristics of the ultimatum game. The ultimatum game has some specificities compared to the usual representation of the bargaining problem:

In the case of an agreement, the sum of payoffs always forms the same value, so the boundary of achievable payoffs S is a straight line. Possible solutions are found only at points on line S and the point of disagreement. The bold line in the figure highlights the points considered acceptable by both players.

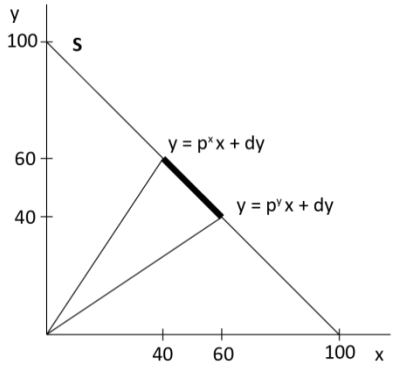



**Fig. 2.** The UG with lines of investments neutrality

Source: Own creation

If the baseline assumption holds, then the bargaining space perceived by both players as position-neutral should change due to additional information about the players' future investment options in their positions. The experiment is designed to test this assumption. At the same time, it explores the opposite phenomenon of positional investing, which is an investment in capabilities that enable system-wide efficiency gains. In UG, this increase is manifested by an increase in the amount distributed.

The experiment continuously changes the players' perceptions of the future possibilities of using the opponent's reception. By manipulating the context of the game, the slope of the positional investment neutrality lines is purposefully altered to test the reaction of the experiment participants to the new game conditions.

The experiment tests the hypothesis that player behavior in the ultimatum game is influenced by the perception of the opponent's positional investment opportunities.

The second player in the ultimatum game will not accept the historically accepted payoff distribution when the first player's historically allocated portion of the payoff is sufficient for positional investing.

Suppose the offering player in the ultimatum game perceives opportunities for positional investment by the other player that could threaten his privileged position in upcoming games. In that case, he will reduce the proposed distribution offer to prevent the other player from positional investing. It shall do so despite the high risk of not accepting the offer.

However, the first player is willing to invest in the second player's ability if this maximizes his own present value of future income, even if his income is significantly reduced in the short term.

A verbal description of the negotiation problem, which is different for each round, is used to create an idea of future games. Due to information asymmetry, each player forms a different idea of the neutrality line of positional investing. This approach is quite different from standard UG experiments, which at most try to limit the influence of imprecise information in an attempt to explore some single aspect of complex human decision-making. The bargaining problem, complemented by the neutrality lines of positional investing, allows us to analyze decision-making while accounting for players' different perceptions of future opportunities and the influence of imprecise and unreliable information. As a result, it allows us to predict a region of position-neutral solutions (rather than a specific point) and goes beyond some of the limitations of existing models described by Aliev et al. (2016).

The experiment aims to investigate the model's predictive ability in real negotiation situations. Therefore, the course of the experiment is designed to simulate a real negotiation environment:

- The participants in the experiment know each other,
- see each other during the experiment and can communicate,
- the game assignment includes a description of the current and future situation in each round

- the information provided is neither accurate nor reliable.

The instructions for the game are printed and stapled in a booklet for each participant so they cannot see future rounds of the experiment and ensure that the instructions are uniformly communicated to all participants. The division of players into proposer and responder is made randomly. Framing the experiment plot in a work setting approximates the decision situation - the proposer is a senior employee who proposes the distribution of rewards between himself and his subordinate. The responder is the subordinate who decides whether or not to accept the proposed reward distribution.

In the experiment, we only work with hypothetical rewards. Participants take part in the experiment voluntarily without any financial reward. The approached potential participants were asked to find a second player to join the experiment themselves. The influence of real or hypothetical rewards on the results of experiments may not be crucial in all cases (Eckel, 2014).

Although in some experiments, the decision outcomes differ between hypothetical and real rewards, the variance of the average distributional designs in the ultimatum game is marginal when comparing low financial and hypothetical rewards. A crucial factor is the participants' intrinsic motivation (Camerer & Hogarth, 1999). We assume that intrinsic motivation is powerful in the case of this experiment because participants themselves have some costs associated with selecting and reaching out to the other player.

The experiment is divided into seven rounds, described in more detail below. Participants do not know the upcoming rounds in advance and therefore make decisions based only on the information contained in the current round or on the experience of previous rounds.

***First round:*** The first round helps to understand the nature of UG. We also use it to verify if the sample of participants behaves in a standard way. The proposed distribution is assumed to be 40-50% of the amount; this distribution should be accepted.

***Second round:*** From the second round onwards, the game is framed in a corporate setting. Players are not given additional information about future games. The second round tests that this additional game context does not significantly impact the players' final decisions. We assume a slight change in the proposed distribution from the first round in favor of the first player. According to Nouri and Traum (2015), there is typically a reduction in the proposed amount due to game experience without a significant effect on the acceptance rate.

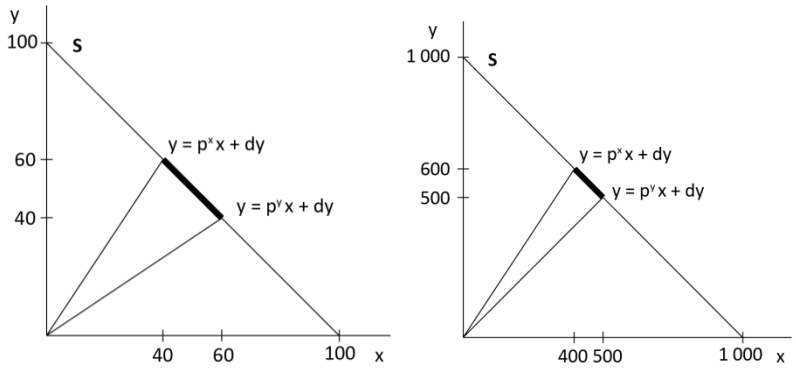



**Fig. 3.** First round (left) and Second round (right)

Source: Own creation

***Third round:*** In the third round, the first player is offered information about an investment opportunity in the second player's position for the first time. To prevent it, he must reduce the offer to a 10% stake. The information about the investment opportunity is uncertain; the presentation is quoted with the words: "You have heard from someone in the company that..." The consequence of investing in the position should be to replace the proposer in his leadership role with a second player. Will the proposer

be willing to give up his portion of the payout to avoid a very uncertain positional investing opportunity? The second player assumes the usual course of the game and has no information about the first player's possible suspicions.

***Fourth round:*** In the fourth round, both players have information about a future investment opportunity. The second player can realize his investment opportunity by acquiring at least a 40% stake. The consequence of the investment is twofold: 1) it will increase the second player's qualification and hence the future distributed payoff, and 2) the second player may (or may not) take over the first player's leadership position due to his higher qualification.

***Fifth round:*** In the fifth round, the second player's reaction to the investment opportunity in the first player's position is tested. The investment opportunity leads to a permanent reduction in the amount distributed and an increase in the first player's fixed payoff by the same amount. To realize the investment opportunity, the first player needs at least a 30% share of the payout. The second player works with the idea that a 30-60% share is needed.

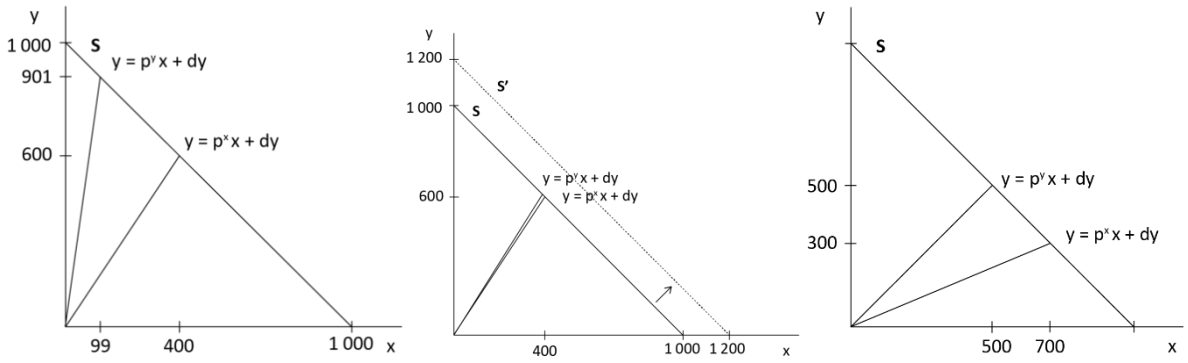



**Fig. 4.** Third round (left), Fourth round (middle), and Fifth round (right)

Source: Own creation

***Sixth round:*** The sixth round examines the response to an investment opportunity in the other player's skills that increases the total payoff distributed in the future. The first player does not face an immediate positional threat but must give up a significant portion of his current payout to invest. For the investment to be made, the proposed distribution to the second player must be at least 80% of the payout.

***Seventh round:*** In the final round, a higher total payout is distributed due to successful investment in the other player's abilities. Players are not presented with additional information about the potential future use of rewards.

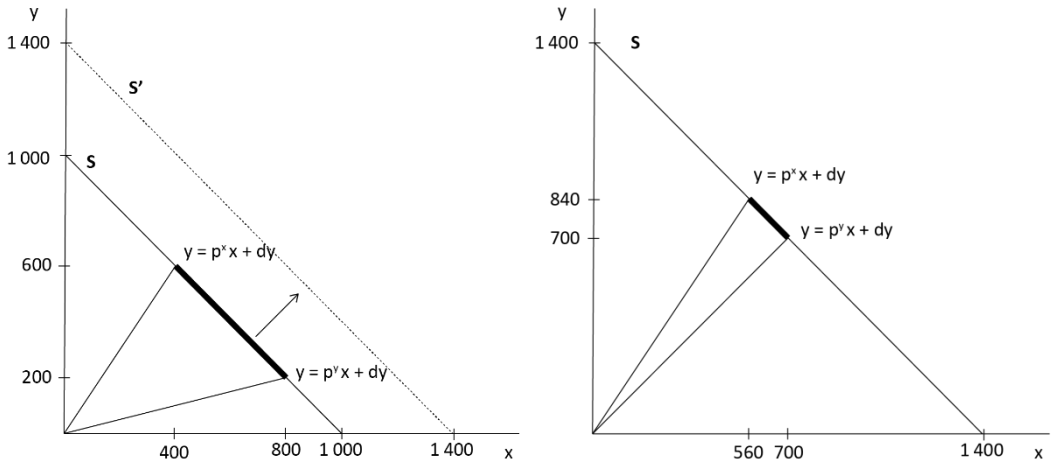



**Fig. 5.** Sixth round (left), and Seventh round (right)

Source: Own creation

The experiment was conducted on a sample of 64 people from the Czech Republic. 53% of women and 47% of men participated in the experiment. It was a pilot project with a small number of participants, but it was possible to secure a representative composition of the sample (not only students but people with different levels of education, of different ages, and in different fields). More than 70% of the participants were employed at the time of the experiment, while only 5% were students. Figure 11 shows the Age structure of the participants.

| Age range | 20-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|
| Absolute Representation | 18 | 19 | 10 | 8 | 7 | 2 |
| Relative Representation | 28,13% | 29,69% | 15,63% | 12,50% | 10,94% | 3,13% |

**Table 1.** The age structure of the experiment participants

Source: Own creation

In the first round of the experiment, results similar to those presented in other UG investigations were obtained. Although the players did not act anonymously, they knew each other and could interact, so 84% of proposers proposed a responder 40-50% payoff share; this proposal was accepted in most cases.

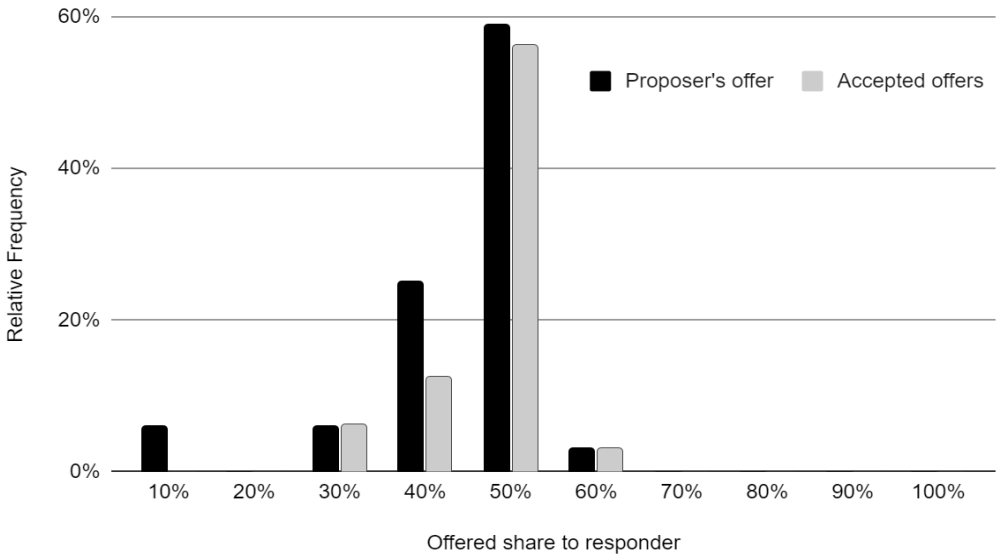



**Fig. 6.** First round results

Source: Own creation

In the second round, the amount offered was reduced. Compared to the first round, where the average proposal was 43% of the payoff, the average proposal was reduced to 40%. Thus, despite adding additional game context and role creation, the sample of respondents made decisions similar to those in the two-round experiments with standard conditions.

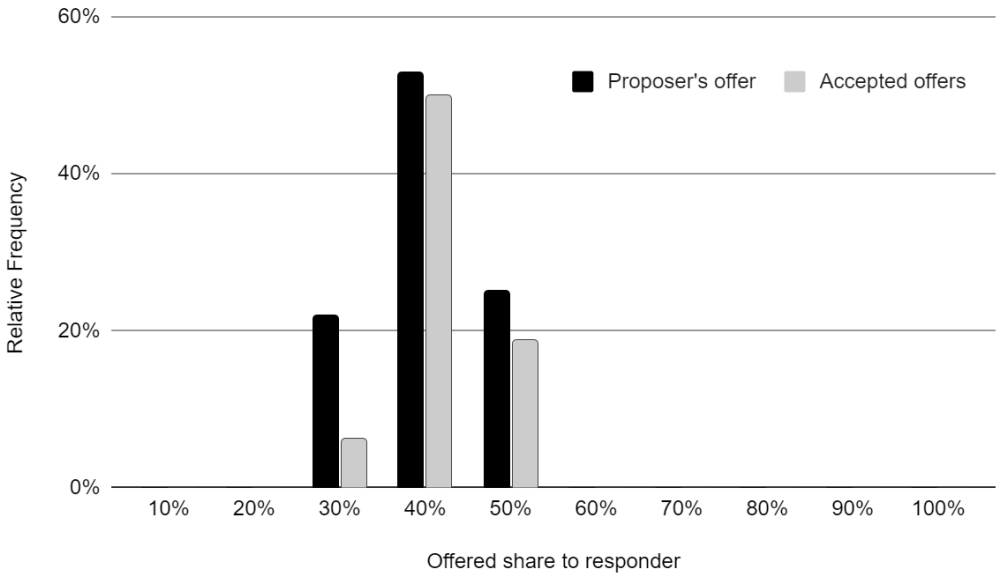



**Fig. 7.** Second round results

Source: Own creation

According to Nouri and Traum (2015), the change in decision-making in the second round of UG is due to the initial game experience. This is also consistent with a closer look at the behavior of individual bidding players in the second round (fig. 7). The decrease in bidding occurred primarily for players who bid above-average rewards.

Players with bids close to the average did not change their behavior. It is not entirely clear from the results to what extent the first player's decision-making in the second round is influenced by game experience and to what extent the division of roles influences it into supervisor and subordinate in the game assignment.

| Kind of change in the payoff offered | Relative Frequency | Average share to responder | | Change |
|---|---|---|---|---|
| | | First round | Second round | |
| Decrease | 53% | 48% | 36% | -25% |
| Without change | 34% | 46% | 46% | 0% |
| Increase | 13% | 14% | 43% | 207% |

**Table 2.** Change in player behavior between the first and second round

Source: Own creation

After providing the bidder with information about a possible positional threat from the other player in the third round, 25% of bidders reduced the bid to a level that prevents possible positional investment. As expected, these reduced bids were rejected in most cases (fig. 8).

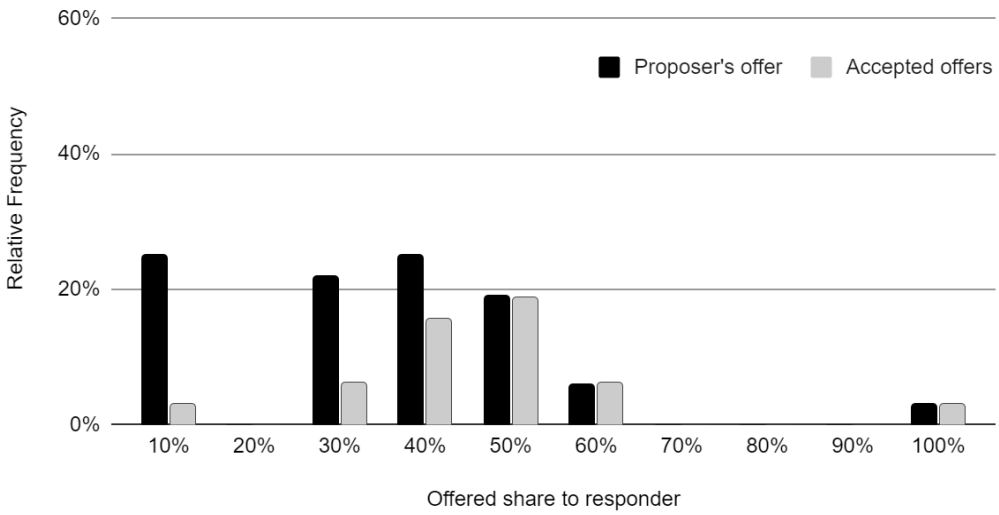



**Fig. 8.** Third round results

Source: Own creation

In the fourth round, the bidding players' desire to allow investment in the other player's skills to increase the future distribution amount prevailed. The average bid was 6% higher compared to the second round. The number of bids preventing the second player from investing decreased significantly compared to the third round. All rejected bids were in the range of 30-35%, i.e., in the range of the amount preventing the second player from investing.

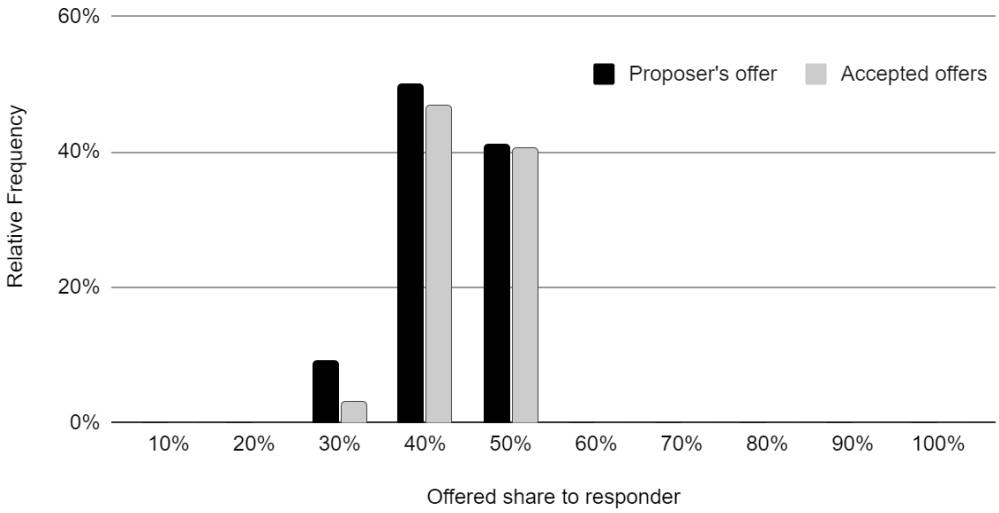



**Fig. 9.** Fourth round results

Source: Own creation

In the fifth round, the context of the game contained opportunities for positional investment by the first player.

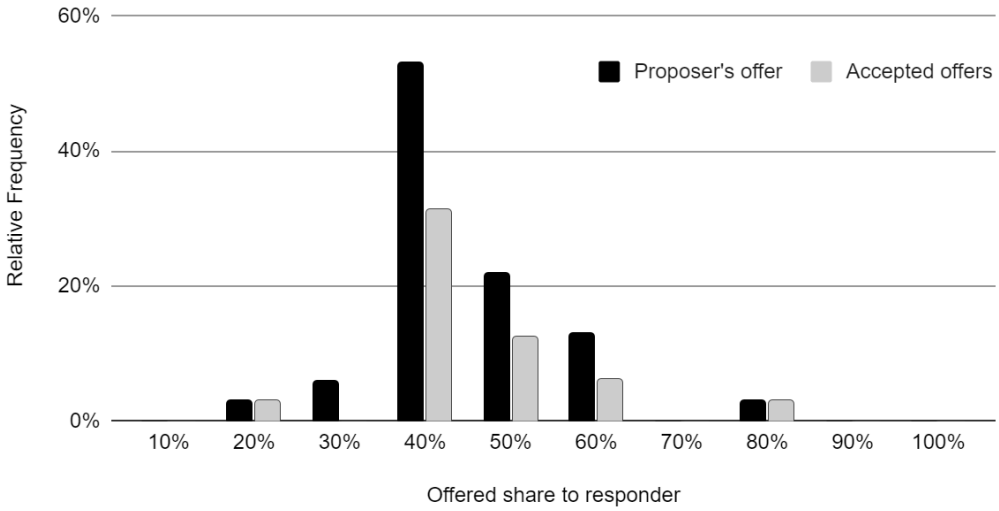



**Fig. 10.** Fifth round results

Source: Own creation

The following table compares the rejection rates of identical offers in the second and fifth rounds. The second player rejects the historically accepted distribution proposal if the first player has enough to invest the historically accepted amount in the position.

| | 2. round | | 5. round | |
|---|---|---|---|---|
| Offered payoff | Frequency | Rejected | Frequency | Rejected |
| 40% | 53% | 6% | 53% | 41% |
| 50% | 25% | 25% | 22% | 43% |

**Table 3.** Comparison of identical offers in the second and fifth rounds

Source: Own creation

In the sixth round, both players were given information about the other player's investment opportunity in abilities that could increase the payout distribution. According to the assignment, the investment was possible if the other player was offered at least 80% of the payout. More than half of the bids were of sufficient amount to make this investment.

Unexpectedly, there was a significant increase in bids in the range of 60-70 % of the payout, which did not appear in the comparative second round. Based on the interview with the participants, this level of bids was justified because the second player should save at least part of the investment's purchase price to be responsible enough to approach it. In total, 56% of players provided sufficient rewards to invest in, but 81% suggested splitting the reward to invest in the other player's skills. Players were, in most cases, willing to invest in the other player's skills, even if it meant a temporary reduction in their income.

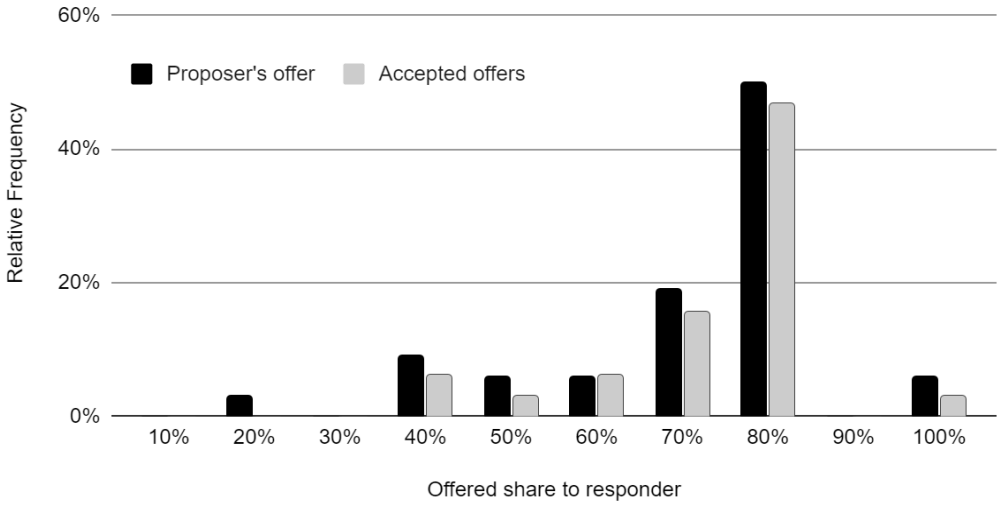



**Fig. 11.** Sixth round results

Source: Own creation

In the seventh round, the increased reward was distributed based on the investment in skills from the previous round. This round does not have additional information about the future use of the payout, so we compare it to the second round. Most offers are in the 40%-50% payout range. The acceptance rate is similar. Due to the investment in skills, the first player saw an average increase in the absolute payout of 27%.

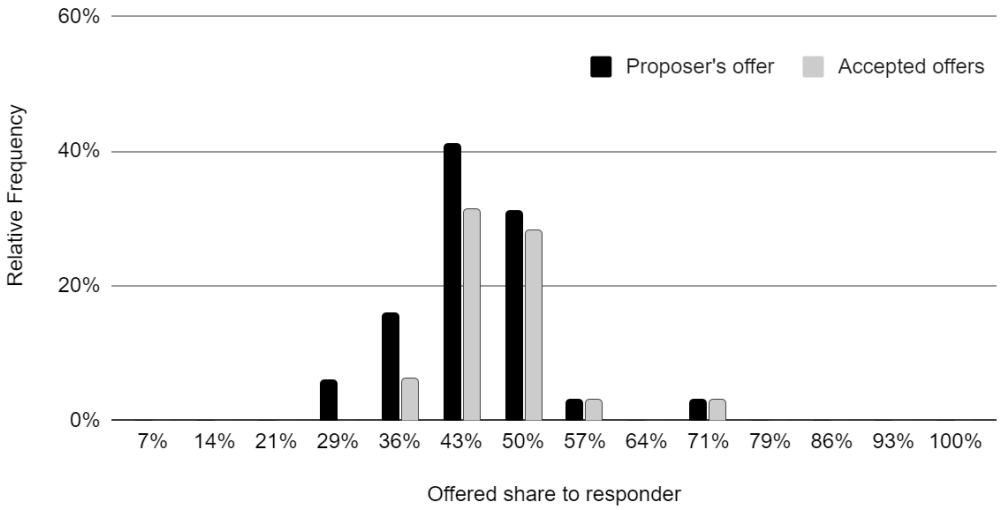



**Fig. 12.** Seventh round results

Source: Own creation

## 5. RESULTS

Results of the UG experiment support usefulness of our theoretical approach to the Bargaining problem expanded with the position neutrality function of investing. This paper's experimental part confirmed that most players would rather forfeit their current pay-off in favor of retaining their bargaining position for future rounds. Hence, the decision process also comprises future states or some notion of future development. On the other hand, the players are willing to invest part of their pay-off to achieve the possibility of a bigger pay-off in the future.

We have decided to complement the UG experiment by projecting future development to achieve the research objectives. This approach to designing the experiment has its pros and cons. It brings the conditions of the experiment closer to real decision-making situations. However, it is also the main limitation of our experiment. Even a slight change in the situation description could change the decision of our participants. Therefore, we approach this investigation as a pilot experiment. A need arises to develop an experimental protocol that would overcome this trouble.

## 6. DISCUSSION

One possible way to do so is to simplify the protocol to investigate the causes of "fairness" in the standard UG distribution. Our assumption in the explanation of "fair behavior" is that a fair offer is every positional neutral offer. Hence, in a standard UG game without any additional context, the notion of a neutral investment area lies around the equal payoff division. In the future investigation, we want to reach the state when both players see only one acceptable (fair, neutral) pay-off distribution. Adding one specific rule: in a multi-round game, the proposer becomes the player with a higher reached pay-off. We expect that, in this case, both players will evaluate the line of position neutrality same, which will correspond to an equal distribution of payments.

## 7. CONCLUSIONS

The use of positional investment analysis tools allows us to explain the results of UG experiments. Suppose we extend the experiment by specifying how the funds raised in UG are used. In that case, we find that the degree of inequality that players are willing to tolerate or accept is directly related to whether these funds are used for positional investing or to enhance player performance. From here, important implications for both the firm and the social reforms in the areas of social investment and

social insurance follow. In the first case, this can strengthen the affinity of employees to the firm or prevent unhealthy rivalry, while in the second case, it can rally the public to support reforms that increase the efficiency of the social system.

## ACKNOWLEDGMENTS

The result was created in solving the student project "Position investment analysis tools and financial market developments" using objective-oriented support for specific university research of the University of Finance and Administration.

## REFERENCES

1. Aliev, RA., Pedrycz, W, Kreinovich, V, Huseynov, OH 2016, "The general theory of decisions. Information Sciences", pp. 125–148.
2. Ball, S, Eckel, C, Grossman, PJ, Zame, W 2001, "Status in markets" *The Quarterly Journal of Economics*, vol. 116, no. 1, 1pp. 61-188.
3. Camerer, CF, Hogarth, RM 1999, "The effects of finaSupposeial incentives in experiments: A review and capital-labor-production framework", *Journal of risk and uncertainty*, vol. 19. no. 1, pp. 7-42.
4. Černík, O, Valenčík R, Wawrosz, P 2020. "Economics of productive consumption and multipoint extension of Nash bargaining problem", *Journal of International Scientific Publications: Economy & Business*, vol. 14, no. 1, pp. 10-25.
5. Clarke, J 1915 (2007) "Essentials of economic theory", Ludwig von Mises Institute Auburn, Alabama
6. Demiral, EE, Mollerstrom, J 2020, "The entitlement effect in the ultimatum game–does it even exist?", *Journal of Economic Behavior & Organization*, vol. 175, pp. 341-352.
7. Eckel, C 2014, "Economic games for social scientists", *Laboratory experiments in the social sciences* pp. 335-355.
8. Forsythe, R, Horowitz, JZ, Savin, NE, & Sefton, M 1994, "Fairness in simple bargaining experiments", *Games and Economic behavior*, vol. 6, no.3, pp. 347-369.
9. Güth, W, & Kocher, MG 2014. "More than thirty years of ultimatum bargaining experiments: Motives, variations, and a survey of the recent literature", *Journal of Economic Behavior & Organization*, vol. 108, pp. 396-409.
10. Güth, W, Schmittberger, R, Schwarze, B 1982 "An experimental analysis of ultimatum bargaining", *Journal of economic behavior & organization*, vol. 3, no. 4, pp. 367-388.
11. Henrich, J 2000 "Does culture matter in economic behavior? Ultimatum game bargaining among the Machiguenga of the Peruvian Amazon", *American Economic Review*, vol. 90, no. 4, pp. 973-979.
12. Hirsch, F 1976, "Social Limits to Growth. Cambridge", Mass.: Harvard University Press
13. Hoffman, E, McCabe, K, Shachat, K, Smith, V 1994) "Preferences, property rights, and anonymity in bargaining games", *Games and Economic behavior*, vol. 7, no. 3, pp. 346-380.
14. Madani, K, Hipel, KW 2011, "Non-cooperative stability definitions for strategic analysis of generic water resources conflicts", *Water resources management*, vol. 25, no. 8, pp. 1949-1977.
15. Marx, K 1885, "Das Kapital. Kritik der politischen Ökonomie", Zweiter Band, Hamburg 1885. Online http://telota.bbaw.de/mega/

16. Nouri, E, Traum, D 2015, "Cross cultural report of values and decisions in the multi round ultimatum game and the centipede game", *Procedia Manufacturing*, vol. 3, pp. 4044-4051.
17. Oosterbeek, H, Sloof, R, Van De Kuilen, G 2004. "Cultural differences in ultimatum game experiments: Evidence from a meta-analysis", *Experimental economics*, vol. 7, no. 2, pp. 171-188.
18. Reich, R 1991 "The Work of Nations: Preparing Ourselves for 21st Century Capitalism", New York: Knopf Publishing.
19. Roth, AE, Prasnikar, V, Okuno-Fujiwara, M, Zamir, S 1991, "Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An experimental study", *The American economic review,* pp. 1068-1095.
20. Rubinstein, A 1982, "Perfect equilibrium in a bargaining model", *Econometrica: Journal of the Econometric Society*, pp. 97-109.
21. Thomson, W, Lensberg, T, 2006, "Axiomatic theory of bargaining with a variable number of agents", Cambridge Books.
22. Thomson, W 2010, "Bargaining and the theory of cooperative games: John Nash and beyond", Edward Elgar Publishing.
23. Valenčík, R, Černík, O 2021, "The Inequality In Society And A Multipoint Extension Of Nash Bargaining Problem", *Economy & Business Journal*, vol. 15, no. 1, pp. 221-232.
24. Valenčík, R, Frank, B, Schulz, B 2022, "Conflict analysis tools in situations related to Nash bargaining problem", Eco*nomy & Business,* vol. 16, no. 1, pp. 293-305.
25. Vavra, P, Chang, LJ, Sanfey, AG 2018, "Expectations in the Ultimatum Game: distinct effects of mean and variance of expected offers", *Frontiers in psychology*, vol 9, p. 992.
26. Veblen, T 1899(1934), "The theory of the leisure class: an economic study of institutions", New York: The Modern Library.
27. Weiss, Y, Fershtman, C 1998, "Social status and economic performance: A survey", *European Economic Review*, vol. 42, no. 3-5, pp. 801-820.