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AN INVESTIGATION ON THE EFFECT OF PRIMING IN ECONOMIC GAMES

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Abstract: *The paper examines whether priming has an effect on offer sizes and acceptance in economic games. We examine the effect of priming for both dictator as well as ultimatum games. We prime the participants in economic games using a mathematical problem. The results show that the answer to the mathematical problem can have a direct impact on the offer size in dictator and ultimatum games and on the minimum acceptance threshold in ultimatum games. The results show that that offer sizes and acceptance thresholds can be affected by priming the participants. These show that the offer and acceptance behaviour of participants in economic games is malleable and these are subject to contextual variables.*

Key words: *Priming, Anchoring and Adjustment, Ultimatum Games, Behavioural Economics*

JEL Classification Codes: *D00, D01, A10*

INTRODUCTION

Economic games are often used to study economic behaviour. The two most common economic distribution games are Dictator Games (Kahneman, Knetsch, and Thaler, 1986) and Ultimatum Games (Guth *et al.* 1982). In a Dictator game (DG) a proposer gets an endowment and is asked to share a part of that endowment with a recipient. The recipient has no control over the amount that he/she is offered. The Ultimatum game (UG) works slightly differently, in this the proposer gets an endowment (say Rs. X) to share with a responder. The proposer has to make an offer (say Rs. C). If the responder accepted the offer, the proposer and responder share the money as per the offer, (proposer gets X-C and responder gets C). However, if the responder were to reject the offer, neither the proposer not the responder gets any money. As such, in UG the responders have the right to refuse and destroy the endowment and in the process exert indirect control over offer sizes. The settings of such economic games have been used to investigate fairness, inequity aversion etc (Guth *et al.* 1982).

Priming has been studied extensively in psychology to investigate whether the exposure to a particular stimulus has an effect on subsequent perceptions, evaluation, choices and decisions (Kamenica, 2012). It has been shown that priming consumers

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with words that are related to old age caused them to walk slower (Bargh, Chen, and Burrows, 1996). While there is evidence that priming can have important implications there has not been much research that has studied the impact of priming in economic decision making, specifically in the area of distribution games. The objective of this study is to investigate whether priming can impact participants' behaviour in economic distribution games.

PRIMING, ANCHORING AND ADJUSTMENT AND BEHAVIOR

The key findings on distribution games are that proposers tend to offer more than what the traditional assumptions of rational economic behaviour suggests. Moreover, the offer proportions tend to remain largely invariant across different stake sizes Andersen *et al.* (2011). We suggest that priming participants in economic games can impact the behaviour of the participants related to offer sizes and acceptances. One of the ways in which priming is said to work is that it provides an anchor from which people do insufficient adjustment (Kahneman, 2011).

Anchoring and adjustment heuristic (Tversky and Kahneman, 1974) has been used to explain a wide variety of phenomenon. The impact of anchoring and adjustment has been shown to affect consumer behavior in a number of contexts such as property pricing (Northcraft and Neale, 1987), bundle pricing (Yadav, 1994) etc. To the best of our knowledge, there is no empirical evidence on the impact of anchoring and adjustment in distribution games.

STUDY 1 – PRIMING IN DICTATOR GAMES

Experiment Design

The experimental design was 2 (High anchor/Low anchor) between subject design in a dictator game setting. Participants (n=54) from a management institute in western India participated in a study. The participants volunteered for a participation fee and a chance to make real money in the game. They were randomly assigned to one of the two experimental groups. Participants were given written instructions in which they were explained the rules of the dictator game. The participants were also paired with another 54 anonymous participants who acted as receivers in the dictator game. The endowment was kept at Rs. 100, i.e. the participants had to give the recipients out of 100 Rs.

Before the participants made they offer they were asked to solve a mathematical problem (refer to appendix 1). The problem was a quadratic equation, the equation was a perfect square and the answer was either a low (10) or a high number (40). The high anchor group got the problem, which had the answer 40, and the low anchor group got the problem, which had the answer 10. Next, the proposers were asked to indicate the amount that they would offer to the receivers. At the end of the study, payment was made to the participants.

RESULTS

The final sample only contained participants who were able to solve the problem correctly. Table 1 shows the descriptive statistics of the offers across the two treatment groups.

Table 1
Offer sizes in Dictator Games at different anchors

Anchor	*Number of Subjects*	*Mean*	*Standard Deviation*
Low Anchor	27	15.85	16.96
High Anchor	27	34.26	11.99

A t test indicates that there was a significant difference in the offer sizes across the high anchor and low anchor conditions The mean offer size for the high anchor condition ($M_{\text{High Anchor}}$ = 34.26, *SD* = 11.99) was significantly higher than the low anchor condition ($M_{\text{Low Anchor}}$ = 15.85, *SD* = 16.96), $t(52) = 4.60$, $p < 0.001$). The results indicate that the priming did have an impact on offer sizes. When the participants came up with a low answer (low anchor) the offer sizes were low, however when the answer was high, it resulted in high offer sizes.

STUDY 2 – ULTIMATUM GAMES WITH PROPOSERS

Dictator games are said to be a game of benevolence and are not strategic in nature, as such, it is likely that priming could have an impact on offers, as there is a lack of cognitive processing. However, UG is a game of strategy, they are likely to results in cognitive thinking, and that priming may not have an impact on UG offers. The objective of this experiment was to investigate whether priming participants with a high or a low anchor has an impact on offer sizes in a UG game.

Experiment Design

The experimental design was 2 (High anchor/Low anchor) between subject in a UG setting. Participants (n=62) from a management institute in western India participated in the study. The participants volunteered for a participation fee and a chance to make real money in the game. They were randomly assigned to one of the two experimental groups. The setup was similar to that in study 1 other than the fact that the instructions were that for proposers in an UG. The endowment was kept at Rs. 100, i.e. the participants had to give the recipients out of 100 Rs. The participants were paired with another 62 anonymous participants who participated in the game as responders. The responders were separately given the rules of the UG, and asked to indicate the minimum amount that they would accept (minimum acceptance threshold, MAT) any offer below the MAT would be refused.

Before the participants made they offer they were asked to solve a mathematical problem as in study 1 (see Appendix 1). After this, the proposers were asked to indicate the amount that they would offer to the receivers. The offers by proposers were randomly paired with the MATs from the responders and payments made as per the rules the same day.

Results

The final sample only contained participants who were able to solve the problem correctly. Table 2 shows the descriptive statistics of the offers across the two treatment groups.

Table 2
Offer sizes in Ultimatum Games at different anchors

Anchor	*Number of Subjects*	*Mean*	*Standard Deviation*
Low Anchor	31	33.52	20.54
High Anchor	31	43.55	11.20

At test indicates that there was a significant difference in the offer sizes across the high anchor and low anchor conditions The mean offer size for the high anchor condition ($M_{\text{High Anchor}}$ = 43.55, *SD* = 11.20) was significantly higher than the low anchor condition ($M_{\text{Low Anchor}}$ = 33.52, *SD* = 20.54), $t(60) = 2.38$, $p < 0.05$). The results indicate that even in a UG, the priming effect prevailed and this had an impact on the offers. UG offers are known be more strategic and hence it is assumed that offers are more rational than dictator games. Hence, there were doubts whether the priming would impact these. However, the results suggest that priming did impact the offers. A low anchor reduced the offer size whereas a high anchor increased the offer size.

STUDY 3 – RESPONDER BEHAVIOR

To test the robustness of the results we tested whether the priming had an impact on responder behaviour. To examine the impact on responder's behaviour we examined a subjects' minimum acceptance threshold (MAT) rather than the acceptance/rejections to specific offers. A subject's MAT is measured by asking them to indicate the minimum offer that they would accept from the proposer rather than a response to an actual proposal. The MAT approach has been used frequently in research on ultimatum games (Cappelletti *et al.* 2011; Munier and Zaharia, 2003). The advantage of this approach is that it allows us to observe responder's complete acceptance strategy rather than just the response to specific proposals (Güth and Tietz, 1990).

Experiment Design

The experimental design was 2 (High anchor/Low anchor) between subject in a UG setting. Participants (n=54) from a management institute in western India participated in the study. The participants volunteered for a participation fee and a chance to make real money in the game. They were randomly assigned to one of the two experimental groups. Participants were given written instructions as a responder in a UG. They were told that they are being paired with an anonymous participant who was a proposer. They were instructed that if the proposer offered an amount lower than what was the minimum acceptable to them, neither the proposer nor the responder would get any money. On the other hand, if the proposer's offer were more than the minimum that they were willing to accept, the money would be divided as per the proposer's offer. The endowment was kept at Rs. 100 as in the earlier studies. The participants were paired with another 62 anonymous participants who participated in the game as proposers. The proposers were given the rules of the UG, and asked to indicate their offers. Similar to studies 1 and 2, the participants solved a quadratic equation before indicating their MAT. The MATs by responders were randomly paired with the offers from the proposers and payments made as per the rules the same day.

Results

The final sample only contained participants who were able to solve the problem correctly. Table 3 shows the descriptive statistics of the offers across the two treatment groups.

Table 3
Responder's Minimum Acceptable Thresholds

Anchor	*Number of Subjects*	*Mean*	*Standard Deviation*
Low Anchor	31	28.52	22.08
High Anchor	31	39.45	13.71

A t test indicates that there was a significant difference in the offer sizes across the high anchor and low anchor conditions The mean offer size for the high anchor condition ($M_{\text{High Anchor}} = 39.45$, $SD = 13.71$) was significantly higher than the low anchor condition ($M_{\text{Low Anchor}} = 28.52$, $SD = 22.08$), $t(60) = 2.34$, $p < 0.05$). The results reiterate the support for the impact of priming on participants' behavior. It is obvious that it is possible to alter the behaviour of proposers as well responders in a UG.

DISCUSSION AND CONCLUSION

This research through a series of three studies establishes the role of priming on the behavior of participants in economic distribution games. Study 1 showed that when participants were primed with a high anchor they offered higher money to the receivers than when they were primed with a low anchor. Study 2 showed that this effect also prevails in an Ultimatum game, which by nature is more strategic. Though the offers were more strategic and larger than in a dictator game, they were influenced by priming. High anchors resulted in higher offer sizes than low anchors. Finally, study 3 shows that even the responders are influenced by priming and their minimum acceptance thresholds are affected by priming. Low anchors results in low acceptance thresholds whereas high anchors result in high acceptance thresholds. Overall, the results provide a conclusive support for the effect of priming on behaviour of participants in economic distribution games. This research for the first time shows that priming participants with an irrelevant number can impact offer sizes. It shows that numbers irrelevant to the analysis can have a major impact on behaviour of participants in games and by extension on real life negotiations.

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Appendix 1

High Anchor

Find unique value of x from the following algebraic equation: (rough work can be done on back side)

$$1=\frac{(x-40)(x+61)+100}{(x+60)}$$

Answer: x = ☐

Low Anchor

Find unique value of x from the following algebraic equation: (rough work can be done on back side)

$$1=\frac{(x+91)(x-10)+100}{(x+90)}$$

Answer: x = ☐