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Equal Splits or Product Prices: An Experiment

Håkan J Holm*and Emma Svensson†

Abstract

This paper compares the choice of focal points in a Nash Demand Game embedded in an abstract frame with the corresponding choices in a game with a real product frame where parties bargain for a well-known consumer product. We find that the frame has a substantial impact on the fraction of subjects choosing the equal split outcome casting doubt on the robustness of this solution in bargaining over real goods. The paper shows that there is notable heterogeneity among subjects with regard to their choices of focal points and reports individual characteristics predicting these choices.

Keywords: focal points; Nash Demand Game; heterogeneity; framing; equilibrium selection

JEL classification codes: C91; D03; D84

1 Introduction

There is strong theoretical support for the equal split solution in a symmetric Nash Demand Game (NDG). It can be motivated from axiomatic bargaining theory (Nash, 1953), from efficiency and equity principles (see Myerson, 1991, Fehr and Schmidt, 1999 and Bolton and Ockenfels, 2000). The equal split solution also gets strong empirical support in various experiments (see Roth, 1995 and Camerer, 2003), and has even been observed more frequently than what is predicted by the Nash bargaining solution (e.g. Nydegger and Owen, 1974, Roth and Malouf, 1979, Anbarci and Feltovich, 2013). By manipulating the frame this paper demonstrates however that the equal split solution is more fragile

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than previously thought. This effect is specifically interesting because it means that mere changes in the description of the game that do not change the underlying game alter players' decisions.

We do not claim to be the first to show that the equal split solution can be affected by the frame in an NDG. In particular, Mehta et al. (1992) find that randomly dealt aces from a reduced deck of cards affect the distribution of surplus in an NDG. This type of artificially induced entitlements has also been shown to have effects in other types of bargaining games (see e.g., Gächter and Riedl, 2005)¹. What is novel in this paper is that we introduce an aspect that is often present in real bargaining contexts, namely a product with a known reference price. This also means that we introduce one natural aspect of the field content in an experiment and thereby add insights into how robust laboratory outcomes building on abstract frames are to situations where parties typically have some information about historical prices (see Harrison and List, 2004). We also take the research further by investigating individual characteristics to learn whether people differ in this respect in how they react to the frames.

In our baseline treatment, we let buyers and sellers make bids and asks for a hypothetical good. In this treatment, the equal split is the only focal point, so there are no reasons why players should deviate from a 50-50 split. In the other treatment, we let buyers and sellers make bids and asks for a liter of milk, which is a product with a well-known market price for the subject pool thus inducing an additional focal point. We suggest a simple separation mechanism based on heterogeneity among subjects to understand the choice of focal point. While one group views the product as an addition to the surplus to divide and therefore chooses the commonly observed *equal split* in both the hypothetical treatment and in the milk treatment, the other group consists of those who are sensitive to the presence of the *product* and therefore chooses equal splits in the hypothetical treatment and the price of the product in the milk treatment.²

The separation of these two groups further allows us to distinguish if there are characteristics that are distinct for the subjects belonging to a specific group and we propose that these two groups can be seen as the outcome of a combination of factors.³ For example, what subjects choose may depend on

¹In particular, Roth and Schoumaker (1983) and Binmore et al. (1993) induce focal points by letting subjects pre-play with computers programmed to demand a specific division. They find that these induced focal points affect how much subjects demand of the surplus when they later play a human opponent.

²A related reason for why players opt for the milk price is that it is a reference price. Kahneman, Knetsch and Thaler (1986) show in a much-cited paper that people have reference prices/transactions that they use as benchmarks to assess whether a firm/employer/landlord act fair or not. These reference prices depend on factors such as observed historic prices, costs, competitor's costs (see Xia et al. 2004, Ferguson, 2008). Thus, players may choose this price because they think that it is a fair price and expects that others do the same.

³We do not attempt to provide general rules of focal point selection. Instead, we try to understand the reasons behind a particular choice which should prove useful in situations where two or more rules can be applied (see e.g. Mehta et

what attributes that come to subjects' minds in a given situation (see Bacharach, 1993, Bacharach and Bernasconi, 1997). We approach this issue by testing a number of factors that are related to subjects' characteristics, such as cognitive sophistication, and others that are related to how strong the frame is for a subject, such as self-serving bias (Babcock et al., 1995, 1997, Konow, 2000).

The result strongly suggests that both sellers and buyers do in fact choose different focal points in the milk treatment but not in the hypothetical treatment. These multiple focal points have detrimental effects on transaction volumes. This result remains when subjects first play the hypothetical treatment and then the milk treatment. In addition, the choice of focal point seems to be self-serving, which means that buyers are more inclined to believe that sellers will choose the milk price than sellers are. We also find that some individual characteristics make it more likely to choose the milk focal point. First, subjects with a low score on a cognitive reflection test are more likely to choose the milk price than subjects with high scores in the same test. This indicates that it requires some cognitive sophistication to focus on the underlying game. Second, high consumption of milk increases the likelihood of choosing the milk price. This result suggests that the choice of focal point may depend on availability of attributes (see Bacharach and Bernasconi, 1997). Finally, there is some evidence that open-minded subjects are less likely to choose the milk price, which suggests that the tendency to think in abstract terms plays a role in the choice of focal point.

Together, these results imply that the search of general rules in how people choose focal points needs to take into account that there are behavioral differences between subjects, and that part of these differences are due to subjects' characteristics and others are due to the context. In addition, the results suggest that experiments building on abstract frames may be misleading for understanding bargaining outcomes in real markets, where buyers and sellers typically have some idea of the price of the product or service.

2 The Game and Hypotheses

This section starts by specifying the Nash demand game and the underlying mechanism behind separation in the context of the game. It then outlines hypotheses and factors that might be important in

al. 1994a). For studies that investigate rules or principles of focal point selection in abstract settings or in theoretical frameworks see e.g. Bacharach (1993), Sugden (1995), Bacharach and Bernasconi (1997), Bacharach and Stahl (2000), Casajus (2000), Janssen (2001), Mehta et al. (1994a), Isoni et al. (2013).

explaining separation.

2.1 Separation

In the Nash demand game studied here, a buyer and a seller simultaneously submit non-negative bids, $p^b, p^s \in [0, 100]$, for a good with value $v \geq 0$ to the buyer. If $p^b \geq p^s$, then there is a transaction and the buyer receives the good and the payoff $100 - p + v$, where 100 is the sum the buyer has in her budget and p is the price which is given by $p = (p^b + p^s)/2$.⁴ If $p^b < p^s$ there is no transaction and both players receive zero, which means that the seller does not keep the milk.⁵ In this game there are many equilibria. If we concentrate on the set of pure Nash equilibria, this set is given by $p^b = p^s$, and $(p^b = 0, p^s = 100)$. The Nash bargaining solution is given by $p = (100 + v)/2$ (Nash, 1953).⁶

When this game is presented in the context of a hypothetical good (H-treatment) with $v = 0$, the 50-50 focal point dominates since there is no actual good for which the subjects may have priors for. In this treatment, we therefore expect that bids will center around 50, where buyers put in a somewhat higher bid to secure a transaction and sellers, for similar reasons, put in a somewhat lower bid.

In a parallel treatment, we replace the hypothetical good with one liter of milk (M-treatment), a good with a well-known market price which was around 8 at the time of the experiment. Thus, we induce a competing focal point and hypothesize that some subjects will focus on how to divide the available surplus and therefore choose *equal splits*, i.e. bid around 50, and that others will focus on the *product*, i.e. on buying and selling milk for the given market price which is around 8.^{7,8} As in the H-treatment, one can expect that buyers put in a somewhat higher bid to secure a transaction and sellers put in a somewhat lower bid for the same reasons. We state our separation hypothesis as follows:

Hypothesis 1: Buyers and sellers will separate in the M-treatment, but not in the H-treatment.

⁴All numbers here refer to Swedish crowns (SEK), which at the time of the experiment was 0.14 USD.

⁵The disagreement point (0,0) is common in Nash demand games, and since the seller does not keep the good, we minimize endowment effects.

⁶Risk preference affects the solution theoretically and we will return to this issue in section 2.3.

⁷To ensure that subjects were familiar with the price of milk, we elicited how much they thought a liter of milk cost at the closest general dealer. 98 percent guessed a price between 6 and 13. The modal price guess was 8.

⁸If subjects take the value of the product into account when they divide the surplus in the M-treatment, the equal split should be marginally higher. However, whether they do or not is ultimately an empirical question and since the valuation of milk is relatively low, we disregard from it in this theoretical presentation.

It should be noted that our distinction between the two groups does not explicitly rely on beliefs. Recent research indicates that differences between subjects ability to think strategically, i.e. levels of reasoning, may affect whether subjects take beliefs about how other subjects perceive the situation into account (see e.g. Bardsley et al. 2010). Thus, the actual bid given by a subject is the result of a process that, more or less, includes beliefs. We elicit what subjects believe their opponents will choose, on average, to evaluate how the induced focal point affects subjects' perception of the situation.

2.2 Experience and Self-Serving Bias

It is possible that lack of understanding of the strategic situation can explain why some focus on the *product*. If this is the case, one would expect subjects to realize the nature of the situation after playing the H-treatment once, and therefore avoid bidding around the milk price in a subsequent M-treatment. This would also make the *product* strategy less robust. Hence, our next hypothesis is as follows:

Hypothesis 2: Strategic experience obstructs separation.

In the M-treatment we deliberately try to induce competing focal points, where the outcome is affected by how subjects perceive the bargaining situation. Various economic experiments have observed that subjects suffer from self-serving biases, i.e. they think that an outcome that is favorable to them is more likely to occur (see e.g. Babcock et al., 1995, 1997, Konow, 2000). Babcock et al. (1997, p.111) conclude that "This research suggests that self-serving assessments of fairness are likely to occur in morally ambiguous settings in which there are competing "focal points" – that is, settlements that could plausibly be viewed as fair". In the M-treatment subjects can "choose" to believe that others perceive the situation in the same way as they do. It is a small step to realize that believing in the *product* frame is relatively more beneficial to buyers than to sellers. For buyers, focusing on the *product* will result in the tempting self-serving belief that sellers will offer low prices. For sellers on the other hand, believing in the *product* strategy is costly, and they might therefore be more inclined to believe that buyers will focus on *equal splits*. Thus, the self-serving bias will make the buyers' beliefs about their opponents more responsive to the opportunity to (unconsciously) exploit the milk focal point in the M-treatment as a vehicle for price reductions.

Hypothesis 3: The treatment differences in beliefs will be more pronounced among buyers than

among sellers.

2.3 Factors Affecting Individuals' Choice of Focal Point

To explain the individual variation when there are competing focal points, we study variables that predict subjects' bids in the M-treatment. Some of these variables are related to the strength of the frame for the subject, such as which role she is assigned and her relation to the product, and others are related to a subject's characteristics.

The first group of variables are denoted experimental control. These include the role that the subject have and the order of play. To start with, the role *Buyer* can affect bids. The self-serving mechanism suggests that buyers are more attracted to the milk price. On the other hand, for tactical reasons, buyers should submit higher bids, at a given focal point, than sellers to secure a transaction. Thus, these two mechanisms may counteract each other. Irrespective of this, the role of the subject is potentially important and needs to be controlled for in our analysis. Another experimental control variable is experience. If the *product* strategy is due to lack of understanding of the strategic aspects of the game, one can expect that such a strategy will be more common among subjects who play the game for the first time, i.e. in *Period 1*, than among those who have played the hypothetical game before playing the M-treatment.

Factors related to milk consumption may also affect how attracted to the milk subjects are. First, the level of subjects' milk *Consumption* may be related to how deeply the market price is imprinted and thereby be the first thing that springs to the subjects mind. Thus, it can therefore be more difficult for a subject to think of other ways of perceiving the situation. Secondly, a subject's *Valuation* of milk may affect what she bids.

Recent research indicates that individuals' tendency to anchor is related to cognitive factors. Bergman, Ellingsen, Johansson and Svensson (2010) demonstrate that subjects' tendency to anchor their valuations of consumer goods to irrelevant factors is negatively correlated to cognitive ability and cognitive reflection.⁹ To control for the latter we include the outcome of the *CRT*-test which is designed to pick up reflective versus impulsive decision-making (see Frederick, 2005).¹⁰

⁹The tendency to anchor on seemingly irrelevant factors was first demonstrated by Tversky and Kahneman (1974). In an influential study, they showed that subjects' estimations of the number of African countries in the UN are affected by a random number generated by a fortune wheel.

¹⁰Due to the number of variables included in the experiment, we only control for cognitive reflection, which is a short test of three questions. These questions are designed so that the answer that first comes to mind is incorrect and the

Other variables that are related to subjects' characteristics are bargaining attitude and risk preference. Subjects that have an aggressive bargaining attitude may bid a higher price as sellers and a lower bid as buyers. Thus, aggressive types will have a higher *Surplus Demand* than less aggressive types. In addition, risk attitude has implications in many game theoretic models of bargaining, and there is also some empirical evidence that this is the case (see e.g., Murnighan et al., 1988). It is therefore natural to control for *Risk aversion*.

We also include demographic variables: *Male*, *Income* and *Age*, without any strong prior expectations, but their inclusion can be justified by prior research or by economic theory. For instance, Croson and Gneezy (2009) claim that there is robust experimental evidence of gender differences in risk preferences, social preferences and in preferences for competition. All these dimensions may affect the bargaining game in this study. In relation to the age variable, Güth, Schmidt and Sutter (2007) detected, in a large newspaper ultimatum experiment, that older subjects are more concerned with equal distribution than younger ones. The income variable can be justified on many grounds. For instance, income might affect the motivation to make an optimal choice in the experiment or the local curvature of the utility function and thereby the degree of risk-aversion.

Finally, we include a set of variables that we find interesting to explore and for which we do not have any strong prior expectations. We ask if there are specific personality traits, such as being an open-minded person, or other sociological factors that are related to choosing a particular focal point. To this end we use a personality test based on the Five Factor Model (FFM), a popular model in psychology, which maps the basic structure of all personality traits (see e.g. Goldberg, 1993).¹¹ To limit the number of statements that the subjects have to consider about their character in this test, we exclude some of the facets of the FFM and include the following: *Morality*, *Cooperation*, *Altruism*, *Modesty*, *Sympathy*, *Trust*, *Intellect*, *Liberalism*, *Dutifulness* (moral obligation) and *Cautiousness* (the disposition to think through possibilities before acting). In the personality test we also include a *Self monitoring* scale that measures how much an individual tries to adapt to what the situation requires. A low self-monitor acts on feelings while a high self-monitor is sensitive to the environment (Snyder, 1974).¹² Thus, we expect that a high self-monitor considers that she is in the laboratory and correct answer requires cognitive reflection.

¹¹The personality test statements are available on a public domain webpage, The International Personality Item Pool (IPIP), www.ipip.ori.org along with instructions and scoring keys. Swedish translations for the statements come primarily from Martin Bäckström's online personality test lab www.pimahb.com.

¹²Self-monitoring has previously been correlated with differences in advertisement and willingness to pay for a product

therefore focuses on dividing the surplus equally. The final set of exploratory variables relates to the individual's degree of social activity and includes the number of friends, *Contacts*, and *Time* spent on social networks such as Facebook.

3 Experimental Design

We ran the experiments in five sessions at Lund University on May 5-7, 2010. The 126 students that participated were recruited during lectures in the introductory course in Economics. Four written experimental forms were handed out separately and we collected every form before proceeding with the next one.¹³

The students were divided into four groups; seller and buyer in the M-treatment, and seller and buyer in the H-treatment. To create these groups, we split the classroom into four equal sizes with one group in each corner of the classroom. The students were informed that they would be matched against an anonymous opposite (buyer if seller, seller if buyer) and did not know the division in the classroom. After a verbal introduction of the general purpose of the experiment, the students received written information, an identity note and instructions for the first part of the experiment. Each identity note had a unique number that the students wrote on all parts of the forms so as to remain anonymous. They also used the identity note to collect their earnings a few days after the experiment.

After reading the instructions, the students played the Nash demand game by writing down a selling price or a buying price. They also stated how much they believed that their opponent group (e.g. sellers if the subject was a buyer) would sell/buy the good for. This belief elicitation was incentivized by rewarding subjects with respect to how close their guesses were to the average opponent's bid.¹⁴ After all the subjects had completed this first part, we collected all the forms except for the identity note. The subjects did not receive any information about the outcome of the game, i.e. the market price and whether the transaction was successful or not, and they did not know that they would play two games in a row but with different goods. For the second round of the game, the sellers and buyers switched goods (e.g. a seller in the M-treatment became a buyer in the H-treatment) and we repeated

(Snyder and DeBono, 1985). The self-monitoring scale also comes from the IPIP website.

¹³Instructions and transfer forms are available in Appendix B.

¹⁴It is well-known that, in theory, belief elicitation might trigger a hedging problem. However, unless the hedging opportunity is very prominent, it seems to be a minor problem (see Blanco et al., 2008). We therefore prioritized simplicity in the belief elicitation task.

the same game with these switched goods and collected the forms once they were filled in.

The third part of the experiment consisted of elicitation of valuation of milk, familiarity with the actual price of milk at the present time, risk preference, bargaining attitude and the cognitive reflection test. To elicit how much every subject valued milk, we used a list of decisions between a liter of milk and an increasing sum of money. We also asked what they thought was the highest price others would pay for milk in the valuation task, and how much one liter of milk cost at the closest general dealer. We elicited risk preference through a multiple price list (see Binswanger, 1980, and Holt and Laury, 2002). To elicit bargaining attitude, we used a scenario where the subject had to decide on how to split a taxi fare with an old classmate, and the length of the taxi ride was randomly varied across the four treatment groups. The final part of the experiment consisted of the personality test and a questionnaire on demographics, milk habits and social activity information on the students. The students handed in this part once they had completed the questionnaires and left the classroom.

The experiment lasted about 60 minutes and average earnings were 200 SEK (\approx \$26), to be compared with 120 SEK (\approx \$16), which at the time of the experiment was the average hourly pay for this age group in Sweden. Every subject received a 50 SEK show-up fee.

Table 1: Sequence of Play

No. subjects	31	30	31	31
Role	Seller	Buyer	Seller	Buyer
	↓	↓	↓	↓
Period 1	M-treatment		H-treatment	
	↓	↓	↓	↓
Period 2	H-treatment		M-treatment	
	↓		↓	
	Elicitations, Personality test, Questionnaire			

4 Results

This section presents the results from the experiment based on the hypotheses and discussion in section 2.

4.1 Separation

Our first result concerns the separation in the choice of focal point. According to Hypothesis 1, we expect that bids in the H-treatment center around the equal split, i.e. around 50, and hence no

separation. In contrast, in the M-treatment we expect separation with some bids around the milk price, 8, and some bids around the equal split.

Figure 1 shows the distribution of the first round. The data clearly supports Hypothesis 1. In the H-treatment prices are set around 50 with somewhat higher bids submitted by buyers compared to sellers, possibly to secure the transaction. In the M-treatment, there is a clear indication of separation since the distributions are double peaked with a substantial mass below 30. Thus, both buyers and sellers in the M-treatment submit lower prices. The average prices among sellers are 41.5 and 51.3 in the M-treatment and H-treatment, respectively. The corresponding figures among buyers are 37.2 and 59.3. A robust rank test rejects ($p=0.023$, $n=62$ for sellers and $p=0.0005$, $n=61$ for buyers) that the distributions come from the same underlying price distribution.¹⁵

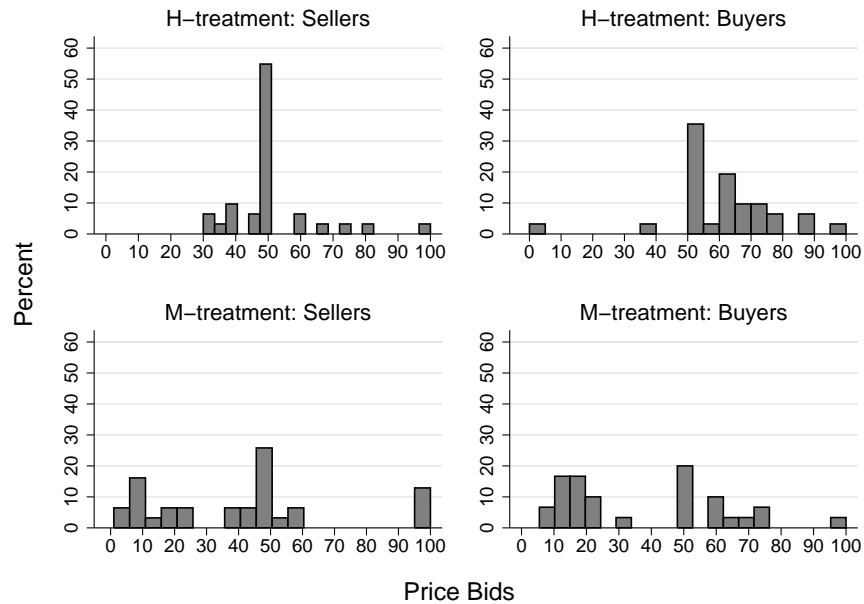


Figure 1: Distribution of Buyers' and Sellers' Price Bids in H-treatment and M-treatment in Period 1

The presence of two focal points in the M-treatment also causes significant losses in transactions. Only 48 percent of all possible transactions take place in the M-treatment compared to 81 percent in the H-treatment and this difference is highly significant (Chi-square test, $p=0.008$, $n=62$ in period 1).

¹⁵A robust rank test is used since the variances differ in the two treatment distributions due to separation (see Siegel and Castellan, 1988, p.137). The distributions for the groups in Figure 1 verify this conjecture.

4.2 Experience

We now investigate if the experience of having played the game once affects bids. By inspecting the distributions in Figure 2, the first thing to note is that the double peaked distributions in the M-treatments and the single peaked ones in the H-treatments remain. Hence, we cannot confirm Hypothesis 2, since separation seems to be robust to experience.

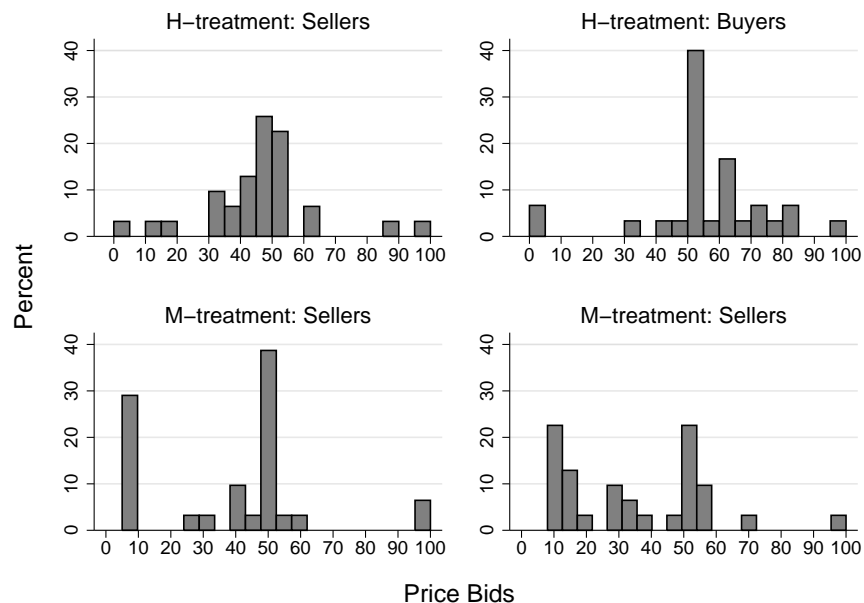


Figure 2: Distribution of Buyers' and Sellers' Price Bids in H-treatment and M-treatment in Period 2

If we look at how the different groups change their behavior in Table 2 we find that sellers who move from the M-treatment to the H-treatment increase their average bid from 41.5 to 45.1, while sellers who move from the H-treatment to the M-treatment decrease their bids from 51.3 to 38.6. Hence, there is a tendency that the M-treatment generates the lowest prices (independently of the order). A within-subject analysis of proportion of sellers who change bids from the H-treatment to the M-treatment (irrespective of order) confirms this supposition. 26 sellers have lower bids in their M-treatment and 12 sellers have higher bids (while 24 do not change their bids).¹⁶ We can reject the null hypothesis that the probability of increasing a bid is equal to the probability of lowering a bid in the two treatments (two-sided, Wilcoxon signed-rank test, $n=62$, $p=0.0179$). This suggests that the

¹⁶In the group that first received the M-treatment, 13 increased (7 decreased) their price in the following H-treatment. In the group receiving the H-treatment first, 13 decreased (5 increased) their price in the following M-treatment.

average sellers change their behavior to have their lowest bid in the M-treatment. Thus, a substantial fraction of the sellers are malleable to the change in the frame.

We now move to the group of buyers. In the second period, the average prices set by the buyers in the M-treatment and the H-treatment are 34.9 and 53.9, respectively. If we also look at the changes in behavior, we find that buyers moving from the M-treatment to the H-treatment increase their average bid from 37 to 53.9. Those who move from the H-treatment to the M-treatment decrease their bids from 59.3 to 34.9. A within-subject analysis of the proportion of buyers who change bids from the H-treatment to the M-treatment (irrespective of order) reveals that 36 subjects have lower bids in their M-treatment and only 9 subjects have higher bids (while 16 do not change their bids).¹⁷ Here, we can also reject the null hypothesis that the probability of increasing a bid is equal to the probability of lowering a bid in the two treatments (two-sided, Wilcoxon signed-rank test, $n=61$, $p=0.000$). This strongly suggests that, even with some experience, buyers move in the direction of decreasing (increasing) their bids in the milk (hypothetical) treatment. A substantial proportion of buyers adapt to the change in the frame.

Table 2: Average Prices in the Treatment Groups in Period 1 and Period 2

Role	Seller	Buyer	Seller	Buyer
Period 1	↓ (41.5) M-treatment	↓ (37)	↓ (51.3) H-treatment	↓ (59.3)
Period 2	↓ (45.1) H-treatment	↓ (53.9)	↓ (38.6) M-treatment	↓ (34.9)

In addition, the pervasive effect on transaction volumes due to two focal points remains. The proportion of transactions in the M-treatment is still 48 percent but falls slightly to 74 percent in the H-treatment. However, the difference remains significant (Chi-square test, $p=0.037$, $n=62$).

4.3 Self-Serving Beliefs and Expected Payoffs

According to Hypothesis 3, we should observe a more substantial treatment effect among buyers than among sellers if subjects form self-serving beliefs about their opponents' choice of focal point since buyers benefit from coordinating on the milk price. This is indeed also the case. In the first period,

¹⁷In the group that first received the M-treatment, 15 increased (5 decreased) their price in the following H-treatment. In the group receiving H-treatment first, 21 decreased (4 increased) their price in the following M-treatment.

the average buyer's beliefs of the average seller bid are 26.2 and 54.8 in the M-treatment and H-treatment, respectively. This gives a treatment difference in average belief of 28.6. The corresponding average beliefs among sellers, also in the first period, are 50.0 and 54.1, which gives a treatment difference of only 4.1. In the second period almost equally strong figures can be observed.

By inspecting how much the individual subjects change their beliefs between the treatments, we get an indication of whether there is a significant difference between sellers and buyers in how they react to the treatment differences. In Figure 3, we give the individual belief differences (H-treatment belief minus M-treatment belief) for buyers and sellers. The null hypothesis that the distributions of these differences come from the same underlying distribution can be strongly rejected (two-sided, Wilcoxon-Mann-Whitney test, $n=122$, $p=0.0002$). These results support Hypothesis 3, i.e. there is a self-serving bias present. Subjects' judgements of their opponents' choice of focal point thus depend on whether they act as a seller or a buyer.

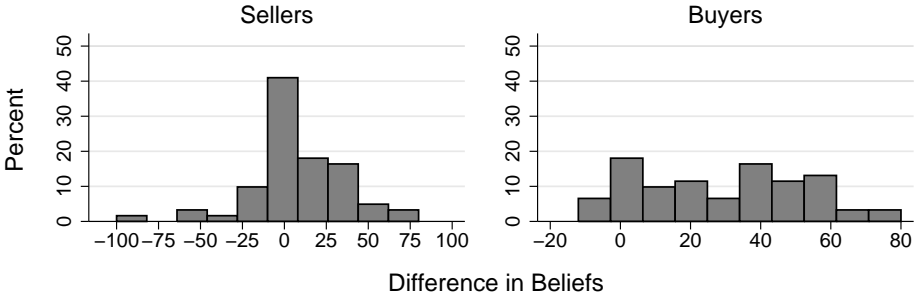


Figure 3: Individual Differences in Beliefs Between H-treatment and M-treatment

These role contingent treatment differences in beliefs also come through in actual bids. The average differences between the M- and H-treatment in the first period are 22.3 among buyers and 9.8 among sellers. In the second period, the differences are 19 and 6.5, respectively. The distributions of how the individual subjects change their prices also indicate that there is a significant difference between sellers and buyers. The null hypothesis that the distribution of these differences comes from the same underlying distribution can be rejected (two-sided, Wilcoxon-Mann-Whitney test, $n=123$, $p=0.039$).

It is also instructive to look at the expected payoff of different buyer and seller bids in Figure 4. The expected payoff curve indicates the best-responses against the observed bid distributions. In the H-treatment, the expected payment increases in seller prices up to around 50, where it drastically

decreases. For buyers, the expected payoff for low bids is zero but increases rapidly as prices get closer to 50 after which the price decreases. Disregarding from some small notches, the curves in the H-treatment are single peaked with best-responses around 50. Around 50, the curves have steep parts suggesting that players are punished rather severely when they deviate from the focal point.

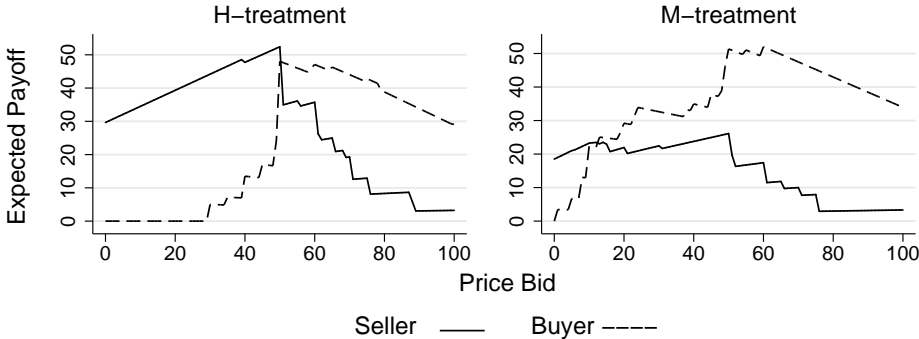


Figure 4: Expected Payoff of Various Bids for Buyers and Sellers in the H-treatment and M-treatment

The corresponding curves in the M-treatment are flatter. One remarkable difference between the buyers' curve in this treatment compared to the buyers' curve in the H-treatment is that the expected value rises steeply already for low values. This reflects the fact that some sellers will accept low bids with very beneficial prices to buyers. Even if low bidding buyers are relatively generously rewarded with a local maximum around 23, the global maximum is around 50. Sellers' curve in the M-treatment is even flatter than the buyers' curve which illustrates the following dilemma: If sellers bid around the market price for milk, 8, the probability for a transaction will be high, but the price will be low. On the other hand, if they increase their bids above the market price they will get a higher price but encounter a relatively low probability that it is accepted due to *product* buyers. Thus, the flat seller curve with a local maximum around the market price for milk gives a rationale for the reluctance to deviate from the milk price that a seller may experience.

4.4 Choosing Focal Point

In this section we further explore individual differences with respect to the chosen focal point. Those subjects that focus on the *product* bid around price of milk, i.e. around 8, in the M-treatment and around 50 in the H-treatment while those subjects that focus on the *equal splits* bid around 50 in both treatments. Allowing for some noise and the strategic uncertainty that buyers need to set a price

not lower than the seller, we classify bids between 5 and 25 as bids around the milk price and bids between 26 and 75 as equal split bids. The few bids below 5 and above 75 are excluded from the analysis.¹⁸ According to Hypothesis 1, there should only be bids between 5 and 25 in the M-treatment since there is no competing focal point in the H-treatment. Table 3 contains the distribution of the two groups of bids in all treatments and confirms that Hypothesis 1 holds very well except for two bids in one H-treatment. Thus, to study individual differences we rely exclusively on the behavior in the M-treatment and we use the bids between 5 and 25 in as *product* bids and bids between 26 and 75 as *equal splits* bids.

Table 3: Number of Bids as between 5 to 25 and 26 to 75 (in parentheses): All Treatments

	M-treatment	H-treatment
Seller 1st period	15 (10)	29 (0)
Seller 2nd period	19 (10)	26 (2)
Buyer 1st period	14 (15)	27 (0)
Buyer 2nd period	18 (12)	25 (0)
Total	66 (47)	107 (2)

We use a logit regression analysis on these observations where the chosen focal point is the dependent variable ($product = 1$, $equal\ splits = 0$). We include several categories of variables to investigate the determinants behind a subject’s choice (see section 2.3). These include variables relating to: i) experimental control, ii) demographics iii) risk behavior iv) milk consumption v) cognitive reflection vi) personality traits, vii) social activity. Descriptive data for our sample is presented in Table 5 in the Appendix 6.

Our estimation strategy is to include i)-ii) as control variables and then test variables iii) to v) first since these variables can be motivated either by theory or by earlier research. We then separately explore the vi)-vii) variables with the variables that are significant in the first part of the analysis. In this way we reduce the problem of overfitting.

Equations 1 and 2 in Table 4 show that neither the experimental controls nor the demographic variables strongly predict *product*. Only *Male* is significant but at the 10 percent level. We can also see in Equation 2 that *Surplus Demand*, *Risk Aversion* and *Valuation* do not have any significant predictive power but cognitive reflection, as measured by *CRT*, is significantly and negatively associated with

¹⁸In total there are ten observations that fall outside the range of these two classifications.

Table 4: Logistic Regression of Choice of Focal Point

Explanatory Variables	Eq. 1	Eq. 2	Eq. 3	Eq.4	Eq.5	Eq.6
INTERCEPT	1.30 (0.585)	1.074 (0.725)	0.178 (0.674)	0.597 (0.775)	0.133 (0.933)	2.733 (0.018)
I. Experimental control						
Buyer	0.324 (0.419)	0.242 (0.592)				
Period 1	0.295 (0.462)	0.38 (0.406)				
II. Demographics						
Male	-0.719* (0.075)	-0.808* (0.089)				
Income	-0.0034 (0.334)	-0.0015 (0.670)				
Age	-0.062 (0.579)	-0.076 (0.536)				
III. Bargaining attitude						
Surplus Demand		0.0034 (0.690)				
IV. Risk attitude						
Risk aversion		0.0198 (0.872)				
V. Cognitive reflection						
CRT		-0.512** (0.023)	-0.607*** (0.002)	-0.536*** (0.010)	-0.579*** (0.005)	-0.569*** (0.005)
VI. Milk consumption						
Consumption		0.256* (0.052)	0.274** (0.019)	0.306*** (0.010)	0.317*** (0.009)	0.287** (0.014)
Valuation		0.066 (0.383)				
VII. Personality traits						
Morality				0.237 (0.338)		
Modesty				0.259 (0.268)	0.036* (0.094)	
Intellect				-0.298 (0.182)		
Liberalism				-0.333 (0.130)	-0.039* (0.068)	
Openness						-0.054** (0.017)
No. of observations	110	102	112	112	112	112
Significance of model:						
P-value (Prob > chi2)	0.303	0.064	0.0013	0.0010	0.0005	0.0002

P-values in parentheses. The Pearson correlation coefficients between the explanatory variables are below 0.35 for all correlations. Estimates of the variance inflation factors (VIFs) are no higher than 1.25. Thus, these measures do not indicate any serious multicollinearity. Tests for heteroscedasticity using a heteroscedastic probit regression in Stata on equations 5 and 6 show no significant improvement of generalizing the homoscedastic model. We only test these two as omitted variables also can cause heteroscedasticity (Cameron and Trivedi, 2009). Finally, robust standard errors do alter the results in any of the above equations.

product. This is also the case with *Consumption*, which is weakly significant and has the expected sign. A Wald test shows that the insignificant variables in Equation 2 are also jointly insignificant ($p=0.928$).¹⁹ *Male* becomes insignificant when we remove the insignificant variables leaving *CRT* and *Consumption* significantly correlated to the *product* as presented in Equation 3.²⁰

We also want to explore if psychological and sociological variables, as measured by the personality trait indicators and social activity indicators, can help explain who responds to the product. Given the number of variables to explore and that some of them (primarily the personal trait variables) are correlated, we apply the strategy of picking out the variables that are significantly correlated to the dependent variable at the 10 percent level and we then test them separately in a model with the variables in Equation 3. From the correlations we find that *Morality* (0.25), *Modesty* (0.20), *Intellect* (-0.22), *Liberalism* (-0.24), and the aggregate facet *Openness* to experience (-0.31) are all significantly correlated to *product*.²¹

These correlations all make some sense. It is possible that moral individuals are more prone to react to prices that deviate from their historic or normal price than less moral individuals. If following moral principles is to rely on some form of behavioral rigidity, then since almost everyone has accepted the market price of a common good like milk, deviations from it may be morally provoking. *Modesty* also makes sense if one believes that choosing something other than the "normal" price can be regarded as immodest and challenging. That intellectual orientation is negatively correlated to responding to the *product* seems to follow the same logic as the CRT-score, which also is negatively correlated to *product*. *Liberalism* represents a willingness to question conventions and traditional values, and a liberalist attitude is that most things should be allowed if the involved parties agree on it. Thus, when the milk price is thought of as something that is conventional or "normal", then it is reasonable that a liberalist attitude is negatively related to *product*. Finally, *Openness* is negatively correlated with *product*. This is not surprising as it consists of *Liberalism* and *Intellect*, and since it also is an indicator of the ease of thinking in abstract terms.^{22,23}

¹⁹We use a Wald test as there are missing observations for some of the variables.

²⁰A Wald test also shows that *Male* and *Valuation* are jointly insignificant and jointly insignificant with the other insignificant variables in Equation 2.

²¹We use the biserial correlation coefficient that estimates the correlation between a binary variable with an underlying normal distribution and a continuous normally distributed variable.

²²To interpret the personality test scores we use a narrative provided by Johnson (2010).

²³As we limited the number of facets due to time constraint, we have only two of the six facets in this aggregate. However, this facet can still give us an indication of cognitive openness. Openness and CRT are not significantly correlated even if they move in the same direction and therefore capture different cognitive aspects.

In Equation 4 we include the four non-aggregate personality variables. Although none of them are individually significant, together they significantly add to the overall model and Equation 4 fits the data better than the model with only *CRT* and *Consumption* (LR-test, $p=0.0576$). Testing down we find that *Morality* does not seem to explain *product* at all and the best fit also excludes *Intellect*.²⁴ Equation 5 shows this specification with *Liberalism* and *Modesty*, both significant at the 10 percent level, and this model predicts *product* significantly better than the model with only *CRT* and *Consumption* (LR-test, $p=0.038$). We then test our aggregate facet *Openness* to experience with *CRT* and *Consumption*. The *Openness* indicator is highly significant and Equation 6 predicts who responds to the frame better than Equation 3 (LR-test, $p= 0.013$) and Equation 5 (BIC= 151.03 vs. BIC=155.39).

The results in Equation 6 tell us that if a subject consumes the average amount of milk every week and is classified as an average open individual, the probability that the subject chooses the milk focal point is 65 percent if she scores zero on the CRT-test (i.e. impulsive decision-making) and only 25 percent if she scores the maximum (i.e. reflective decision-making). If a subject is instead classified as a closed-minded individual, still consuming the average amount of milk, the probability that she chooses the milk price when scoring 0 on the CRT-test is 89 percent.

5 Conclusions

The equal split solution has strong theoretical support and the solution is a common finding across many bargaining experiments emphasizing its focality. However, when we introduce a competing focal point related to a well-known product's market price, a majority of subjects deviate from equal splits in favor of trading the product for the exogenously established market price. The separation of these two groups of subjects, where some are sensitive to changes in the frame and where others focus on the division of surplus, alerts us to the difficulty in establishing general rules for how subjects choose focal points when there are two salient points. As Mehta et al. (1994a) note "When two rules conflict, each rule seems to attract some people." (p. 180). Our results imply that how subjects choose when there are competing focal points depend on both heterogeneity in subjects' characteristics and on the strength of the frame for the subject.

²⁴Results are available upon request.

Our experimental approach also relates bargaining outcomes to the field through the "nature of the commodity" (Harrison and List, 2004). It shows that for goods with established prices, the division of surplus can be highly skewed casting doubt on the prediction of equal divisions of surplus in the field, where known prices of products and services can give an advantage to one of the parties. The results also provide interesting topics for future research such as testing the strength of this framing effect in the presence of learning, different information, or changes in the budget; or in turning the tables on the roles so that the price of the good favors the seller.

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6 Appendix

Table 5: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Dependent Variable</i>					
Choice of Focal point	113	.416	.495	0	1
<i>Experimental Control and Demographic Variables</i>					
Buyer	123	.496	.502	0	1
Period 1	123	.496	.502	0	1
Male	122	.484	.502	0	1
Income	120	99.99	76.90	12	700
Age	122	21.37	1.84	18	28
<i>Bargaining Attitude, Risk, and Cognitive Reflection</i>					
Surplus Demand ^a	123	47.90	28.18	0	100
Risk aversion	112	6.40	1.97	0	10
Crtscore ^b	123	1.86	1.10	0	3
<i>Milk Consumption</i>					
Consumption	122	2.08	1.82	0	10
Valuation	119	7.58	3.51	0	25
Guess milk price	123	8.86	2.21	6	26
<i>Personality Traits and Social Activity</i>					
Trust	123	50.13	10.0	24	71
Morality	123	50.01	9.93	14	68
Altruism	123	49.89	10.0	7	69
Cooperation	123	50.05	10.1	24	72
Modesty	123	50.06	9.93	29	71
Sympathy	123	50.03	10.0	15	66
Agreeableness	123	49.93	9.90	9	68
Dutifulness	123	49.97	10.0	16	67
Cautiousness	123	49.94	9.95	27	71
Conscientiousness	123	50.03	10.03	21	72
Intellect	123	50.12	10.2	23	67
Liberalism	123	49.97	10.0	20	68
Openness	123	50.02	10.02	23	72
Selfmonitoring	123	49.96	10.0	29	73
Contacts	118	300.1	191.1	0	1450
Time spent	119	48.8	56.6	0	500

^a Demanded share of surplus in a scenario describing how to split a taxi bill.

^b Number of correct answers on the CRT-test. (See instructions for details).