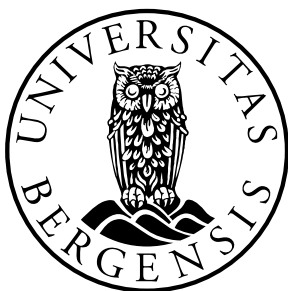


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Adversarial anchoring in bargaining



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Abstract

A low opening offer is the most basic advice given to bargainers trying to achieve a low price. Such low offers can lead to low prices through different mechanisms. It can signal that you are a tough negotiator, it can commit you to a hard-nosed strategy, or it can anchor your opponent on a low number. In this project we try to distinguish between these effects, focusing on anchoring. Anchoring is one of the most well-established psychological mechanisms: if people consider a high number they will provide higher estimates and valuations in a range of situations. However, would anchoring work if the anchor is provided by a person with opposing interests? There is no direct evidence for such adversarial anchoring in bargaining, where, as discussed, many different mechanisms can affect strategies simultaneously, nor in other settings. In our experiment we present proposers in an ultimatum bargaining setting with a signal that is either randomly determined (an anchor), or chosen by a bargaining counter-part or relevant third party, with or without private information. Signals are found to affect offers in similar ways in all treatments. This provides strong support for adversarial anchoring, and no evidence for any other mechanism. Additionally, we find that people's tendency to be anchored in the bargaining task is correlated with their tendency to be anchored in an individual incentivised estimation task.

Keywords: Anchoring, Bargaining, Cheap talk

JEL Classification: C72 , C91 , D01 , D82 , D91

1 Introduction

Negotiators often receive the advice to make the first offer and to make that an aggressive offer. For example, the Kellogg School of Management¹ and Business Insider² both urge negotiators to make the first offer, the Harvard Law School Program on Negotiation places ‘extreme demands’ at the top of their list of ‘hard-bargaining tactics’³, and Leanin.org advises women to “aim higher and ask for more”⁴. These publications justify this advice by the anchoring effect. Your counterpart in the negotiation is presumed to be anchored by your opening offer which would bias their counteroffer in the direction of your initial offer.⁵

Anchoring a bargaining counterpart with your first offer seems solid advice because the anchoring effect, the tendency of numerical answers to be biased in the direction of even uninformative numerical signals, is one of the most well-established decision making biases in psychology (Furnham & Boo, 2011) and behavioral economics (Li, Maniadis, & Sedikides, 2021). Although there is some discussion on the strength of the anchoring effect (Fudenberg, Levine, & Maniadis, 2012) and the effectiveness of extreme anchors (Chapman & Johnson, 1994), the evidence for the existence of an anchoring effect is strong. However, despite this strong evidence and the prevalence of the advice to use this to your advantage when bargaining, there is no direct experimental evidence for anchoring effects in bargaining or more generally on the effectiveness of adversarial anchors, anchors provided by people with opposing interests to those of the decision maker.

In this paper we provide direct experimental evidence for adversarial anchoring in bargaining, compare adversarial to random anchors, and distinguish between anchoring and possible informational mechanisms through which opening offers can affect counteroffers.⁶ We find that both adversarial and random anchors have a substantial effect on bargaining offers, the effect of adversarial anchors being no weaker than that of random anchors. Conversely, we find no evidence for any of the informational mechanisms in our setting. Furthermore, we show that an individual’s tendency to be anchored in an individual task correlates with their response to a signal in a bargaining

¹https://www.kellogg.northwestern.edu/news_articles/2014/04022014-negotiate_first_offer.aspx (accessed 18-08-2021)

²<https://www.businessinsider.com/how-to-negotiate-make-first-offer-2014-5> (accessed 18-08-2021)

³<https://www.pon.harvard.edu/daily/batna/10-hardball-tactics-in-negotiation> (accessed 17-08-2021). The list is based on Mnookin, Peppet, and Tulumello (2000).

⁴<https://leanin.org/education/negotiation-making-first-offer> (accessed 17-08-2021)

⁵Although the terms ‘bargaining’ and ‘negotiating’ are often used interchangeably a distinction is sometimes made between the two. Bargaining is then defined as purely distributive (e.g. agreeing on a price) while negotiations can be more multidimensional and potentially cooperative (Steinel & Harinck, 2020). We follow the colloquial convention by using the terms interchangeably, as much of the literature does, but the antagonistic anchoring mechanism we explore appears most directly relevant to the distributive bargaining setting, although it may well generalize to negotiations. Our experiment also models a distributive bargaining situation.

⁶The experiment on which we report was preregistered at the AEA RCT Registry with identification number AEARCTR-0003091 (<https://www.socialscienceregistry.org/trials/3091>)

situation. This correlation supports the interpretation of the results in the bargaining experiment as anchoring and provides unique evidence for anchoring susceptibility as an individual tendency exhibited across domains.

In most existing studies on anchoring in either economics or psychology the anchor is determined by a random device (e.g. [Tversky and Kahneman \(1974\)](#)) or an explicitly irrelevant number that occurs in the environment (e.g. [Ariely, Loewenstein, and Prelec \(2003\)](#)) to guarantee to participants that the anchor contains no information. In the remaining studies the anchor is provided by an experimenter without any explanation, or has a connection with the target and may therefore contain information ([Li et al., 2021](#)).⁷ A signal from someone with largely opposing interests, such as a bargaining counterpart, is very different because they may well be trying to manipulate you. If a signal coming from someone with diverging interests is indeed seen as an attempt at manipulation that could trigger reactance ([Brehm, 1966](#))⁸ or betrayal aversion ([Bohnet & Zeckhauser, 2004](#)). Both reactance and the fear of betrayal may make people wary of the signal, thereby reducing the likelihood that they will take it as an anchor. The realization that the other person may be trying to move your offer in a particular direction may also make you consider reasons to move in the opposite direction which again reduces the anchoring effect ([Mussweiler, Strack, & Pfeiffer, 2000](#)) and could even reverse it if a more extreme anchor is more likely to trigger reactance or betrayal aversion.

The field of marketing is inherently interested in such adversarial strategic anchoring of consumers by retailers. However research in marketing mostly relies on anchors provided by experimenters, often in non-incentivized experiments (e.g. [Wansink, Kent, and Hoch \(2018\)](#) studies 3 and 4) or based on experiments where anchors can credibly be seen as informative (e.g. [Obermiller \(2019\)](#)), are provided by a neutral agent or device (e.g. [Adaval and Wyer \(2011\)](#)), or are apparently just present in the environment (e.g. [Nunes and Boatwright \(2018\)](#)), rather than explicitly provided by sellers or marketeers. None of these studies directly compare anchors derived from different sources or experimentally vary the alignment of interest between the sender of the anchor and its receiver. Therefore they do not allow for a direct comparison between the effects of adversarial and ‘neutral’ or explicitly random anchors.

Unlike for the anchoring effect, there is research on the effect of the interests alignment and/or the source of defaults on the default bias. In that literature more and less trustworthy defaults are directly compared. Both [de Haan and Linde \(2017\)](#) and [Caplin and Martin \(2016\)](#) find that people are less likely to follow less informative defaults, although a default bias remains. [Freeman, Tong, and Zrill \(2021\)](#) show that people will often follow defaults based on social information, expert advice, or if the defaults are based on their own earlier decisions, but ignore defaults when they are informed that these defaults

⁷Li et al. find in their meta-analysis that anchors that may contain information have a larger effect.

⁸According to reactance theory a person who perceives her autonomy to be threatened will take action to try and regain their autonomy.

are randomly generated. Most directly related to the current research however is [Altmann, Falk, and Grunewald \(2020\)](#) who show that decision makers respond strongly to the alignment between their own interests and those of the default setter. Of course, as the research discussed above has shown, people are strongly affected by explicitly random anchors while explicitly random defaults may be ineffective, so the decision-making processes behind the default bias and the anchoring effect appear to be different. The findings of Altman at all might therefore not generalize to anchors.

Most directly related to anchoring in bargaining is the substantial and longstanding literature that studies the effect of opening offers on both counter offers and bargaining outcomes, starting with [Chertkoff and Conley \(1967\)](#). This literature shows that in hypothetical or unincentivized bargaining interactions higher first offers consistently lead to higher counter offers ([Benton, Kelley, and Liebling \(1972\)](#), [Bateman \(1980\)](#), [Galinsky and Mussweiler \(2001\)](#), [Poucke and Buelens \(2002\)](#), [Oesch and Galinsky \(2003\)](#), [Galinsky \(2004\)](#), [Claussen-Schulz \(2005\)](#), and [Galinsky, Ku, and Mussweiler \(2009\)](#)). The meta-analysis by [Orr and Guthrie \(2005\)](#) confirms that the results of these experiments are consistent with opening offers anchoring counteroffers, an effect that is only a little weaker for more experienced or better informed participants. However, these studies do not provide direct evidence for anchoring because opening offers can affect counteroffers in other ways. A bargaining counterpart may deduce information from an opening offer, information that in turn may affect their counteroffer. Their rational response to such information can look like anchoring because it could lead them to adjust their counteroffer in the direction of the opening offer. This makes it difficult to identify the mechanisms through which opening offers affect counteroffers.

One type of information that could be contained in an opening offer is information about the valuation of the offer's proposer. This is possible because the proposer was anchored by their valuation or due to strategic reasoning on their part.⁹ Strategic reasoning can lead to a positive relation between valuation and an opening offer because, for example, a breakdown of negotiations is more costly for a buyer with a higher willingness to pay. Such a buyer may therefore put forward a higher initial offer to reduce the probability of a breakdown. If a higher opening offer indeed indicates a higher valuation, a higher opening offer may lead to a higher counter offer in response, not because the counterpart is anchored but due to a change in her beliefs about the valuation of the first mover.

An opening offer can also reveal a first mover's inherent eagerness to strike a deal or their (un)willingness to drive a hard bargain. A seller who starts the negotiation by proposing a high price is more likely to be the type of seller who is willing to push for an advantageous outcome and run the risk of negotiations breaking down. Depending on the setting this could imply that the seller has a good outside option ([Hennig-Schmidt, Irlenbusch, Rilke, & Walkowitz, 2018](#)),

⁹Valuation here could be, for example, willingness to pay for a buyer or costs or willingness to accept for a seller.

or just that they have an aggressive strategy or general negotiation style. An opening offer that suggests a powerful or aggressive negotiator may lead the bargaining counterpart to make a relatively conciliatory counteroffer. Again, this looks like anchoring, but it is driven by a change in beliefs.

If opening offers affect counteroffers because a counterpart derives strategically useful information from the magnitude of the offer, making a first offer may work against rather than in favor of whoever makes that first offer. Therefore, identifying the mechanisms underlying the effect of opening offers on counter offers is not only of academic interest but may also affect our interpretation of naturally occurring bargaining situations and the advice provided to bargainers such as that referenced in the opening paragraph of this paper. Indeed the same articles which suggest using your opening offer to anchor a negotiation counterpart claim that the conventional wisdom is *not* to make the opening offer and suggest that you should refrain from making the opening offer if you are (already) at an informational disadvantage.¹⁰ Indeed in an unincentivized bargaining experiment [Cotter and Henley \(2008\)](#) provide direct evidence of a first-mover *dis*advantage when looking at bargaining outcomes, at least with experienced bargainers.¹¹ They attribute this to a lack of an anchoring effect, but do not consider alternative mechanisms that could explain a disadvantage rather than no effect.

[Croson \(1996\)](#) shows that when explicitly provided with relevant information bargainers take it into account. In a hypothetical bargaining experiment [Loschelder, Trötschel, Swaab, Frieze, and Galinsky \(2016\)](#) also show that providing information with your opening offer can hurt. Participants who are coached to report not only their numerical offer but to also provide the information that this offer relates to their most important negotiation dimension no longer have a first-mover advantage. Both of these studies show that bargainers will take explicit information provided with or before the opening offer into account, but do not tell us whether bargainers will deduce information from an opening offer.

Taken together, the existing literature provides strong evidence for anchoring effects in general and for an effect of first offers on counteroffers that could be driven by anchoring. However, there is no explicit evidence for the effectiveness of adversarial anchors nor on the relative importance of anchoring and other mechanisms in bargaining settings. In the next section we set out the comparisons required to separately identify each mechanism and derive explicit hypotheses based on these mechanisms. The subsequent experimental design section describes the bargaining setting in which participants interact and the various treatments that allow for the relevant comparisons, while the results of the experiment follow in the fourth section. In the final section we discuss the implications of our findings.

¹⁰For example, <https://www.pon.harvard.edu/daily/negotiation-skills-daily/when-to-make-the-first-offer-in-negotiation/> (accessed 18-08-2021).

¹¹[Alevy, Landry, and List \(2015\)](#) also show that experience reduces anchoring in non-bargaining settings. The anchoring effect therefore appears to weaken with relevant experience, although in both of these studies it is possible that numbers from earlier interactions acted like (additional) anchors, thereby obscuring or undermining the effect of a new anchor.

2 Hypotheses

The classic explanation for the anchoring effect is that people take a possibly irrelevant number, the anchor, as a starting point when reasoning about a numerical answer (Tversky & Kahneman, 1974). They then adjust in a reasonable direction, but fail to do so sufficiently. As a consequence answers are biased in the direction of the anchor. This cognitive process does not need to depend on circumstances, so an anchoring effect is a-priori as likely in a strategic as in an individual decision-making situation. Indeed the anchoring effect has been confirmed in auctions (Beggs & Graddy, 2009) as well as for valuations (Ariely et al., 2003) and numerical answers (Tversky & Kahneman, 1974). However, anchoring has been shown to be sensitive to the exact frame in which the anchor is presented (Brewer & Chapman, 2002) and to disappear when people have experience buying and selling a good (Alevy et al., 2015).

A possible explanation for why experienced traders are not affected by the anchoring bias is that they expect to sell and are therefore thinking strategically about resale value rather than considering their own valuation. If a bargaining settings prompts a similar strategic way of thinking, this might prevent the occurrence of an anchoring effect when people consider their offer. However, in a market setting (Alevy et al., 2015) and in auctions (Ivanova-Stenzel & Seres, 2021) the anchoring effect is also observed with induced values, which implies that also when people only reason about strategy rather than valuation, anchoring has an effect. This anchoring effect in auctions and markets disappears with experience, which suggests that it is rather the reduction in uncertainty about the ‘right’ answer that comes with experience that reduces the anchoring effect rather than strategic thinking. The fact that anchoring also affects high stakes strategic decisions in games shows, further confirms that strategic thinking does not appear to eliminate anchoring effects (Jetter & Walker, 2017).

Based on this existing literature there is no reason to assume that anchoring won’t work in a bargaining situation, but at the same time there is no direct confirmation that it does. This is especially regrettable given the potential for strategic use of anchors in bargaining and the common advice to do so. A first priority is therefore to confirm whether a standard explicitly random anchor induces an anchoring effect in bargaining settings by testing the following hypothesis.

Hypothesis 1 There is a positive correlation between a random anchor and the bargaining offer made by the recipient of the anchor.

If this hypothesis is confirmed it is plausible that anchoring a bargaining partner through your opening offer is possible. However, as set out in the introduction, it could be that such an adversarial anchor would not work. Additionally an opening offer might provide your bargaining counterpart with information. To focus on only the adversarial part first requires a comparison

between an explicitly random anchor and a completely uninformative signal from a person with misaligned interests.¹² To ensure that this signal does not contain information the sender should not have relevant private information and should also not be the person you are going to negotiate with to ensure that the signal cannot contain information about the type and/or strategy of your bargaining counterpart. To make the signal relevant and allow for the possibility to worry about being manipulated, the sender should however have an interest in the bargaining process that is the same as that of a bargaining counterpart and misaligned to the interests of the signal's receiver. We will refer to such a sender as an uninformed stakeholder. Evidence from defaults suggests that the source of a default affects how people respond to it (Altmann et al., 2020). If the anchoring effect is similarly affected the response to a random anchor can be expected to be stronger than the response to a (potentially) adversarial anchor.

Hypothesis 2 A signal from an uninformed stakeholder will have a weaker effect on the receiver's offer than a random anchor.

Rejecting this hypothesis or even finding a weaker but still significant effect of an uninformative signal from a party with opposing interests would provide direct evidence that even an adversarial anchoring affects offers in bargaining and would thereby also go a long way towards validating the bargaining advice cited in the first paragraph of this paper. However, a signal send by an uninformed stakeholder is still very different from an opening offer, precisely because it excludes the possibility that the signal contains information. Providing the stakeholder with relevant information about their private value of the good under negotiation before sending a signal allows for a direct test of whether receivers believe they can deduce information from such a signal.¹³ Having the bargaining counterpart rather than a stakeholder send the signal allows the receiver to also infer something about the strategy or type of her counterpart. Assuming receivers of the signal indeed infer such information from these signals implies the following hypothesis.

Hypothesis 3 A signal from an *informed* stakeholder will have a stronger effect on a receiver's offer than a signal from an *uninformed* stakeholder. A signal from an informed bargaining counterpart will have a stronger effect on a receiver's offer than a signal from an informed stakeholder.

Whether a receiver infers information from a signal is a separate question

¹²We will refer to any numerical value received before deciding on an offer as a signal and to the person receiving the signal before deciding on her offer as the receiver. In case of a random anchor the signal is conspicuously uninformative, while a signal from another agent could contain information.

¹³The private valuation of your bargaining counterpart is relevant when making an offer because it affects their willingness to accept an offer. For example, a buyer who values a good more is willing to pay a higher price. In our experiment the recipient of the signal is the seller, while their bargaining counterpart is the buyer.

from whether the signal contains information. To examine that second question we need to consider the relation between the information available to the sender and the signal they send. If there is information in the signal a positive correlation between their private information, their private value for the good, and the signal is expected.¹⁴

Hypothesis 4 For both informed stakeholders and informed bargaining counterparts there is a positive correlation between their private information and the signal they send.

If there is indeed useful information in the signal that may hurt the sender of the signal. Conversely, if sending a signal allows senders to anchor the receiver that may help them. Senders' profits may therefore either be higher, or lower if it is possible to send a signal. As the informational effects are only possible with informed senders, lower profits are only expected to occur in that case.¹⁵

Hypothesis 5 Bargaining counterparts and stakeholders who send a signal will make higher profits than those who cannot send a signal. Informed bargaining counterparts and stakeholders who send a signal will make lower profits than those who cannot send a signal and than uninformed stakeholders who send a signal.

So far we have considered anchoring at the aggregate level. However, there is evidence that some people are more susceptible to the anchoring effect than others. For example, people who score higher on openness to experience (Mcelroy & Dowd, 2007) or who have lower cognitive abilities (Bergman, Ellingsen, Johannesson, & Svensson, 2010) are more affected by random anchors. A logical follow-up question is whether those who are more affected in one setting such as answering numerical knowledge questions, are also most affected in a bargaining setting.

Hypothesis 6 People who are more affected by anchors in an individual task are also more affected by (even uninformative) signals in a bargaining task.

If such a correlation is indeed observed that would also strengthen the case that an effect of signals on offers observed in the bargaining setting is indeed due to the anchoring effect.

¹⁴It is not possible to deduce the full strategy of the bargaining counterpart in our experimental setting. Therefore it is impossible to investigate whether there is a correlation between a bargaining counterpart's strategy and the signal they send.

¹⁵It is also possible that the information transfer (also) facilitates coordination and thereby prevents negotiations breaking down. This could result in higher profits for all bargainers, or at least counter the negative effect on senders' profits while benefiting receivers. Another possibility is that receivers believe there is information in the signal even when there isn't which would allow senders to 'manipulate' receivers even without an anchoring effect. In that case informed senders may perform better. We will consider these possibilities in the results section.

3 Experimental design¹⁶

Participants in the experiment first participate in one bargaining task and subsequently a private anchoring task. Both tasks will be explained in detail below. In both tasks the participants can earn points which are translated into earnings at the exchange rate of 1 euro-cent per point with earnings rounded to the nearest 10 cents and paid out in cash at the end of the experiment. Session were conducted at Maastricht University’s BEELab in 2018 and 2019. Participants were recruited using ORSEE (Greiner, 2015) and the experiment was programmed in z-Tree (Fischbacher, 2007).

3.1 Ultimatum bargaining with private information

Participants in our experiment interact in one one-shot ultimatum bargaining game with private information, similar to for example Mitzkewitz and Nagel (1993).¹⁷ In this game a Producer proposes a price between 0 and 1100 for which to sell a good to a Retailer. The Retailer can either accept or reject this offer. If the Retailer accepts the price the Producer makes a profit equal to this price minus her production costs.¹⁸ These production costs are drawn from a uniform distribution from 200 to 600 and are private information of the Producer and known to her before making her offer. The Retailer can sell the product for a retail price drawn from a uniform distribution from 600 to 1100. This retail price is private information to the Retailer and known to him before deciding whether to accept the offer. The Retailer has to share his profit from the sale of the good with a passive partner who is labeled Retailer 2, while the active Retailer is labeled Retailer 1. In case Retailer 1 accepts the Producer’s offer both Retailers’ profits therefore equal the retail price minus the price proposed by the Producer divided by two. If Retailer 1 rejects the Producer’s offer all three players earn a profit of zero.

All participants are fully informed about these rules, including the distributions used to determine production costs and retail prices. They answer a set of questions to test their understanding before learning about their role. These questions also address the rules of the relevant treatment of which they are informed directly after the general rules. Appendix A contains the experimental instructions for all treatments.

Assuming risk neutral preferences, the sub game-perfect Nash equilibrium for this game would be that the Proposer asks a price of $550 + 1/2 \cdot \text{production costs}$. This means that Producer prices are expected to be distributed uniformly between 650 and 850. Retailers should accept only if

¹⁶Before running the sessions we uploaded a pre-analysis plan to the AEA RCT Registry with identification number AEARCTR-0003091 <https://www.socialscienceregistry.org/trials/3091>). The design was updated by adding treatment Stakeholder Uniformed. An updated design document was uploaded to the registration prior to running sessions that included this treatment.

¹⁷There is a substantial literature on ultimatum bargaining games with private information. In these papers there is commonly an explicit pie to be divided. One or both players possess private information on the size of the pie. In our experiment the pie is implicitly determined by the privately held valuations.

¹⁸We will refer to Producers as she and Retailers as he from now on.

the offered price is lower or equal to the retail price which in equilibrium will be 70% of the time.

Of course we know that participants often don't act in a risk-neutral and/or fully rational way. Furthermore, we know that in the ultimatum game and related games, social preferences lead responders to reject small positive offers and proposers to offer more than the standard equilibrium predicts (Güth, Schmittberger, and Schwarze (1982), Thaler (1988)). In addition ultimatum bargaining experiments with asymmetric information reveal further systematic deviations from equilibrium behavior, in particular higher rejection rates (Kagel, Kim, and Moser (1996), Croson (1996), Croson, Boles, and Murnighan (2003)). Of course our focus in this study is not on testing for equilibrium play or general deviations from it, but rather the existence of anchoring effects on the chosen offer.

3.2 Anchoring

Before deciding on her offer the Producer is asked whether she is going to propose a price higher or lower than a number Z .¹⁹ This is a classic anchoring manipulation used in for example Ariely et al. (2003). Although anchoring has been observed with other manipulations, this method is relatively forceful and proven to be effective. Additionally the need to consider the number before making an offer also makes the number similar to an offer made by another party in a bargaining setting because a bargainer will have to consider whether to accept or reject that offer before making a counteroffer. The only difference between treatments is how this number Z is determined.

3.3 Treatments

We ran five between-subject treatments in the experiment. Assignment to treatments was randomized within sessions. The "Stakeholder Uninformed" treatment was added in one of the later sessions. Randomization probabilities for treatment assignment were adjusted to ensure a roughly equal number of observations per treatment. Nevertheless the number of observations is slightly lower for "Stakeholder Uninformed".

3.3.1 Baseline

In this treatment the Producer does not respond to a number Z , but decides on a price immediately. This provides us with a baseline setting where anchoring cannot play a role.

3.3.2 Random

This treatment is closest to a traditional anchoring task. Here the number Z to which the Producer has to respond before deciding on her price offer is an integer drawn from the interval $[0,1100]$. She is aware that the number is

¹⁹The exception to this is treatment 'Baseline', see below.

determined through this procedure. The Retailers also know the procedure, but not the number drawn.

3.3.3 Stakeholder Uninformed

Taking a step in the direction of an opening offer, this treatment lets the number Z be determined by another person rather than a random procedure. The person determining it is Retailer 2, so not the person who will respond to the Producer's price offer, but someone with the same incentives as the Producer's bargaining counterpart. In this treatment Retailer 2 has to decide on the number Z before receiving information on the retail price. The number Z has to be an integer in the range $[0,1100]$. All participants are aware of this procedure for determining Z , including the lack of information and the range from which the number has to be selected. Importantly Retailer 1 will not know the number chosen by Retailer 2 and both the Producer and Retailer 2 are aware of that.

3.3.4 Stakeholder Informed

The only difference between treatments Stakeholder Uninformed and Stakeholder Informed is that in Informed Retailer 2 *is* informed about the retail price before determining the number Z . As in all treatments all participants are aware of the way Z is determined including the range and the information available and as in "Stakeholder Uninformed", Retailer 1 is never informed of the number chosen by Retailer 2.

3.3.5 Bargaining Counterpart

In Bargaining Counterpart it is Retailer 1 rather than Retailer 2 who determines the number Z . So in this case the Producer receives a signal directly from the person she is bargaining with. In all other respects the treatment is the same as Stakeholder Informed, so Retailer 1 is aware of the retail price for which he will be able to sell the good when determining the number Z . Again, all participants are made aware of who determines the number Z and what information he has available. Now Retailer 2 is never informed about the number chosen by Retailer 1. This treatment comes as close as possible to Retailer 1 making in opening offer to the Producer, while maintaining a similar procedure in all treatments.

This treatment is similar to [Croson et al. \(2003\)](#). In their ultimatum bargaining experiment participants also poses private information and responders can send a cheap-talk message to proposers. However, in their case this is a free form message that primarily gets used to make promises and threats. The authors note that anchoring is one way in which messages could affect offers, but do not examine the role of anchoring in their experiment.

3.4 Individual anchoring tasks

After the bargaining task all participants are asked three questions with a correct numerical answer between 1 and 1000. Prior to each question they are asked whether the correct answer is higher or lower than a randomly drawn number. They are then asked to provide an answer. Two of these three questions are randomly selected to be payoff relevant. For the first of these, participants receive 20 points if they answered correctly to the higher/lower question. For the second they receive 50 points minus the absolute difference between their answer and the correct answer, with a minimum of 0 points. The three questions are: 1) how many thousands of people live in the Norwegian city of Bergen (correct answer 280), 2) how many years ago was the Dutch city Weert granted city rights? (correct answer 604), and 3) What is the distance in kilometers between the UK towns of Oxford and Cambridge? (correct answer 106). The questions are determined to be rather hard, but varied in difficulty and to cover a range of values.

4 Results

In this section we will go through tests of all six hypotheses in turn and then discuss the overall picture that emerges from our experiment. However, before doing so we will consider the demographics of our sample and whether there are unexpected differences between treatments in terms of these demographics. All p-values reported will come from two-sided tests.

4.1 Demographics

Table 1 reports the demographic details of the participants. These participants were about 58% female, 16% were Dutch²⁰, 68.4% were students from an economics or business program and their average age was around 21 years old. These demographic attributes did not differ significantly between the treatments (Kruskal-Wallis test p-values > 0.1). Regression analyses will be reported with and without these demographics as control variables.

Table 1 Demographics

	N	Female	Dutch	Age	Economist
All treatments	462	58.0%	16.0%	21.14 (2.58)	68.4%
Baseline	96	55.2%	20.8%	21.68 (3.31)	76.0%
Random	96	62.5%	15.6%	21.14 (2.44)	69.8%
Uninformed Stakeholder	84	66.6%	16.6%	20.75 (2.30)	57.1%
Informed Stakeholder	93	54.8%	15.1%	21.17 (2.24)	69.9%
Bargaining Counterpart	93	51.6%	11.8%	20.90 (2.38)	67.7%
Kruskal-Wallis p-value	462	0.2292	0.5639	0.1031	0.4441

Standard errors in parentheses

²⁰Maastricht University hosts many foreign students, predominantly from Germany

4.2 Hypotheses tests

In this subsection we will report the results corresponding to the six hypotheses. The first of these hypothesis considered the effect of a random anchor on proposed prices. This is the most direct test of anchoring in this bargaining setting in the treatment that is most analogous to traditional anchoring experiments. If a random anchor does affect bargaining behavior there should be a positive correlation between the (random) signal and the price asked in the Random treatment. Such a correlation is indeed observed.

Result 1 There is a positive correlation between a random signal (an anchor) and the offer made by the recipient of the random signal.

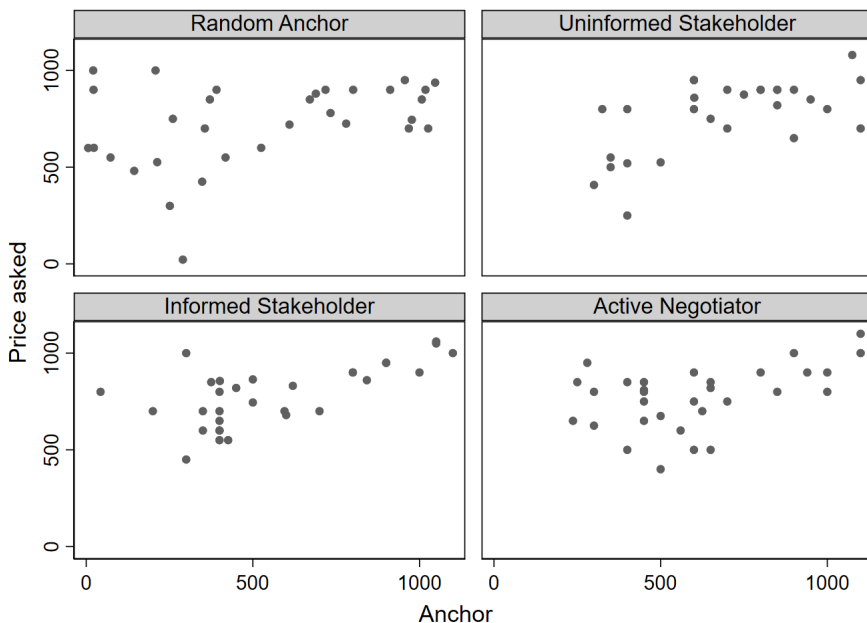
The pairwise correlation between the signal received and the price asked is 0.3750 with a p-value of 0.0345 in this treatment.²¹ Table 2 below also shows that when controlling for the Producer costs and demographic controls, this effect remains.²² If the random signal is one point higher that results in a proposed price that is over one-fifth of a point higher. Figure 1 shows the relation between signals and price proposals for all treatments. The top-left graph shows the behavior in the Random treatment which confirms the positive relation between signal and proposed price. In particular it appears that while low prices are sometimes asked after a low signal, these low offers do not occur after a high signal.

The second hypothesis was based on the idea that the anchoring effect of a signal would be diminished if a signal would come from another person, especially if this person has an interest in affecting the price asked, rather than from a random device. To exclude other possible effects, such as information transfer, the signal needed to come from a person without information as is the case with the uninformed third party in the Uninformed Stakeholder treatment. This hypothesis is not confirmed. If anything the response to the signal is stronger when it comes from another person.

Result 2 A signal from an uninformed but interested third party does not have a weaker effect on the receiver's offer than a random signal.

²¹The Spearman rank correlation is equal to 0.333 with a p-value of 0.0626.

²²Table 2 also includes dummies for the other treatments and interactions of those treatment dummies with the value of the signal. Treatment Baseline is not included because there is no signal in that treatment. We will also refer to this table when discussing other hypotheses and when discussing the overall picture that emerges from the experiment

Fig. 1 Scatter plot of Price asked versus Signal by treatment**Table 2** Regression of the Price asked by Producers

	Price asked	Price asked
Price asked		
Signal	0.219** (0.080)	0.253** (0.080)
Uninformed Stakeholder	-160.277 (103.148)	-178.30 (102.04)
Informed Stakeholder	-21.175 (83.086)	11.16 (82.43)
Bargaining Counterpart	-29.736 (91.047)	-1.99 (90.16)
Signal x Uninformed	0.213 (0.147)	0.204 (0.146)
Signal x Informed	0.114 (0.132)	0.024 (0.134)
Signal x Counterpart	0.0902 (0.141)	0.044 (0.140)
Producer cost	0.296* (0.135)	0.308* (0.133)
Controls	No	Yes

Standard errors in parentheses. N=122. Controls included gender, age, nationality (Dutch or not) and field of study (Economics or not). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

A non-parametric way to compare the anchoring effect between treatments is to compare the distance between the signal and the price asked. If the anchoring effect is stronger the same signal will lead to a price closer to that signal,

so a smaller difference would be observed.²³ Table 3 shows that the average distance to the anchor is lower in the Uninformed Stakeholder treatment, suggesting a stronger anchoring effect in that treatment, the opposite of what was predicted. However, this difference is not significant according to a two-sided Mann-Whitney test. Similarly, the regressions in table 2 shows no significant interaction effect of the signal with the Uninformed Stakeholder treatment dummy, neither without or with controls. Note, an F-test to assess the combined effect of the signal plus the interaction of the signal and the Uninformed treatment shows a significant overall anchoring effect for the Uninformed treatment ($p=0.0007$ without controls and $p=0.0003$ with controls).

Table 3 Absolute difference between the Signal and the Price Asked

	$ Signal - PriceAsked $
Random	295.66 (256.83)
Uninformed Stakeholder	165.93 (131.17)
Mann-Whitney p-value	0.0641
N	60

Standard deviations in parentheses

Hypothesis 3 concerns the possible transfer of information about the private information held by the Retailer or about their bargaining strategy. If Producers deduce such information the effect of a signal on proposed prices should be stronger if the sender has private information (treatment Informed Stakeholder) and/or is the person who will respond to the price offer (treatment Bargaining Counterpart) than when the sender has no information (treatment Uninformed Stakeholder). The evidence does not support this hypothesis however, because there is no significant difference between these treatments in terms of the relation between the signal and the price asked. The point estimate is even negative.

Result 3 There is no significant difference in the effect of a signal on price offers depending on whether the signal sender is a direct bargaining counterpart or an indirect stakeholder. Furthermore there is no significant difference in the strength of the anchoring effect depending on whether an informed stakeholder or an uninformed stakeholder chooses the signal.

Comparing the Bargaining Counterpart, Informed Stakeholder and Uninformed Stakeholder treatments using either the distance between signal and proposed price as a proxy (see Table 4) or comparing the coefficients of the interactions between signal and treatments in Table 2, reveals no significant difference in the anchoring effect between these treatments (F-test

²³This way of measuring an anchoring effect works for the interpretation of the anchoring effect as a 'pull' towards the anchor. In more broad interpretations, such as modeling the anchoring effect as a linear "coefficient" factor the absolute difference between anchor and price does not always have to decrease with stronger anchoring effects (for example in case of an anchor coefficient larger than 1). In our situation the two measures in table 2 and 3 show a similar picture.

p-value 0.5678 for the coefficients in Table 2). Furthermore, the F-tests for the combined coefficients of the signal and the interaction of the signal with the treatments are significant for both the Informed Stakeholder and the Bargaining Counterpart treatments (p-values for the Informed Stakeholder treatment $p=0.0022$ without controls and $p=0.0103$ with controls, p-values for the Bargaining Counterpart treatment $p=0.0084$ without controls and $p=0.0103$ with controls).

Table 4 Absolute difference between the Signal and the Price Asked

	$ Signal - PriceAsked $
Uninformed Stakeholder	165.93 (131.17)
Informed Stakeholder	231.10 (197.04)
Bargaining Counterpart	221.52 (174.75)
Kruskal-Wallis p-value	0.5109
N	90

Standard deviations in parentheses

Result 3 suggests that Producers did not deduce information from signals when this was possible. However, a separate question is whether the signals send by informed participants actually contained any information. Hypothesis 4 was based on this idea, suggesting that there would be a positive correlation between the signal and the private information held by the sender of the signal, the retail price, in the treatments where senders held this information (Informed Stakeholder and Bargaining Counterpart). We observe no such correlation.

Result 4 There is no significant correlation between private information and the chosen signal, neither for informed third parties nor for bargaining counterparts.

Table 5 reports this correlation result, for completeness for all treatments rather than only Informed Stakeholder and Bargaining Counterpart. For all treatments, including the two relevant ones, the correlations are small and not significant.

Table 5 Pairwise correlation Retailer price and Signal by treatment

	$Corr(Price, Signal)$	p-value	N
Random	0.148	0.4203	32
Uninformed Stakeholder	0.086	0.6620	28
Informed Stakeholder	0.111	0.5512	31
Bargaining Counterpart	0.192	0.2997	31
All Signal	0.106	0.3196	90

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Hypothesis 5 put forward that if there is an anchoring effect and signal senders use this to their advantage, the ability to send a signal before a price

is proposed would increase sender (Retailer) profits. Information transfer was hypothesized to undermine this effect in the treatments where information could be transferred. However, no such effect on profits is observed,

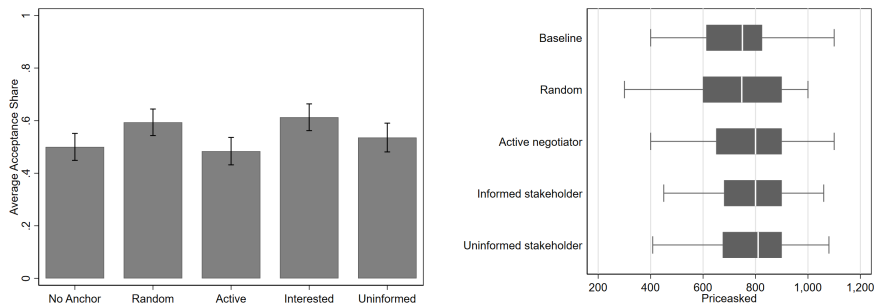
Result 5 Neither Retailer nor Producer profits vary significantly between treatments.

Figure 2 shows acceptance rates and box plots of the proposed prices by treatment. No differences in these variables can be observed suggesting that average accepted prices and profits will not vary between treatments. Table 6 shows that indeed neither proposed prices, acceptance shares, Producer profits, nor most importantly, Retailer profits vary significantly between treatments (Kruskal-Wallis p -value >0.4). This results is perhaps somewhat surprising as the previous results showed strong anchoring effects, which should potentially be to the advantage of the Retailers. However, it appears that Retailers are not, on average, aware of the benefit they can obtain by anchoring the Producer. In every treatment the Producer, who makes the take-it-or-leave-it offer, earns on average substantially more than each of the Retailers, as is to be expected in an ultimatum bargaining setting.

Taking all treatments together about half of the offers are rejected. This rather high level of rejections, compared to 30% in the risk-neutral Nash equilibrium, is in line with the existing literature on bargaining with private information and/or variable endowments. See for example [McKelvey and Page \(2000\)](#), [Schmitt \(2004\)](#).

Table 6 Mean Prices, Acceptance and Profits per treatment

	Price asked	Share Accepted	Profit Producer	Profit Retailer
Baseline	749.00	50.00%	168.28	34.67
Random	724.69	59.38%	170.47	84.05
Uninformed	767.39	53.57%	141.18	34.71
Informed	784.39	61.29%	243.26	41.05
Counterpart	771.90	48.39%	166.71	39.29
Kruskal-Wallis p	0.7382	0.8068	0.4856	0.4711

Fig. 2 Acceptance share and proposed prices per treatment

So far the results appear to point to a substantial effect of signals on offers and that this effect is driven by anchoring rather than informational mechanisms. Regarding the relation to the equilibrium predictions, we see in figure 2 that the average price asked is very close to the 750 average predicted, although a substantial portion of offers does lie outside the predicted 650 to 850 interval. Furthermore, we see in table 2 that production costs are taken into account when setting the price, as the Nash equilibrium for the game predicts, though at a lower coefficient than the 0.5 predicted. This stylized fact is in line with a related result from [Anbarci and Feltovich \(2013\)](#) who find for example outside options less utilized than the Nash bargaining solution would predict.

Our last hypothesis, hypothesis 6, aims to test the anchoring mechanism further by investigating the relation between the extent to which a participant's offer is positively affected by a signal and that participant's response to anchors in a separate, private task. We indeed observe this positive relation.

Result 6 The positive relation between signal and offer in the bargaining game is stronger for participants who show a stronger anchoring effect in a private task.

To substantiate this result we will first show that there are indeed anchoring effects in the private anchoring tasks. Then we will determine a measure to identify participants as more or less anchoring prone and relate that measure to their behavior in the bargaining task. Table 7 shows that for the three incentivised private anchoring tasks either separately (top panel) or taking all three together (bottom-two panels) there is a positive relation between anchor and answer. Controlling for the correct answer (middle-panel) or looking only at Producers, who can be anchored in the bargaining game (second column bottom-two panels), reveals very similar effects.

Table 7 Anchoring effects for the three anchoring questions

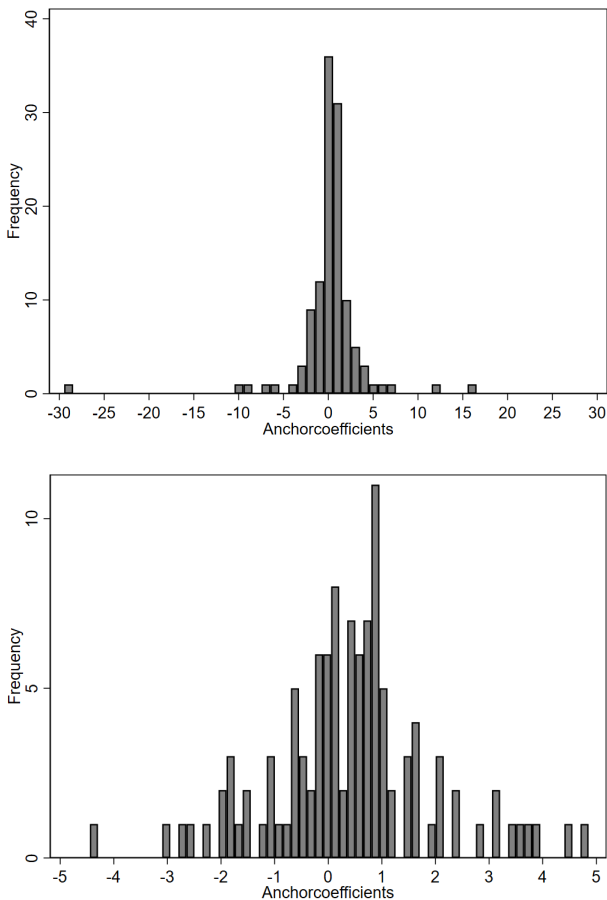
	Answer Q1	Answer Q2	Answer Q3
Signal reg. coef.	0.345***	0.483***	0.273***
Signal correlation	0.309***	0.513***	0.385***
N	462	462	462

	Answer	Answer (Type=Producer)
Signal reg. coef.	0.363*** (0.030)	0.400*** (0.048)
True answer	0.132** (0.041)	0.153* (0.041)
N	1386	462

	Answer	Answer (Type=Producer)
Signal reg. coef.	0.374*** (0.031)	0.449*** (0.052)
N	1386	462

Standard errors, clustered by individual, in parentheses. Standard errors clustered per individual
 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Because each participant answered three questions it is possible to run the regression in the middle panel of Table 7 for each individual separately. These regressions use three data points to identify three coefficients (constant, the effect of the anchor and the effect of the true answer) and are therefore somewhat noisy. However, it does yield a consistent estimate of each participant’s tendency to be anchored. Figure 3 below shows a histogram of these anchor coefficients. Although there is a substantial spread in anchoring effects, most of the estimated coefficients lie between -5 and 5 (see the upper panel) and the ‘bulk’ seem to be situated between 0 and 1, indicating a tendency for positive anchoring effects in the answers to the three questions. As can be seen in the upper panel histogram, this set of “anchor coefficients” we estimated contained a number of quite extreme outliers. To address this we conduct two analyses below. First (table 8), we only include observations of decision makers who had an estimated anchor-coefficient between -5 and 5 (This is true for 111 of the 122 Producers). Second, we include a regression (table 9) where we first rank all the individually estimated anchor coefficients, and use this ranking score (after normalizing it to be numbers between -0.5 and 0.5) in the regression to look for a possible interaction effect.

Fig. 3 Histogram of the per individual estimated anchor coefficients

The lower panel zooms in on the Anchorcoefficient, between -5 and 5.

We can see in both table 8 and table 9 that when regressing the offered price on both the signal Producers received, but also on an interaction between this signal, and either a direct or indirect (via the ranking) estimation of the Producer's individual anchoring effect estimated from the three post-bargaining questions, there is a clear and significant relationship. Producers who showed higher estimated anchor coefficients from the estimation questions also exhibit a stronger anchoring effect in the bargaining game.

Table 8 Regression of the Price asked by Producer

	Price asked	Price asked
Signal	0.296*** (0.054)	0.280*** (0.053)
Anchor Coefficient	-85.63*** (23.13)	-83.54** (23.25)
Signal x Anchor Coefficient	0.113** (0.036)	0.100** (0.038)
Controls	No	Yes

Standard errors in parentheses. N=111, observations from the no-anchor treatment are not included. Controls include the demographic variables plus the Producer cost. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 9 Regression of the Price asked by Producer

	Price asked	Price asked
Signal	1.08*** (0.244)	0.97*** (0.245)
Anchoring rank	-1467** (415)	-1511** (413)
Signal x Anchoring Rank	1.95** (0.624)	1.73** (0.628)
Controls	No	Yes

Standard errors in parentheses. N=122, observations from the no-anchor treatment are not included. Controls include the demographic variables plus the Producer cost. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.3 Overall picture

Taking all results together a picture emerges: Consistent evidence in favor of an anchoring effect on proposed prices but no evidence for any of the other proposed mechanisms. Table 2 shows that the signal has a robust effect on proposed prices in all treatments and that this effect is not significantly different between treatments. Figure 1 also provides a clear illustration of a very similar positive relation between signal and proposed prices in the different treatments.

The correlation between susceptibility to anchors in private and strategic bargaining decisions provided in tables 8 and 9 further strengthens the interpretation that anchoring is driving the correlation between signals and anchors in the bargaining task. It also shows that some people are more affected by anchors than others, which fits with the results of [Mcelroy and Dowd \(2007\)](#) and [Bergman et al. \(2010\)](#) who show that the extent to which a person is influenced by anchors correlates with other personal characteristics.

Finding an anchoring effect in a strategic setting confirms the results of [Alevy et al. \(2015\)](#) and [Ivanova-Stenzel and Seres \(2021\)](#) who find anchoring effects in markets and auctions. Our results build on this by showing that this anchoring effect is not diminished if the signal comes from a person who has reason to try to manipulate you. The lack of a significant effect of any of the informational mechanisms is perhaps surprising given the fact that people have been shown to use relevant information about their bargaining counterpart ([Croson \(1996\)](#) and [Loschelder et al. \(2016\)](#)) when making an offer. Deducing potential information from a signal may have required too much strategic

sophistication in our experiment, or producers correctly deduced that there was no information being transferred.

5 Discussion

Our experiment aimed to provide a direct test of adversarial anchoring effects in bargaining, as well as of other mechanisms through which opening offers can influence counteroffers. Both random and adversarial anchors indeed had a significant and substantial effect on offers in our ultimatum bargaining experiment. No such confirmation was found for the informational mechanisms that were explored. Whether a signal was randomly generated or provided by an interested party, and independent of the role of or information held by the interested party, the effect of a signal on offers was considerable and not significantly different.

These results appear to validate the advice provided to bargainers to use their opening offer to anchor their bargaining counterpart. Making the first offer and making it rather extreme is likely to improve your bargaining results. Conversely, concerns that your opening offer might provide useful information to your bargaining counterpart did not receive support. Interestingly, it appears that on average participants who received the opportunity to anchor their counterpart did not manage to exploit that opportunity in our experiments. That suggest that the advice to "aim higher and ask for more"²⁴ is not just valid, but also necessary.

A potential caveat is that participants in our experiment were inexperienced and only performed this task once. As [Alevy et al. \(2015\)](#) showed experience could reduce the anchoring effect, while it seems plausible that more sophisticated informational mechanisms might come to the fore. We did not allow for repetition in this experiment because in an experimental setting it appears likely that signals or results from previous rounds would also anchor offers as is indeed observed by [Tufano \(2009\)](#) in markets. Repetition would therefore reduce experimental control and make both informational and anchoring effects harder to observe. Note however that in many naturally occurring bargaining settings at least one of the bargainers is also rather inexperienced. Amateurs bargain when selling or buying used products online for example. In many of our biggest purchases, such as buying a house or a car there is often an asymmetry where the seller may have experience, but the buyer often does not, or to a substantially lesser extent.²⁵

The finding that the anchoring effect is not reduced when the anchor comes from someone whose interests do not align with yours has relevance beyond bargaining. Sellers and marketeers may use such adversarial anchors not to just to influence acceptable price levels, but also purchase quantities ([Wansink](#)

²⁴<https://leanin.org/education/negotiation-making-first-offer> (accessed 17-08-2021)

²⁵In the case of buying a house neither buyer nor seller is likely to have much experience. However, the seller commonly employs a realtor to sell a house, while a buyer may not. Although of course situations where both or neither party is represented by a realtor also occur.

et al., 2018), amounts used per application, or time of replacement (Obermiller, 2019). Most marketing research relies on non-incentivized tasks, where results could be explained away as an experimenter demand effect or simply carelessness, or on anchors in the environment, where it may be unclear that the source of the anchor does not have your best interests at heart. In our experiment however, the potential motivation of the source of the signal is unambiguous and your bargaining offer has real financial consequences. Even in such an explicitly adversarial setting the anchoring effect holds up.

The experiment presented in this paper adds to an incredibly extensive literature on the anchoring effect. It adds to that literature in general as well as through the applications in bargaining and marketing discussed above. The stability of the anchoring effect between treatments adds to the position of anchoring as one of the most consistently identified decision-making biases. So does the main finding of this paper that the anchoring effect remains when the anchor is provided by a potentially antagonistic party. The correlation between anchoring in a bargaining task and an individual tasks adds to the emerging literature on anchoring as a consistent and individually specific susceptibility.

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A Experiment Instructions

Baseline treatment:

Welcome

You are about to take part in a decision making experiment that will last approximately 50 minutes. You will earn money in this experiment depending on your decisions and the decisions of other participants. Earnings will be denoted in points during the experiment and will be exchanged for euros at the end of this experiment. 50 points will be worth 1 euro. On top of the earnings from the points in the experiment you will receive 4 euros.

In this experiment you and two random other participants will conduct a negotiation. There are three roles, one person will have the role of the producer who can make a product, while the other two are retailers who together run a store where they can sell the product. The producer knows the cost of the product, while the retailers know the price for which they can sell the product. The two retailers together run one business of which they share the profits.

The retailers and the producer negotiate the price of the product, however only one of the retailers (retailer 1) can engage in the negotiation as retailer 2 has to watch the store.

(Baseline)

The negotiation works as follows: the producer names his or her price and retailer 1 will accept or reject the price. Retailer 1 cannot discuss his/her decision with retailer 2. If the price is accepted the profit or loss for the producer is the price minus the cost, for the retailers the profit or loss is (the sales price

minus the price)/2. In case of rejection all three make a profit of 0 points.

(Random Anchor)

The negotiation works as follows: First, the producer will be asked whether (s)he is planning to set a price higher or lower than a randomly selected amount Z lying between 0 and 1100. Both random number Z and the producer's response will not be communicated to either retailer. Then the producer names his or her price and retailer 1 will accept or reject the price. Retailer 1 cannot discuss his/her decision with retailer 2. If the price is accepted the profit or loss for the producer is the price minus the cost, for the retailers the profit or loss is (the sales price minus the price)/2. In case of rejection all three make a profit of 0 points.

(Bargaining Counterpart treatment)

The negotiation works as follows: First, Retailer 2 will select an amount Z lying between 0 and 1100. This number will be communicated to the producer but not to Retailer 1. After this, the producer will be asked whether (s)he is planning to set the price higher or lower than the selected amount Z . The producer's response here will not be communicated to either retailer. Then, the producer names his or her price and retailer 1 will accept or reject the price. Retailer 1 cannot discuss his/her decision with retailer 2. If the price is accepted the profit or loss for the producer is the price minus the cost, for the retailers the profit or loss is (the sales price minus the price)/2. In case of rejection all three make a profit of 0 points.

(Informed stakeholder treatment)

The negotiation works as follows: First, Retailer 1 will select an amount Z lying between 0 and 1100. This number will be communicated to the producer but not to Retailer 1. After this, The producer will be asked whether (s)he is planning to set the price higher or lower than the selected amount Z . The producer's response here will not be communicated to either retailer. Then, the producer names his or her price and retailer 1 will accept or reject the price. Retailer 1 cannot discuss his/her decision with retailer 2. If the price is accepted the profit or loss for the producer is the price minus the cost, for the retailers the profit or loss is (the sales price minus the price)/2. In case of rejection all three make a profit of 0 points.

(Uninformed Stakeholder treatment)

The negotiation works as follows: First, Retailer B will select an amount Z lying between 0 and 1100. This number will be communicated to the producer but not to Retailer A. Note that Retailer B is not yet informed about what the retail price will be exactly at the time of choosing amount Z . After this, the producer will be asked whether (s)he is planning to set the price higher or lower than the selected amount Z . The producer's response here will not be communicated to either retailer. Then, the producer names his or her

price and retailer A will accept or reject the price. Retailer A cannot discuss his/her decision with retailer B. If the price is accepted the profit or loss for the producer is the price minus the cost, for the retailers the profit or loss is (the retail price minus the price)/2. In case of rejection all three make a profit of 0 points.

(All treatments except the Uninformed Stakeholder treatment)

The costs of the producer can be any whole number from 200 to 600 with equal probability. Only the producer will know the actual value prior to the negotiation.

The sales price of the retailers can be any whole number from 600 to 1100. Only the retailers will know the actual value prior to the negotiation.

(Stakeholder Uninformed treatment)

The costs of the producer can be any whole number from 200 to 600 with equal probability. Only the producer will know the actual value prior to the negotiation.

The retail price of the retailers can be any whole number from 600 to 1100. Only the retailers will know the actual value prior to the negotiation, but not when choosing amount Z .

In this experiment, you are assigned the role of “producer”/retailer 1”/retailer 2”

Please note that there will be no practice round, you will engage in only one bargaining situation and your decisions here will have immediate payoff consequences. Below is a summary of the experimental instructions. This summary will also be displayed in the next screens.