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Does the Endowment Effect Prevail When Traders Act Strategically?

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Abstract
Trading is more than a personal valuation of own property. Traders try to anticipate the WTP potential buyers have for the good they want to sell. They do not focus on the value the entitlement has for them, their personal valuation is only a reservation price. The law analyzes the Endowment Effect because it wants to protect gains from trade; most economic and psychological Endowment Effect studies by contrast are concerned with a different question: They test theories of preference formation; unlike in trading behavior they focus the participants on their entitlement to demonstrate that valuation depends on ownership and expectations.

We show in this study that an experimental design that focuses the subjects’ attention on their good elevates the size of the Endowment Effect and can mislead the legal debate. Our experiment provides the subjects with incentives for strategic behavior. As typical for trading, the participants can earn more if they ask for a price that exceeds their personal valuation of the good they are endowed with. The incentives shift the attention of the subjects to the potential WTP of the buyer. The results we find show that the cognitively more complex trading task weakens the owners’ occupation with their entitlement and significantly decreases their loss aversion.

Our findings should apply to most business transactions, as strategic behavior is very common in professional relationships. The study suggests that the Endowment Effect is likely less prominent in real markets than often suggested and that private ordering may seldom need legal protection against it.

I. Introduction

Hundreds of law articles have argued that the endowment effect (henceforth EE) requires the law to intervene in private ordering. In free markets people should ideally exchange goods until they are owned by those who value them the most absent transaction costs (Coase, 1960). But transaction costs are not the only impediment of beneficial exchange, another are the owners themselves, when their decisions are biased. The size of the EE suggests that the bias is a severe behavioral threat of efficient trade: Prices demanded in the state of possession typically exceed peoples’ willingness to pay by a factor of 3 or 4. The effect is robust and replicates reliably when the standard experimental protocols are used. The implication for private ordering is far reaching: Unlike in a Coasian world, the EE suggests that initial ownership matters. Owners will keep their entitlements, even when other market participants would value the property considerably more (see, for example, Thaler, 1980; Knetsch & Sinden, 1984; Knetsch 1989; Tversky & Kahneman, 1991; Kahneman, Knetsch & Thaler, 1991). However,

Notice, the paper is single authored. Nevertheless, I use the pronoun “we” throughout the paper following international customs as the paper is written for publication in an international Law and Economics Journal.
when owners are biased voluntary transactions cannot realize these gains from trade, because they exist only when both parties are in the same state of possession. Thus, unless owners themselves can overcome their EE, the bias seems to call for external intervention.

In recent years though, the evidence on the EE and the policy recommendations based on it are viewed more skeptical. First, Plott and Zeiler criticized the results on methodological grounds. They argue that the gap between WTA and WTP prices is often an artefact of the experimental methods used. For example in some studies experimenters endowed subjects with a good they personally assigned instead of allocating it randomly. Plott and Zeiler show that subjects value the good more, if it was personally selected for them. However, the EE has since been reproduced attending to their critique: Isoni et al (2011), Heffitz and List (2013), Arlen and Tontrup (2015), and others (see below) report significant evidence employing an improved experimental protocol that avoids the misconceptions that Plott and Zeiler identified in their work.

Arlen and Tontrup (2015) by contrast do not question that ownership can bias valuation. They argue that the legal EE literature tends to derive policy recommendations from experiments that do not account for the institutions that people typically use or act within when they trade. Sellers anticipate experiencing regret should they find out after the sale that keeping their entitlement would have been the better decision. The expected costs of regret can prevent them from trading. In business contexts however, owners seldom trade alone. They employ institutions like an agent or a board of peers decides by vote. The institutions allow decision makers to share responsibility and to mute the regret they expect to experience over a wrong decision. Entitlement holders even purposely involve costly institutions in order to self-debias and trade at lower regret costs2.

In this study we show that incentives for strategic behavior can substantially reduce or even eliminate the EE. Strategic behavior and preference misrepresentation are characteristic for business and trading decisions. Competition is almost never perfect: A good’s attributes and price may not be fully transparent, for some goods no near substitutes may be available, strategic situations like hold ups may occur. Owners and buyers can exploit these situations and exaggerate or downplay their true valuation for an entitlement. As strategic incentives are so omnipresent in real transactions our findings suggest that policy intervention may seldom be needed to protect private exchange against the influence of the EE.

The EE experiments in Psychology and Economics typically abstract from strategic behavior. The two most often used experimental paradigms are a random price mechanism and a random allocation design (for the details see the literature section); both instruct and incentivize subjects to focus on valuing their entitlement. The experiments are designed to analyze the cognitive processes that underpin preference formation. To cleanly proof that valuation is state dependent and affected by loss aversion they radically reduce the decision making situation, such that ownership alone can affect the valuation of a good. In these experiments participants’ sole cognitive task is to value their entitlement; the only information they

2 Another behaviorally rational strategy muting the EE exploits the decision makers’ social context (Arlen & Tontrup 2016): If owners expect that others might trade in their situation, they acquire costly information on their choices to take them as a reference point. Focusing on the trading decisions instead of their entitlement allows owners to reduce the regret they expect to experience over the trade should it bring up a loss.
are provided with and that they have to process are the positive and negative attributes of the good. Strategic behavior is ruled out as a confounding factor.

The law’s interest by contrast is policy orientated and concerned with private exchange and this brings strategic behavior into focus: When people trade they typically set prices strategically to earn a profit. Their personal valuation for the good they want to trade, presents only a reservation price. Trading is a complex cognitive task: Instead of focusing on the value the good has for him, the decision maker shifts attention to the social and economic context of the transaction. He focuses on market prices, he will form beliefs about the behavior of potential partners he interacts with. He may have expectations concerning the profit he has to realize for his business or for private matters, he may consider whether he can compensate the loss if expectations are not met. We argue that the complexity of this cognitive task divides the sellers’ attention between many economic and social factors they have to process when they trade. Compared to the experimental designs Economic and Psychology use in their EE experiments they focus less attention on their entitlement and its valuable attributes. As a result we expect the EE to affect actual trading behavior less than typically reported in earlier experiments and in the legal literature.

We ground our study in cognitive process theories of attention. The original explanation for the EE is Prospect Theory’s loss aversion (Kahneman & Tversky, 1979): The owner experiences selling the good as a loss while the buyer perceives adding the same good to his endowment as a gain. As the loss looms larger than the gain preferences are biased by ownership: the same individual values the good more in the role of a seller than as a buyer, his WTA exceeds his WTP (Thaler, 1980). Prospect Theory however, does not clarify the cognitive process that causes the different experience of losses and gains. It cannot explain why social factors affect the size of the EE when they do not change endowment status. For instance personal attachment (Strahilevitz & Lowenstein, 1998) and self-association with the traded good tend to intensify an owner’s EE (Maddux et al., 2010). Given their effect, both factors must interfere with the cognitive process that causes the bias. The same holds for the strategic incentives we study: we expect them to affect the EE without altering endowment status. For analyzing the incentives’ influence on the EE we need an understanding of the cognitive process that drives loss aversion.

Recent studies have tried to provide this understanding (Brown, 2005; Morewedge, et al., 2009). Carmon and Ariely (2000) for example propose that the EE is caused by a cognitive focus on the forgone: sellers focus on the good they give up and buyers on the money they spend. Query theory suggests that the retrieval of positive and negative attributes of an entitlement from memory is biased by endowment status (Johnson, et al., 2007). Other attention based concepts show (Ashby et al., 2012) that also information uptake is biased: Possession focuses sellers on positive, value increasing information, because owners lose these benefits when they sell their entitlement; negative aspects will not be missed and receive less attention. Buyers in turn, focus on the opportunity costs of obtaining the good. In consequence the subject’s weighing of positive and negative aspects of the transaction is biased creating the characteristic gap between WTA and WTP prices.
Unlike Prospect Theory attention based theories predict that social factors can increase or reduce the EE if they affect the seller’s focus of attention\(^3\). Self-association and personal memories for example focus owners on their entitlement and thereby increase the EE. Strategic incentives have the opposite effect: They draw the sellers’ attention from the attributes of their entitlement to the social and economic context of the decision making situation; trading focuses the seller on the profit he wants to earn and on estimating the WTP of his potential partners to accomplish a successful deal. In line with the attention based theories we assume that the information about markets, prices and trading partners etc. that the subjects have to process when they trade refocuses their attention, weakens their biased fixation on the entitlement and thereby substantially reduces or even eliminates their bias.

In our study we endow subjects with tickets of a real public lottery, the Eurojackpot\(^4\). We inform the participants about the probabilities that the ticket might win a prize in one of the categories to enable them to assess the ticket’s expected payoff. For the trading decisions we use a random price mechanism (BDM, details in the design section). Our 2x3 design varies the endowment status of the subjects comparing an Endowment with a No-Endowment condition. Second we manipulate whether subjects are incentivized to reveal their true valuation for the entitlement or whether they face incentives and can benefit from strategic behavior (True Valuation vs. Incentive). In the last treatment we replace the random price mechanism and assign subjects a real transaction partner, who may himself act strategically. In the Endowment condition we present subjects with a price list asking them for each price between 0.25 Cent and 10 Euro whether they prefer to sell or to keep their lottery ticket. Then we draw a random price and compare the subjects’ WTA with this price. If their WTA does not exceed the random price, then the subjects sell their ticket and receive the random price in return, otherwise they keep their ticket. In the No-Endowment treatment we use a choosing design (Johnson et al. 2007). Subjects are presented with the same price list and have to choose for each price whether they prefer receiving the ticket or the money. The transactions’ outcome depends on what choice they have made for the random price we draw.

Comparing the True Valuation conditions reveals a strong EE as expected: Subjects demand on average 5.79 Euro for selling their lottery ticket, while in the No-Endowment condition their choosing price is only 3.76 Euro. Our psychometric measures show that sellers experience significantly more anticipated regret over trading their lottery ticket than the participants in the No-Endowment condition. The finding supports that ownership focuses the subjects on what they lose when they sell: They anticipate regretting the trade should they learn that the ticket won a prize.

In the Incentive treatment we modify the random price mechanism to provide the subjects with incentives for strategic behavior. Participants are not paid the random price, but the

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\(^3\) Findings reported in the literature suggest that factors that are likely to focus the owners’ attention even more on their entitlement like personal memories or self-association with a good (a mug of the University where one has graduated) can considerably increase the size of the EE. In our study we assume the opposite effect: Social factors that draw the attention not towards but away from the entitlement should in turn substantially reduce the EE.

\(^4\) The official website of the lottery: https://www.lottoland.com/en/eurojackpot/results-winning-numbers
amount they demand. This allows subjects to benefit from setting a strategic price: The higher the amount they ask for, the more they can earn. In turn, strategic behavior creates the risk that the deal fails at a price subjects would have preferred to trade for. The results support our attention-based theory and show that processing strategic information reduces the EE: In the Endowment Incentive treatment subjects demand an average WTA of 5.71 Euro, while in the No-Endowment condition we find a mean choosing price of 5.11. The treatment difference reveals a weak only marginally significant EE. Indeed, in comparison to the True Valuation treatment, the bias has shrunk to less than a third of its original size (0.60 vs. 2.03 Euro).

In the final treatment we replace the random price mechanism with a real transaction partner to move the experimental setting further towards a typical trading choice. In the Endowment Real Partner condition we compare the subjects demand with the WTP of a randomly selected participant. The subjects sell their ticket for the price the real partner offers, if their demand does not exceed that offer; otherwise they keep their ticket. In the No-Endowment condition subjects receive either the ticket or the money depending on which of the two they chose for the price the participant offers for the ticket (see the design section). With the Real Partner treatments we increase the complexity of the subjects’ decision making task. In the Incentive treatments subjects can calculate the risk they take when they exaggerate their valuation, since the probability distribution of the random price is known. By contrast when they are matched with a real partner they have to form a belief about what his WTP for the ticket may be. They have to consider that their partner might also behave strategically lowballing his offer. As the design forces participants to process more and new types of information the size of the EE should decrease. Indeed, in the Real Partner treatment the EE collapses: The gap of WTA and WTP prices (Endowment condition: 4.54 Euro; No-Endowment: 4.14 Euro) is no longer significant; accordingly, the difference between the regret subjects anticipate over selling their ticket compared to the No-Endowment condition almost disappears.

Our study has implications for legal policy and the theory of the EE. Economic and psychological research has analyzed various effects of state dependent preferences by focusing the subjects’ attention on valuing their entitlement. The law to the contrary is concerned with the benefits of trading behavior where pricing is typically strategic and owners have to divide their attention between multiple economic and social factors and the valuation of their entitlement. Apparently the law’s interest is so distinctively different that the debiasing influence of strategic incentives on the EE has not been systematically analyzed before even though the literature is very large. Our results demonstrate how important an estimation of the bias is, that posits subjects in a strategic trading context and presents them with the cognitive

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5 When subjects obtain the BDM price, they cannot benefit from misrepresenting their preferences. Exaggerating their true valuation can only make them worse off leaving them with the ticket when they really would have preferred to sell for the random price; see the design section below.
6 Assume subjects demand 8 Euro for the ticket while their true WTA is 5 Euro. In this case they are paid 8 Euro if the BDM price is not smaller than the 8 Euro they asked for. By comparison if the subjects would have indicated their true WTA of 5 Euro instead, they would have received only 5 Euro.
7 To support our theory we estimate a linear model that includes all data (see the result section): The interaction terms of both incentive treatments with ownership (Real Partner*Endowment & Incentive*Endowment) have a significantly negative effect on prices; thus strategic incentives strongly decrease the gap of WTA WTP prices.
complexity that is typical for trading behavior⁸. In such a setting the size and the relevance of the EE for private ordering appear in a new light.

When policy makers estimate how largely the EE impairs private ordering they should also account for the interplay of strategic incentives with other sources of debiasing like the institutions that people use for trading (see Arlen & Tonrup, 2015). Strategic incentives and institutions interfere with the mechanism behind the EE on a different cognitive level suggesting that their debiasing effects might add up. We conclude that in actual markets the EE should at least be substantially smaller in size than suggested by the large existing economic and psychological evidence. Legal intervention may seldom be advised.

This article proceeds as follows. Section 2 presents our theory and the related literature. In section 3 we describe our experimental design while section 4 reports our results. Section 5 finally discusses the validity of our findings and their implications for legal policy.

II. Theory and Related Literature

We assume that the EE is caused by changes in the focus of attention, information uptake and weighting of positive and negative attributes of the entitlement (Carmon & Ariel, 2000; Nayakankuppam & Mishra, 2005; Johnson et al., 2007; Ashby et al., 2012). When owners decide whether or not to sell a good, they focus on the value-increasing aspects of their entitlement giving them more weight in their decision making. This process biases their choice towards the status quo. Conversely, buyers focus on the opportunity costs of the transaction, the money they could otherwise use for other causes.

Two alternative effect channels have been identified to be driving the EE: The first is attachment and refers mostly to physical goods with qualities like beauty, elegance or usability. When endowment focuses the owners’ attention on these attributes their valuation for the good increases, people get attached to their entitlement. By contrast the characteristic attribute of stocks or patents is the uncertainty of their future value. The value of patents for example is typically difficult to predict (Lemley & Shapiro, 2005) and the price of stocks will rise and fall. With their salient win or lose structure these entitlements trigger anticipated regret over the trading choice. However, regret does not alone affect goods of uncertain value: The uncertainty does not have to be caused by properties of the good or the market price. It can be the result of a vague or not confident preference of the owner: If the owner is not sure how valuable the good is for him, then he can anticipate feeling regret over a sale, should he later realize that he would have preferred to keep the entitlement⁹.

As we endowed the subjects with lottery tickets, we assume that anticipated regret is the dominant behavioral driver of the EE we expect to observe in our study (Bar-Hillel et al.,

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⁸ Indeed, the trading situation will often be more complex than in our study: Sellers may be preoccupied with the availability of market prices or trading scenarios like hold ups or social dilemmas (see Glöckner et al., 2014 and Blumenthal, Jeremy A., 2012), or reputation effects and the shadow of future business. They will often present owners with a multilayered puzzle of incentives they have to balance in their decision.

⁹ See also the recent study by Weaver and Fredrick (2012). They find that people tend to reject trading a good for a price that exceeds their true WTA if the offer falls short of the assumed market price for their property. People take the market price as a threshold and anticipate that they will feel regret over selling for a lower price, should later occur an option to sell at market price. They even risk that they not be able sell their property at all.
1996; van Dijk & Zeelenberg, 2005). In line with the literature we therefore ground our predictions in regret theory (Loomes & Sugden, 1982; Sugden, 1985). Anticipated regret roots in a comparison of the alternative choice options a decision maker has, for example ticket holders can either keep or sell their lottery tickets. When they compare their choice options they anticipate regret over the forgone gains of the alternative path. For instance when they consider selling their ticket, they anticipate that forgoing a prize the ticket may win will cause them regret. In turn when they consider keeping their ticket they anticipate experiencing regret over forgoing the sales price, should the ticket turn out to be a blank. Regret affects their choice because it is not symmetrical, when it is biased by ownership. Ownership focuses the subjects’ attention on the entitlement and on what would be lost by selling it: the good’s benefits (Kahneman & Tversky, 1982). The biased focus leads to a higher cognitive availability of the good’s positive attributes increasing the value owners ascribe to their entitlement (Kahneman et al., 1986; Johnson, et al., 2007). The more valuable the attributes appear to the owner, the more regret will he anticipate over selling his property (see Bell, 1982; Loomes & Sugden, 1982; Connolly & Butler, 2006; Zeelenberg & Pieters, 2004). For example when patent holders consider selling their entitlement, they focus on the economic potential of the patent increasing the regret they feel over the trade. With ownership fixating entitlement holders on the benefits of their goods, the gains from selling receive comparatively less attention and less weight in the decision making process (see Ashby et al., 2013 analyzing the attentional focus using an eye tracker). Thus, as the forgone benefits of the entitlement loom larger, patent holders anticipate more regret over selling than over keeping their entitlement. The asymmetry of regret costs biases them against trading (Loomes & Sugden, 1982; Sugden, 1985; Landman, 1987; Baron & Ritov, 1994; Connolly & Butler, 2006; Nicolle et al., 2011). Applied to our study, subjects should therefore experience more regret over trading their lottery ticket than over keeping it. As we will see in the hypothesis section we expect subjects in the role of a seller to compensate for their regret costs by asking for a higher sales price.

We assume that the structure of the cognitive task and the information the subjects have to process when they trade influence their focus of attention and their bias. Business contexts will often contain strategic elements that the parties can exploit to earn profits. First owners have to form risk preferences and decide to ask for a higher or a lower price which will influence how quickly they can close a deal. The interaction with a partner forces the seller to form beliefs about, what WTP and what kind of incentives a potential buyer may have. The transaction partner moves into the focus of attention. Business relationships are often characterized by thick layers of strategic incentives that the sellers have to balance in their choices including the shadow of future dealings specific situations like social dilemmas and so on. Thus, trading forces the decision maker to process more and other types of information beyond the valuable attributes of his entitlement, the only information he has to process in typical EE experiments. We assume that this increasingly complex process weakens the owners’ focus on their entitlement reducing the value they ascribe to their property and the regret they anticipate over selling it.

In order to cleanly analyze the effect incentives for strategic behavior have on the EE we first keep the structure of the incentive simple and implement a very controlled and reduced setting compared to a real trading task: In the Incentive treatments the probability di-
tribution of the random price informs the subjects about the gains and the risk of strategic behavior. The treatment involved subjects’ risk preferences but not strategic interaction. In the Real Partner treatment we add strategic interaction moving the setting close towards a real trading task: We provide the exchange partner with the same strategic incentives as the subjects. Our theory suggests that the incentives and increasing strategic complexity should reduce or eliminate subjects’ EE.

The strategic elements may not alone increase the complexity of the decision making task. They may also affect the framing. If subjects trade to make a profit and set a strategic price above their true valuation their attention may be focused on the benefits of selling. They may be in a gain not a loss frame. A patent holder for example may not focus on the value of the patent, but on the profit he can make with a sale. If the focus of attention switches with the goal of making a profit we expect the perception of the entitlement to change. When the subjects in our study do not focus on the potential prize the ticket may win, but on the gains of selling, we expect their economic valuation of the ticket to reflect that the ticket likely is a blank. Regret over the sale is low and the EE should disappear.

Thus, on the grounds of attention based theories the EE is best understood as a continuum: the bias is strong if an owner’s attention is fixated on the entitlement’s positive attributes, it is weakened when attention is spread out across many strategic or social cues of the trading choice and it disappears if the owner focuses on the gains from trade which is typical for professional traders, who keep goods only for their exchange value (see Kahneman et al. 1990).

III. Experimental Design

A. A Real Lottery

We endowed our subjects with tickets of the lottery Eurojackpot. The tickets can be purchased online. The lottery is conducted every week and distributes millions of Euro amongst the victors. The draw is broadcasted live on the internet and the winning numbers are publicized on the lotteries’ website. Players can tip 5 and two extra numbers on their tickets. We informed the subjects that we used software to randomly select the numbers that we tipped on the tickets. In order to assign the lottery tickets at random we purchased tickets for the targeted number of observations in advance. Then we drew the tickets from an urn and numbered them following the order of the draw. We sent the ticket that was drawn first to the first subject that started with the experiment the second participant received the second ticket and so forth. Before the subjects began completing the study we asked them to create an anonymous e-mail account to which we sent the receipt of the lottery ticket. To confirm that they read the mail, they had to indicate the first three winning numbers listed on the ticket receipt they received. The instructions clarified, that the participants would only be paid, if they submitted the correct numbers. As some subjects may have participated in the Eurojack-

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10 More radially speaking valuation might generally be a function of attentional focus. It can be low or high. The concept of a bias makes still sense but only comparatively everything else equal, ownership tends to bias valuation.
11 You find further details in the methods section.
pot lottery before either with success or disappointment, we did not reveal the name of the lottery before the subjects had fully completed the study.

In all conditions we sent the subjects the receipt that we received from Eurojackpot after purchasing the ticket. As the receipt confirmed the winning numbers that we tipped after our program had selected them the subjects were aware that they would learn after the fact, whether the ticket they owned or could have chosen won in the lottery or not. Importantly, the receipt alone does not establish ownership. We instructed the participants that for claiming ownership and collecting a prize Eurojackpot sends a separate authentication code. Owner is who can provide this code. Only in the Endowment condition we initially entitled the subjects with the authentication code (details in the design section).

B. Modified BDM Mechanism

The impact of strategic behavior on the EE has not yet been analyzed systematically. We therefore developed a new experimental protocol. Our basic treatment replicates the EE. Against this benchmark condition we can measure the effect incentives have on the size of the bias. We use a random price mechanism in the basic treatment as it incentivizes the subjects to reveal the true valuation they have for their entitlement. Because of this property the Becker/Degroot/Marshak mechanism (hereafter BDM, see Becker, et al. 196412) is widely used in EE experiments. In BDM studies the experimenter draws a random price and the subjects sell their entitlement if their demand does not exceed this price. For the sale they are paid the random price, not the amount they demand. As we will explain in more detail below, this mechanism ensures that strategic behavior can only make participants worse off leaving them with the good, when they would have preferred to trade. In the control treatment subjects have no entitlement. They can choose between the good and a monetary payment. Comparing the two treatments reveals the impact of ownership, the gap between the subjects’ WTA and WTP prices.

To implement the incentives for strategic behavior we modify the design of the BDM mechanism. In the first treatment if subjects sell, they are paid the amount they demand instead of the random price. This allows subjects to earn more by exaggerating their true valuation. They receive any price they ask for, as long as their demand does not exceed the random price. On the other hand, subjects risk by inflating their demand that they have to keep the ticket when they would have preferred to sell. In the second treatment we replace the random price mechanism with the offer of a real partner, who can act strategically. Sellers receive any price they ask for, if their demand does not exceed the partner’s offer; otherwise they keep (obtain) the ticket. The partner has incentives to keep the offer low: he has to pay the price he offers. If his offer exceeds the subject’s demand, the experimenter collects the price difference.

12 A second experiment type that is often employed in Economics and Psychology is a random allocation design (see for example Knetisch, Kahneman & Taylor 1990). The study assigns half of the subjects the role of a seller - they receive the good-, while the other half are buyers and are given money. Half of the sellers are expected to trade, as the valuation for the good is randomly distributed across sellers and buyers; the other half should keep the good. As sellers and buyers trade for the market clearing price, they cannot benefit from misrepresenting their true valuation. Sellers should act as price takers.
C. Treatments

We implement a 2x3 factorial design. Our treatments vary a) the endowment status, b) whether subjects are given an incentive for strategic behavior or to reveal their true valuation and c) whether subjects face a real transaction partner or trade with the BDM mechanism.

1. Endowment Status

In all Endowment conditions we send subjects the ticket receipt and the authentication code which establishes their ownership and which entitles them to collect any prize their ticket wins. We instruct the participants that they give up ownership and the right to claim winnings if they sell their ticket in the course of the experiment. In the No-Endowment condition we provide participants only with the ticket receipt but not with the authentication code. Thus while the subjects also lean the winning numbers, they have no ownership rights. We instruct the subjects that they will obtain the authentication code if they buy the ticket.

2. True Valuation Treatment

In the Endowment condition the BDM mechanism compares the subject’s WTA with the random price. Subjects can demand any price within the range of 25 Cent to 10 Euro in exchange for their lottery ticket. The random price is drawn within the same range. We present the subjects with a complete list of the 40 prices (0.25; 0.50; 0.75 … 9.75; 10.00 Euro) and ask them to state for each price whether they want to sell or keep their ticket. The lowest price for which they prefer to sell reveals their WTA. They sell their ticket and are paid the random price in return, if their demand does not exceed the random price. By contrast if they ask for an amount higher than the random price they keep their lottery ticket and are entitled to collect any prize the ticket may win.

In the No-Endowment treatment we employ a choosing design (see Johnson et al. 2007). Subjects are presented with the same price list as in the Endowment condition; for each price they have to choose between the ticket and the money. For example subjects are asked if a random price of 1 Euro is drawn would they prefer to receive the ticket or the money (we present the price list in the appendix). The lowest price for which they prefer to obtain the money reveals their WTP. Henceforth we will call this price their “choosing price”.

The BDM mechanism incentivizes the subjects to reveal their true valuation for the ticket, because they are not paid the amount they ask for, but either receive the random price or the ticket. For example assume a participant demands 5 Euro for selling his ticket, while a random price of 8 Euro is drawn (note, in all examples that follow we will assume the same random price of 8 Euro). Since the random price is larger than the 5 Euro the subject is willing to accept, he collects the random price in exchange for his ticket. Misrepresenting his true valuation can only make the participant worse off: Assume he exaggerates his WTA and demands 6 Euro instead of his true WTA then he would not earn anything extra but still obtain the same random price. If he demands 9 Euro then his WTA exceeds the random price and he has to keep the ticket, even though he would have preferred to trade for the drawn price. Thus misrepresentation has no advantage for the subject as long as his demand does not exceed the random price and it becomes disadvantageous, once the subject asks for an amount higher than the random price. We refer to the treatment that implements the original BDM mecha-
nism as the *True Valuation* treatment. The two conditions *Endowment* and *No-Endowment* serve as our Baseline and intend to replicate the EE.

3. Incentive Treatment

To provide subjects with incentives for strategic behavior we modify the BDM mechanism: The original mechanism allocates subjects the random price, even if their actual demand is lower than this amount. In our modified version participants obtain the price they personally ask for. For example assume a subject demands 5 Euro for selling his ticket. Then the subject trades and receives the 5 Euro he asked for in exchange. Now assume the subject would exaggerate his valuation demanding 7 Euro. In this case he obtains 7 Euro, 2 Euro beyond his true valuation. Our modified BDM mechanism allows the subjects to benefit from misrepresenting their valuation. In turn the design attaches a risk to strategic behavior: Consider the subject demands 9 Euro. Then he has to keep his ticket, even though he would have preferred to sell it for the random price.

In the *No-Endowment* condition subjects obtain their choosing price or the ticket. For example, the lowest price for which a subject prefers money over the ticket is 7 Euro. Then he obtains the 7 Euro as they do not exceed the random price. By contrast, if he states 9 Euro as his choosing price, then he receives the lottery ticket, not the money. We refer to the treatment that presents the subjects with incentives for strategic behavior as the *Incentive* treatment. We again compare an *Endowment* and a *No-Endowment* condition.

**Endowment Status X Incentive’s lead to the following four treatments:**

a) **Endowment & True Valuation:**
Subjects are endowed with a lottery ticket (receipt and authentication code). They sell their ticket in exchange for the random price, if the amount they demand does not exceed the random price, otherwise they keep their ticket.

b) **Endowment & Incentives:**
Subjects are endowed with their lottery ticket. If their demand does not exceed the random price, they sell their ticket and are paid the amount they asked for in exchange. If they ask for an amount higher than the random price, they keep their ticket.

c) **No-Endowment & True Valuation:**
Participants choose for each possible random price whether they prefer to obtain the ticket or the money. Subjects are paid the random price if the lowest amount for which they state to prefer the money does not exceed the random price. Otherwise they receive a ticket.

d) **No-Endowment & Incentives:**
Participants choose for each possible random price whether they prefer ticket or money. Subjects are paid the lowest amount for which they state to prefer the money, if this amount does not exceed the random price. Otherwise they receive a ticket.

3) **Real Partner Treatment**
To move the design closer to a real transaction we replace the random price mechanism and assign the subjects a real partner for their transaction. The treatment also increases
the cognitive complexity of the decision making task\textsuperscript{13}. We filled the role of the partner with randomly selected participants. However, to save observations we assigned the subjects to groups of five and match each group with a single partner. We compare the sales and choosing prices of each subject with the same offer of the partner who we matched with the group. To avoid any confusion, we did not inform the subjects that are part of a group assigned to the same partner.

In the \textit{Endowment Real Partner} condition subjects receive their lottery ticket. A subject sells his ticket, if the price he asks for does not exceed the amount the partner offers. In exchange for his ticket the subject obtains the price he demanded. By contrast if a participant asks for a higher price than the partner offers, then he keeps his ticket. In the \textit{No-Endowment} condition subjects are presented with the price list and state for each price whether they prefer to obtain money or ticket. The subject receives a ticket if he prefers the ticket over the price the partner offered. By contrast if he chooses the money for the price the partner is willing to pay, then he receives his choosing price (not the amount the real partner offered; you find an example in the footnote\textsuperscript{14}). Thus the real partner design also gives subjects an incentive for strategic behavior. The participants face a risk too: If they select a choosing price beyond their true valuation, then they might receive a ticket, even though they would have preferred to be paid the amount their partner offered.

Note we do not vary the partner’s role; in both treatments \textit{Endowment} and \textit{No-Endowment} the partner makes an offer to buy the ticket. This design keeps the manipulation constant across the two conditions. The purpose of the real partner treatment is to force subjects to anticipate and form beliefs about the (potentially strategic) behavior of their partner. However, if that counterpart would be an owner in one condition and a buyer in the other, then subjects may form very different beliefs about the price their partner may offer or ask for, depending on the endowment state he is in. Subjects may even anticipate an EE (however see van Boven et al. on empathy gaps with respect to the EE 2003). Therefore, we give the partner a 10 Euro endowment in both treatments and elicit his WTP for the ticket. He has incentives for strategic behavior: He can offer any price within his budget for buying the ticket and keeps the amount that he does not spend. Since we use the choosing design, this implementation is intuitive also in the \textit{No-Endowment} treatment: The partner gets the lottery ticket, if he states to value the ticket at least as much as the subject; in this case the subject obtains his choosing price. Otherwise the subject receives the ticket and the partner keeps his endowment. We instructed the subjects that their partner face strategic incentives.

\textsuperscript{13} As described above, matched with a real partner the subjects have to consider that their counterpart may also set prices strategically. In the Incentive treatments subjects can calculate the prospects of misrepresentation as they know the probability distribution of the prices the BDM mechanism may draw. By contrast in the real partner design the subjects have to predict the potentially strategic behavior of their counterpart in order to realize the gains from trade. Also other regarding preferences may interfere: if the participants exaggerate the price they do not only risk their own but also their transaction partner’s benefits from trade.

\textsuperscript{14} For instance assume the subject’s choosing price is 5 Euro. If the partner offers 8 Euro to buy the ticket, then the subject obtains his choosing price of 5 Euro, because for his partner’s WTP he prefers to receive the money not the ticket. If the subject decides to exaggerate his true valuation stating 7 Euro as his choosing price, then he would obtain 7 Euro instead of 5.
The Real Partner Treatment:

e) Endowment with Real Partner
Subjects sell their ticket if the price they demand does not exceed the offer of the real partner. They receive the price they ask for, even if the partner has offered a higher amount. If the subjects demand more than the real partner offers then they keep their ticket.

f) No-Endowment with Real Partner
Subjects choose for each possible price their partner may offer whether they prefer obtaining ticket or money. The subjects are paid their choosing price, if they prefer the money for the price the partner offers. Otherwise they obtain a ticket.

D. Hypothetical Second Market

Our theory suggests that subjects are preoccupied with the strategic elements of trading and therefore focus less attention on the positive attributes of their entitlement reducing their loss aversion. To further support this theory we want to identify the subjects who respond to the strategic elements of the task in order to analyse whether they indeed reveal a smaller bias. The price alone does not inform us, whether a subject has set this price strategically or not. The treatment comparison (No-Endowment True Value vs. No-Endowment Incentive for example) reveals only whether the subjects on average respond to the incentives. Therefore we implement a second, hypothetical market, before the subjects receive feedback about the outcome of the transaction. The second market presents the subjects with the alternative treatment: the subjects of the Incentive and Real Partner treatments are asked for the true valuation they have for the ticket; the subjects of the True Valuation treatment by contrast are provided with incentives for strategic behavior. Since all subjects are familiar with the random price mechanism, we only have to inform them about how the rules of the second market differ from the treatment they have already completed. To demonstrate the meaning of the changes we provide the subjects with scenarios that illustrate either why they can benefit from misrepresenting their preferences or why they should reveal their true valuation (instructions are presented in the appendix). Comparing the prices across the two markets reveals whether or not a subject has set prices strategically: whenever the price a subject indicates in a strategic market exceeds the price, he states in a true valuation market, then he has made a strategic choice.

E. Anticipated Regret

We ground our predictions in regret theory assuming that the EE in our study should be driven by anticipated regret costs. To support our theory with direct evidence we elicit the level of regret the subjects expect to experience over their trading choice. We expect that the incentives reduce the asymmetry of regret costs and thereby the subjects’ bias. In the Endowment conditions we ask participants to indicate how much regret they anticipate over selling their lottery ticket considering that they might forgo collecting a prize the ticket may win. To show that the regret subjects anticipate is indeed biased we ask them also, how much regret they anticipate over keeping their ticket, considering that they forgo the sales price in the likely case that the ticket is a blank. We expect comparing the two values to reveal an asymmetry of regret costs that bias the subjects against trading. In the No-Endowment conditions we que-
The subjects how much regret they anticipate over choosing the money considering that they forgo a prize the ticket might win, and how much regret they anticipate over choosing the ticket considering that they forgo the economic value of the sales price if the ticket is a blank. We used Likert items with 10 ordered response levels ranging from 1=no regret at all to 10=very strong regret (see the instructions in the appendix).

V. Methods

We recruited the participants from a subject pool of current and former students of the University of Münster. About 30% of the participants are graduates from the University and work as professionals. The subjects had different disciplinary backgrounds from both the social and natural sciences. We balanced the gender in the sample, inviting half men and half women to the experiment. Gender and age did not significantly affect our results, when we controlled for demographic variables in our regressions. Across treatments we collected 300 observations for our study. 10 percent of the subjects who began the study did not complete the experiment. The dropout rate is comparatively low likely because the subject pool is established for many years and we paid subjects only if they finished the experiment. We sent participants an individual key in their invitation e-mail; they had to enter this key in order to begin with the study. Once used, the key became invalid.

Participation in the study was anonymous. We asked the subjects to create an anonymous and costless e-mail account. Creating the account took the subjects ~30 seconds and they did not have to provide any personal information. We used this anonymous account to send the subjects the receipt of the lottery ticket and in the Endowment conditions their authentication code. Payment was also organized anonymously. We instructed subjects to make up and memorize a 5 digit number. After the experiment they could pick up their earnings in the main office of the student government of the University of Münster. We put their payment in an envelope marking it with their personal 5 digit number that only they knew. When they indicated their number the employee in the office handed them their envelope. The employee was not involved in the experiment and did not know what the envelope contained.

To ensure that the subjects fully understand how the BDM mechanism operates, we presented them with a set of control questions. The participants could only proceed with the experiment if they managed to answer all questions correctly. Their responses revealed that the participants – all of them being current or former University students – had no problems understanding the instructions. We presented the subjects with various scenarios for which we asked them to calculate the payoffs. The scenarios demonstrate that subjects would be worse off if they misrepresented their preferences in the True Valuation treatment that implemented the original BDM mechanism. In the Incentive and the Real Partner treatments the payoff calculations showed that subjects could earn an extra profit by asking for a price beyond their actual valuation, but that misrepresentation could also cost them the deal. We report all scenarios and control questions in the appendix.

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15 This is the provider of the provider of the anonymous e-mail account: https://securemail.hidemyass.com/.
16 Subjects could also opt out of the anonymous payment protocol and decide whether they wanted to be paid via electronic bank transfer or PayPal.
V. Hypothesis

**H**$_{1a}$: Replicating the EE: WTA > WTP

Ownership should focus the subjects’ attention on the positive attributes of their lottery ticket (Ashby et al., 2012). The attention biases the weight subjects give to the benefits of the lottery ticket in comparison to the money they would earn from selling their ticket. The biased weights induce an asymmetry of regret costs over the choice options: The subjects anticipate experiencing larger regret costs over losing the prize their ticket may win, when they sell, than over not collecting the sales price, if they decide to keep their ticket. Therefore when the subjects state their WTA we expect regret costs to increase the price they ask for.

In the *No-Endowment* condition the subjects have neither the ticket nor the money in their possession. When they make their choice, ownership does not cause them to focus their attention more on the chance that the ticket might win a prize than on the economic value of the money. Regret costs should not be systematically biased such that subjects do not have to compensate for asymmetric regret costs in their choosing price. We therefore expect to observe a gap between WTA and WTP prices comparing the *Endowment* and the *No-Endowment* conditions replicating the EE (H$_{1a}$).

**H**$_{1b}$: Ownership Induces Asymmetric Regret Costs

When the subjects’ attention is focused on their entitlement they should experience more regret over losing the benefits of their ticket than over forgoing the sales price. We refer to the difference between the two values as differential regret. A positive cost of differential regret indicates that the subjects are biased against trading. By contrast in the *No-Endowment* condition subjects weigh the benefits of the ticket and the money without ownership biasing their focus. Differential regret should thus not be systematically biased. Thus in comparison we expect differential regret costs to be significantly larger in the *Endowment* than in the *No-Endowment* condition (H$_{1b}$).

**H**$_{2a}$: Incentives for Strategic Trading Reduce the EE

Incentives increase the complexity of the cognitive task the subjects have to complete. Beyond valuing the ticket, traders have to balance gains and risks of strategic behavior and decide whether they want to set a strategic price or not. We assume that the strategic considerations the subjects process preoccupy their attention: Because ownership biases subjects to focus more attention on their entitlement than on the sales price, a redirection of their attention should affect the focus on the entitlement comparatively stronger. Thus by causing subjects to change their focus incentives should weaken the asymmetry of attention that ownership induces (for a numbered example see footnote$^{17}$). Of course in the *No-Endowment* condition the incentives should also absorb attention. However, since the focus of attention is not systematically biased subjects should divide it more evenly between entitlement and money. As a result it should have a similar effect on the level of attention subjects focus on the enti-

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$^{17}$ For illustration consider a stylized example. Assume owners focus 75% of their attention on the benefits of their entitlement and 25% on the value of the sales price. For simplicity we assume linearity between attentional focus and regret providing us with a difference in regret costs comparing the choice options of trading and keeping of 50%. If incentives preoccupy 50% of the owners’ attention, they substantially reduce this bias: in the presence of incentives owners would focus only 37.5% of their attention on the ticket and 12.5% on the sales price; the asymmetry of regret costs is cut in half.
tlement and on the sales price if incentives absorb attention. With incentives reducing the asymmetry of the sellers’ attentional focus in the Endowment condition and no expected effect on subjects’ choosing prices, the gap between WTA and WTP should decrease suggesting we should find a significantly smaller EE in the Incentive than in the True Valuation treatment (H$_{2a}$).

**H$_{2b}$: Incentives Reduce the Bias in Differential Regret Costs**

With ownership focusing subjects’ attention on the benefits of their entitlement, subjects anticipate higher regret costs over losing these benefits than over forging the sales price in the Endowment condition$^{18}$. We assume that incentives will weaken this asymmetry of regret costs: By absorbing the owners’ attention they should reduce the difference between their biased focus on the entitlement and the sales price. As a result we expect incentives to diminish the biased asymmetry of regret costs. When we compare differential regret costs across the Endowment and the No-Endowment conditions we expect to find a significantly smaller bias in the Incentive than the True Valuation treatment (H$_{2a}$).

**H$_{3a}$: Strategic Interaction Reduces the EE**

Matching the subjects with real trading partners increases the complexity of the cognitive task the subjects need to solve. Both parties have incentives for strategic behavior. Subjects have to account for the strategic interaction and have to anticipate the choices of their partner. As in H$_{2a}$ we assume that processing the strategic considerations preoccupies the subjects’ attention and reduces their biased focus on the ticket in the Endowment treatment. We thus expect to observe a significantly smaller gap of WTA vs. WTP prices in the Real Partner compared to the True Valuation treatment (H$_{3a}$).

**H$_{3b}$: Strategic Interaction Reduces Biased Differential Regret Costs**

When subjects in the Real Partner treatments focus more on the strategic elements of interacting with their partner and less on the positive attributes of their entitlement we expect them to anticipate a lower level of regret costs over trading; the bias in differential regret costs should diminish. In comparison to the True Valuation treatment we expect a significantly smaller bias in differential regret costs (H$_{3b}$).

**H$_{4a}$: Strategic Behavior Reduces the EE**

We cannot directly measure how subjects divide their attention between processing strategic information and valuing the attributes of their entitlement. However, with the second market data we can use the subjects’ actual pricing decisions as an approximation: Comparing the prices in the two markets allows us to identify whether subjects made a strategic decision or not. Participants who make a strategic choice reveal that they have focused attention on strategic considerations instead of being fully fixated on valuing the attributes of their entitlement. According to our theory this change of attentional focus should reduce their bias: Subjects who made a strategic choice should reveal a comparatively smaller EE (H$_{4a}$).

**H$_{4b}$: When Incentives Affect Preference Formation They Reduce the EE**

We claim that incentives debias, because they reduce the attention subjects focus on their entitlement. Our two-market design allows us to compare the impact incentives have on

$^{18}$Of course without the bias of ownership
the EE when they interfere with the cognitive process of subjects forming their valuation of the ticket, versus they have a valuation before they face incentives. When subjects are presented with the True Valuation treatment in the first market and the Incentive treatment in the second, we expect them to significantly raise their WTA in response to the provided incentives. However, while we expect the WTA to increase, the size of the EE should remain constant. Subjects had to form their valuation of the ticket, when they were asked to indicate a sales price in the True Valuation treatment. Thus, when they are presented with the incentives in the second market, the incentives cannot interfere with the process of forming their valuation and their bias should remain constant. Thus, for the combination of True Valuation in the first and Incentive treatment in the second market we expect WTA prices to significantly increase while their bias should remain constant.

By contrast when subjects are presented with the Incentive treatment in the first market and the True Valuation treatment in the second, we expect them to significantly reduce the price they demand. The EE is diminished and as the valuations are formed in the first market we expect the EE to remain insignificant. The EE should be significantly smaller when incentives are presented in the first versus the second market. This provides us with the general hypothesis that incentives should debias (only), when they can influence the cognitive process of forming a valuation (H4b).

VI. Results

We first report the WTA and WTP prices across all treatments analyzing the EE and the effect incentives have on the bias. In the second part we present the treatment effects on differential regret costs; we conclude the result section with the second market data.

1. Pricing Decisions

a) Non-Parametric Results

Comparing the two True Valuation conditions Endowment and No-Endowment reveals that subjects’ trading decisions are biased by ownership. We find the characteristic gap between the mean WTA price subjects demand for selling their ticket (5.79 Euro) and their mean choosing price (3.76 Euro), that is the lowest amount for which they prefer to obtain the money instead of the ticket. The price gap yields 2.03 Euro and is significant at p-value <0.01 (two-tailed Mann Whitney see also Table 119).

Table 1: Non-Parametric Treatment Comparisons

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Price € (WTA/WTP)</th>
<th>Differential Regret Costs</th>
<th>Regret Costs Trade</th>
<th>Regret Costs Keep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endow True Value</td>
<td>N=50</td>
<td>5.79</td>
<td>2.13</td>
<td>6.71</td>
</tr>
<tr>
<td>No-Endow True Value</td>
<td>N=50</td>
<td>3.76</td>
<td>0.28</td>
<td>5.0</td>
</tr>
<tr>
<td>Endow Incentive</td>
<td>N=50</td>
<td>5.71</td>
<td>0.89</td>
<td>4.60</td>
</tr>
<tr>
<td>No-Endow Incentive</td>
<td>N=50</td>
<td>5.11</td>
<td>0.49</td>
<td>4.29</td>
</tr>
<tr>
<td>Endow Real Partner</td>
<td>N=50</td>
<td>4.54</td>
<td>-0.24</td>
<td>3.82</td>
</tr>
<tr>
<td>No-Endow Real Partner</td>
<td>N=50</td>
<td>4.14</td>
<td>-0.03</td>
<td>4.18</td>
</tr>
</tbody>
</table>

*p*-values refer to two tailed Mann-Whitney tests.

19 Note in the main text we follow the convention of Experimental Economics to report non-parametric test results. However, our data fulfill the requirements for parametric testing. We will report parametric results in the footnotes, whenever their higher power changes the outcome.
The significant EE supports our H1a. The finding is in line with many studies reported in the literature that use a random price mechanism (see for example the seminal work of Kahneman et al, 1990)\textsuperscript{20}.

Comparing the two Incentive conditions we expect a smaller WTA/ WTP price gap. The incentives should reduce the subjects’ bias. Indeed, in the Endowment condition the sellers demand a mean price of 5.71 Euro for their ticket; the mean choosing price the subjects state in the No-Endowment condition is only marginally lower with 5.11 Euro. Thus, in support of our main hypothesis (H2a) the gap of WTA vs. WTP prices has shrunk with 0.60 Euro to less than a third of the gap we observe in the True Valuation treatment and is no longer significant (p-value 0.33 two-tailed Mann Whitney see Table 1 and footnote).

Likewise the strategic interaction in the Real Partner treatment should reduce ownership bias (H3a). We find a mean WTA subjects demand for selling their ticket of 4.54 Euro. The choosing price in the No-Endowment condition barely differs from this result with a mean WTP price of 4.14 Euro. Indeed, the comparison yields that the gap between WTA and WTP prices has almost vanished: with 0.40 Euro the remaining difference is not significant (p-value 0.45 two-tailed Mann Whitney).

**Figure 1: Illustration Interaction Effects for WTA and WTP Prices**

On first glance the reduction of the WTA/WTP gap may not appear to be the result of debiasing. Instead of owners lowering their biased WTA, it seems the gap is closed by incentives pushing up the subjects’ willingness to pay in the choosing condition. However, the incentives also lift the WTA prices: The second market data (which we present in detail in section IV. 3b) show, that the participants in the Endowment treatment increase their demand significantly when they face incentives. Thus, the WTA price only remains almost constant in the Incentive treatment, because debiasing compensates for the price increase driven by the incentives. In the Choosing condition by contrast debiasing cannot compensate the higher demand the incentives cause, so the subjects’ WTP moves up. The differential regret costs we

\textsuperscript{20} We also observe the methodological improvements of the experimental protocol that Plott and Zeiler suggested (see in detail the discussion section).
have measured confirm the debiasing effect of incentives (section IV. 2): regret costs in the Endowment condition are significantly lower in the Incentive than in the True Valuation treatment as we will show in the next section.

Note, the WTA prices in the True Valuation and the Incentive treatment are very different in nature: The first is a biased (but true) valuation of the ticket. When people trade, this price could not be negotiated. The price in the Incentive treatment by contrast, is strategic. Subjects’ debiased valuation is lower and they may reduce the price in order to reach an agreement with a potential buyer. Thus, even though the size of the WTA’s is almost identical, a trade is more likely to occur in the Incentive treatment, when owners are debiased and the price is strategic.

b) Interaction Effects
To analyze whether the incentives for strategic behavior in the Incentive and Real Partner treatments significantly reduce the EE, we estimate a linear regression model. We include all data and construct dummy variables for Endowment Status and the two treatments Incentive and Real Partner. Endowment Status measures the difference between prices in the Endowment and the No-Endowment conditions and thus estimates the size of the EE across all treatments. To support our main hypotheses we construct two interaction terms: Incentive*Endowment measures whether the incentive for strategic behavior the Incentive treatment provides reduces the bias of ownership. Accordingly, the interaction of Real Partner*Endowment measures whether the strategic interaction with a real partner reduces the EE. We also include demographic variables in the model to control for age and gender.

Table 2: Regression Results Pricing Decisions and Differential Regret Costs

<table>
<thead>
<tr>
<th></th>
<th>Column I. Price First Market</th>
<th>Column II. Differential Regret Costs</th>
<th>Column III. True Valuation Prices First &amp; Second Market</th>
<th>Column IV. Incentive Prices First &amp; Second Market</th>
<th>Column V. Price (WTA/WTP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowment</td>
<td>2.042*** (0.487)</td>
<td>1.599** (0.546)</td>
<td>2.039*** (0.502)</td>
<td>1.747*** (0.471)</td>
<td>2.846*** (0.594)</td>
</tr>
<tr>
<td>Incentive</td>
<td>1.352*** (0.485)</td>
<td>-0.175 (0.533)</td>
<td>0.761 (0.500)</td>
<td>-0.836 (0.470)</td>
<td>-0.378 (0.391)</td>
</tr>
<tr>
<td>Real Partner</td>
<td>0.384 (0.486)</td>
<td>-0.239 (0.544)</td>
<td>0.015 (0.501)</td>
<td>-0.131 (0.470)</td>
<td>-1.752*** (0.593)</td>
</tr>
<tr>
<td>Real Partner*</td>
<td>-1.653** (0.692)</td>
<td>-1.924*** (0.775)</td>
<td>-1.431*** (0.713)</td>
<td>-1.366*** (0.669)</td>
<td>-1.105** (0.537)</td>
</tr>
<tr>
<td>Incentive*</td>
<td>-1.440*** (0.688)</td>
<td>-1.296* (0.771)</td>
<td>-1.565* (0.709)</td>
<td>-1.146* (0.665)</td>
<td>-0.807* (0.415)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.012 (0.037)</td>
<td>-0.009 (0.042)</td>
<td>-0.006 (0.039)</td>
<td>-0.018 (0.036)</td>
<td>-0.008 (0.037)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.005 (0.281)</td>
<td>0.067 (0.315)</td>
<td>0.127 (0.290)</td>
<td>0.027 (0.272)</td>
<td>-0.050 (0.278)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.060 (1.031)</td>
<td>0.195 (1.156)</td>
<td>3.545 (1.063)</td>
<td>4.741 (0.998)</td>
<td>3.914 (1.034)</td>
</tr>
</tbody>
</table>
R²            | 0.00                       | 0.08                                 | 0.10                                                | 0.09                                              | 0.12                     |

* , **, *** indicate significance at the 10%, 5%, and 1% level. Standard errors are reported in parentheses.

First, the analysis confirms that ownership induces a bias in the True Valuation treatment $H_{1a}$. The results show a significant effect of Endowment Status on sales prices with $\beta = 2.042$ p-value <0.01. Our main hypothesis $H_{3a}$ that incentives reduce the EE finds also supports: the interaction term Incentive*Endowment is significant with $\beta = -1.493$ and p-value 0.04 suggesting that the Incentive treatment substantially reduces the biasing effect that En-
*Document Status* has on the pricing decisions the subjects make. As expected we find the same effect for the *Real Partner* treatment: Supporting $H_{3a}$ the strategic interaction in the *Real Partner* treatment reduces the EE significantly with $\beta = -2.039$ and $p$-value $<0.01$. The demographics are insignificant. The regression results are reported below in Column I. of Table 2.

### 2. Differential Regret Costs
#### a) Non-Parametric Results
For measuring the regret subjects expect to experience over their choice options we use Likert items with ordered response levels ranging from 1=“no regret at all” to 10=“very strong regret”. In the *Endowment* conditions we elicit differential regret costs by comparing the regret subjects anticipate over selling their ticket forgiving a potential prize the ticket may win with the level of regret they anticipate over forgoing the sales price, when they decide to keep their ticket. Similarly, in the *No-Endowment* conditions we calculate differential regret costs by subtracting the level of regret the subjects expect to feel over choosing the ticket and giving up the sales price from the regret subjects anticipate over choosing to trade and losing the potential winnings of the ticket.

In the *True Valuation* treatment we expect subjects to reveal a gap between differential regret costs depending on their state of ownership $H_{1b}$ mirroring the EE on sales and choosing prices. Indeed, in the *Endowment* condition subjects report a mean level of regret of 6.71 over losing the lottery ticket and a prize it may win, when they trade and a significantly lower level of 4.58 (two-tailed Mann-Whitney $p$-value $<0.01$) over forging the sales price when they keep their ticket. As hypothesized regret costs are asymmetric (2.13; two-tailed Mann-Whitney $p$-value $<0.01$) biasing the subjects against trading their ticket. By contrast in the *No-Endowment* condition differential regret costs are not biased and approximate zero: subjects anticipate experiencing a mean regret of 5.00 over choosing the money and losing a prize the ticket might win and 4.72 over the opposite choice that gives up the sales price. With 0.28 the asymmetry of regret costs is clearly insignificant at $p$-value of 0.71 (two-tailed Mann-Whitney). When we compare the level of regret across conditions we find support for $H_{1b}$: differential regret costs are significantly larger in the *Endowment* (2.13) than in the *No-Endowment* (0.28) condition confirming that ownership biases anticipated regret in the *True Valuation* treatment (difference=1.83; two-tailed Mann-Whitney $p$-value $<0.01$).

In the *Incentive* treatment we expect the provision of strategic incentives to reduce the effect of ownership on differential regret ($H_{2b}$). In the *Endowment* condition subjects report to anticipate a mean level of regret of 4.60 over selling their ticket and losing a potential prize; 3.71 are the regret costs they expect experiencing over keeping their ticket and forgoing the sales price. A comparison reveals an asymmetry of regret costs (0.89) that is only marginally significant at $p$-value 0.08 (two-tailed Mann-Whitney). In the *No-Endowment* condition the participants expect experiencing mean regret costs of 4.19 over choosing the money and 3.70 over choosing the ticket; as expected regret costs are similar for both choice options with a difference of 0.49 not biasing the trading decisions of subjects in either direction (two-tailed Mann-Whitney $p$-value 0.25). Comparing differential regret costs across the *Endowment* (0.89) and the *No-Endowment* (0.49) conditions yields an insignificant difference of 0.40 (two-tailed Mann-Whitney $p$-value 0.64) suggesting that the remaining ownership bias on
regret costs in the *Incentive* treatment is not substantial. Indeed, when we directly compare the differential regret costs subjects anticipate over selling their ticket between the *Incentive* (0.89) and the *True Valuation* endowment treatments (2.13), the incentives reduce the ownership bias by more than 58% with this decrease being significant at *p*-value 0.05 (two-tailed Mann-Whitney).

As hypothesized H$_{3b}$ the *Real Partner* treatment provides further evidence for our theory that incentives reduce the ownership bias. Participants of the *Endowment* condition report expecting a mean level of regret costs of 3.82 over selling their ticket and of 4.06 over the opposite choice. The asymmetry of regret costs is clearly insignificant (-0.24; two-tailed Mann-Whitney *p*-value 0.76). Even the sign of the differential regret costs has changed suggesting that the bias against trading the ticket has indeed vanished completely. In the *No-Endowment* treatment the participants indicate a mean level of regret of 4.18 that subjects anticipate over choosing the money and of 4.21 over the opposite choice; differential regret costs are with -0.03 almost symmetric (*p*-value 0.95 two-tailed Mann-Whitney) showing that differential regret costs do not influence the subjects in their decision making. When we compare differential regret costs across the *Endowment* and *No-Endowment* conditions of the *Real Partner* treatment we find that the EE has almost disappeared yielding an insignificant difference of merely 0.21 (two-tailed Mann-Whitney *p*-value=0.76).

**Figure 2: Illustration Differential Regret Costs**

![](image)

**b) Interaction Effects**

We estimate a linear model to analyze whether incentives significantly reduce the effect of ownership on differential regret costs. We construct the same dummy variables as in the analysis of the pricing decisions: *Endowment Status* and *Incentive* plus *Real Partner* for the main effect of the treatments. For testing our central hypothesis we form two interaction terms: *Incentive*×*Endowment* and *Real Partner*×*Endowment*.

First, the results show a significant main effect of *Endowment Status* on regret costs with $\beta = 1.814$ *p*-value < 0.01 suggesting that regret is indeed the main behavioral channel.

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21 The differential regret costs that subjects indicate in the No-Endowment conditions of the True Valuation and Incentive treatments differ only barely and insignificantly: Incentive (0.49) and True Valuation (0.28; *p*-value 0.34 two-tailed Mann-Whitney). We can also compare the regret subjects anticipate over selling and over keeping their ticket separately across treatment. The differences are significant.
driving the EE in our study (H1b). Our main hypotheses find also support: In line with H2b, the Incentive treatment significantly reduces the ownership bias on differential regret costs with \( \beta = -1.493 \) and \( p \)-value 0.04. The results show the same effect for the Real Partner treatment supporting H3b: the strategic incentives reduce the EE significantly with \( \beta = -2.039 \) and \( p \)-value <0.01. All results are reported below in Column II. of Table 2.

3. Second Market Prices
   a) Strategic Behavior Reduces the EE (H4a).

We compare the pricing decisions in the first and second market. Any difference between the two prices reveals that the subjects made a strategic choice. We assume that the attention of subjects who behave strategically is more likely to be preoccupied with processing strategic information reducing their EE (H4a). We condition the WTA/ WTP results on whether the subjects set a strategic price or not. For the full set of non-parametric comparisons see Table 3 below.

### Table 3: Mean WTA/ WTP by Subject Type

<table>
<thead>
<tr>
<th>First Market Data (WTA/WTP)</th>
<th>Incentive Treat</th>
<th>Real Partner</th>
<th>True Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-Endowment</td>
<td>Strat 5.20</td>
<td>True 4.94</td>
<td>Strat 3.95</td>
</tr>
<tr>
<td>Endowment</td>
<td>Strat 5.09</td>
<td>True 6.44</td>
<td>Strat 3.39</td>
</tr>
<tr>
<td>Difference EE (p-value)</td>
<td>-0.11 (0.75)</td>
<td>1.50 (0.37)</td>
<td>-0.56 (0.75)</td>
</tr>
<tr>
<td>Difference v. True Value</td>
<td>-1.79 (-106.5%)</td>
<td>-1.16 (-43.6%)</td>
<td>-2.24 (-133.3%)</td>
</tr>
</tbody>
</table>

* p-values refer to two tailed Mann-Whitney tests.

The results show that the presence of incentives decreases the WTA and WTP price gap for both strategic and true types in comparison to the True Valuation treatment. However, for the subjects who made a strategic pricing decision the EE gap is even reversed: Pooling the Incentive and Real Partner treatments strategic types indicate a weakly higher WTP than WTA price (+0.35 Euro). By contrast for the true types who set the same price in the first and second market we find a mean reduction of the EE of only 51.2%. Thus, the descriptive data support our theory and H4a with the strategic types showing a substantially stronger debiasing result in response to the incentives: The fact that the true types also reveal a smaller bias in the presence of incentives suggests that they nevertheless devote attention to the incentives in their decision making process reducing the focus on their entitlement, even though they decided not to set a strategic price in the end.

We test whether incentives reduce the bias of the strategic types significantly stronger by estimating a linear model. We construct a dummy variable to capture the subjects’ type and refer to it as Strategic Behavior. Subjects who state a different price in the first and second market reveal a strategic intention; they are treated as strategic, all other subjects are coded as true types. We include two more dummy variables into the model: Endowment Status and Incentives which distinguishes whether or not subjects were presented with incentives (note 1= Incentive OR Real Partner conditions; 0=otherwise). We construct two interaction terms: First, we expect Strategic Behavior to significantly reduce the EE captured by Strate-
gic Behavior*Endowment. Second, the EE should diminish when incentives are present measured by Incentives*Endowment. We also test for the main effects of Strategic Behavior, Endowment Status and the presence of Incentives.

We report the full regression results in Column IV. of Table 2. The results show a significant interaction of Endowment*Incentives with $\beta = -1.752$ and $p$-value <0.01 confirming our general hypothesis that the presence of strategic incentives reduces the EE. The more specific hypothesis $H_{4a}$ also finds support: in line with the descriptive data that we presented above the interaction of Strategic Behavior*Endowment is significant ($\beta = -1.305$ and $p$-value 0.01). The interaction effect shows that subjects who made a strategic pricing decision indeed reveal a significantly smaller ownership bias. The result provides further evidence for our attention based theory of the debiasing effect of incentives: they suggest that subjects when they process strategic information focus less attention on their entitlement and therefore reveal a smaller or no EE at all. Interestingly, the main effect of Strategic Behavior is insignificant suggesting that strategic behavior is not associated with higher prices; the result fits with our theory as the price increase of strategic behavior is absorbed by the dissolved ownership bias of the strategic subjects.

b) Incentives Affect the Cognitive Process that Causes the EE ($H_{4b}$).

Our theory assumes that incentives reduce the EE, because they affect the cognitive process of preference formation. To test our hypothesis, we compare the prices that subjects indicate in the first and second markets: when subject are presented with the incentives in the second market they should significantly increase their WTA. Their EE however, should remain constant as they formed their valuation for the ticket under the True Valuation treatment in the first market when incentives were not present.

As figure 2 illustrates subjects in the True Valuation treatment significantly increase their WTA (0.31 Euro; Wilcoxon signed-rank test $p$-value 0.04) in both the Endowment and the Choosing Condition (0.52 Euro; Wilcoxon signed-rank test $p$-value <0.01), when they are presented with incentives in the second market. Overall, 67% of the subjects change their decision and asked for a higher price. Their EE however, remained constant as hypothesized: The bias shrunk by only -0.30 Euro in the second market. (1.73 v. 2.03 Euro). A linear panel regression with a dummy variable for Endowment Status and Market [1 or 2] as panel variable confirms that the difference is indeed not substantial: While we find a main effect of Endowment with $\beta = -2.04$ and $p$-value <0.01 on prices the interaction of Endowment*Market is clearly insignificant with $\beta = -0.324$ and $p$-value 0.58. The result shows that the EE occurs in both markets with almost the same size.

In the Incentive treatments we find the opposite pattern. Subjects should reduce their demand, when the incentives are withdrawn in the second market. Their EE however, should remain insignificant. Indeed, as expected the subjects significantly reduce their WTA (Incentive: -0.35 Euro Wilcoxon signed-rank test $p$-value <0.01; Real Partner: -0.58 Euro $p$-value <0.01) and WTP prices (Incentive: -0.60 Euro $p$-value <0.01; Real Partner: -0.16 Euro $p$-value 0.09). Overall 59% of the participants ask for a lower price in the second market. Supporting

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22 The data suggest that subjects added the amount they wanted to strategically increase the price on top of the true valuation they had formed in the first market.
our theory their EE is insignificant even though incentives are no longer provided: We find price gaps of 0.47 Euro for the Incentive and 0.59 Euro for the Real Partner treatments (p-value 0.24; p-value 0.66 two-tailed Mann-Whitney). Estimating the same linear panel regression as above with dummy variables for Endowment Status and Market [1 or 2] allows us to compare the choices subjects make in the first and the second market. As predicted the main effect of Endowment is insignificant for the Incentive (β = -0.595; p-value <0.24) as well as the Real Partner treatment (β = -0.571; p-value 0.37), thus in neither treatment the subjects reveal a significant bias. The interaction term of Endowment*Market is also clearly insignificant (Incentive treatment: β = -0.042; p-value 0.95; Real Partner: β = -0.030; p-value 0.96) suggesting that the subjects are unbiased in both markets.

Figure 2: First and Second Market Prices

The results support our theory that incentives debias, because they affect the cognitive process when subjects form their valuation of the ticket. Therefore, incentives have no impact, in the second market, when subjects have already formed their valuation. By contrast, when participants have made their pricing decision in a strategic context, the EE remains insignificant, even though no incentives are provided in the second market.

When we compare the debiasing effect of incentives across the first and second market data, we find them to have no impact on the EE, when they are provided in the second market (1.73 Euro; p-value <0.01 two-tailed Mann-Whitney). By contrast when incentives are present in the first market the gap is a mere 0.60 Euro in the Incentive (p-value 0.45 two-tailed Mann-Whitney) and 0.40 Euro in the Real Partner (p-value 0.33 two-tailed Mann-Whitney) treatment. To test whether the debiasing effect of incentives is indeed significantly larger in the first market we estimate a linear model with the same dummy variables as in the earlier regressions: Endowment Status and dummies for the Incentive and Real Partner treatments. We want to estimate the impact the Incentive and Real Partner treatments have on the ownership bias (Incentive*Endowment and Real Partner*Endowment). First we find a significant EE in the sample with β = -2.039 and p-value <0.01. However, both treatments Incentive (Incentive*Endow β = -1.565 and p-value 0.02) and Real Partner (Real Partner*Endow β = -1.431; p-value 0.04) reduce the bias significantly as expected. Thus, the debiasing effect of incentives
is indeed significantly stronger in the first market, when incentives can affect the cognitive process of preference formation ($H_{ib}$).

**VII. Discussion and Policy Implications**

**A. Discussion**

*Plott and Zeiler* (2005, 2007, 2011) have identified in their seminal work confounds and misconceptions in the experimental design of many EE studies. We attended to their critique when we designed this study. First *Plott and Zeiler* have argued that endowing subjects with goods that the experimenter selects deliberately for them, may signal to the participants that the chosen good is of particular value. This perception may cause participants to ask for a higher price. We avoid this confound by allocating the tickets randomly; the instructions inform the subjects about the protocol that we use for the random assignment. The instructions also clarify that software sampled the seven numbers we tipped on the lottery tickets, such that in expectations all lottery tickets are identical, having the same expected payoff and the same price. This protocol makes sure that subjects cannot perceive the allocation process as a signal that the ticket they were given may be more valuable than any other ticket.

*Plott and Zeiler* (2005, 2007 and 2011) also suggested that random allocation experiments often impose higher transaction costs on trading than keeping the entitlement. For example experimenters seated all participants in the same class room; only the subjects who wanted to trade had to raise their hand. The design also increases outcome responsibility for those who want to trade: They have to take action, while the subjects who want to keep their entitlement can remain inactive. Action is associated with a higher level of outcome responsibility than an omission (Baron et al. 1994). If subjects feel more responsible they also anticipate more regret over a negative outcome of their choice. The difference between WTA and WTP prices may thus be caused by an omission bias not by loss aversion. In our study we ensure that the participants have to perform the same action whether they want to trade or keep their entitlement: The subjects are presented with a price list and have to state for each price whether they want to sell or keep the ticket or in the *No-Endowment* condition whether they want to choose the money or the ticket.

Our experimental design also avoids the concern that the subjects may influence each other’s choices: When a participant raises a hand in order to trade, this may affect the choice of other subjects who might follow the example to reduce their responsibility for a potentially wrong decision (see Arlen & Tontrup 2016). As we conducted our study online participants could not observe the behavior of other subjects and they remained anonymous during the entire experiment.

Finally, *Plott and Zeiler* suggest that subjects may not understand that the random price mechanism incentivizes them to reveal their true preference. They show that the BDM mechanism can lead to confused pricing decisions. To avoid this problem and to teach the subjects how the mechanism operates we employ a set of training scenarios and control questions (we provide all instructions in the appendix). Subjects could only proceed with the experiment if they completed all control questions correctly. The participants – current or graduated University students - did not reveal any difficulty understanding our experimental design and instructions. In particular subjects recognized in the *True Valuation* treatment that they would be paid the random price and not the amount they demand for selling their ticket. The payoff calculations demonstrate that misrepresentation could only make them worse off;
additionally, their answers to the control questions confirm directly that they understand what the payoffs suggest. In the Incentive treatment the subjects realize that they can benefit from exaggerating the price beyond their true valuation. Their responses also show that the subjects are aware, that by overstating their valuation they risk losing the gains from trade. The results show that the participants understand the treatments that employ the random price mechanism just as easily as the real partner design.

Our findings stand in line with a recent series of studies that find an EE attending to the methodological critique of Plott and Zeiler (see for example Isoni et al. 2011, Arlen & Tontrup 2015, 2016, Marcin & Nicklisch 2016 and others). Thus after Plott and Zeiler’s push for improving experimental protocols, the EE remains to be a robust phenomenon of state depended preferences.

Other questions of internal validity are more specific to the experimental design we chose. To avoid experimenter demand effects we inform the subjects only about the treatment they participated in. We instruct the participants that they remain anonymous throughout the whole study including their payment; to ensure full privacy we prompt them to create an anonymous mail account and to invent a personal code for their payment. The instructions make it salient for the subjects that the experimental protocol guarantees their anonymity.23

Studies that use a random price mechanism often provide subjects with an initial monetary endowment that they can use for buying the entitlement. Such a design can be affected by wealth levels and budget constraints varying between subjects (see Johnson et al. 2007). The choosing design that we implement for eliciting the subjects’ valuation attenuates this problem (see Johnson 2007).

Our design choice to endow subjects with lottery tickets should not limit the applicability of our results to entitlements of uncertain value or to regret as effect channel of the EE. We pointed out in the theory section that the cognitive process that is driving our findings is not specific for a particular type of good. Ownership can focus sellers on the positive attributes of a physical object like a consumer good or real property or on the value of stocks or patents. When the strategic incentives draw attention from the positive attributes of the entitlement, then its perceived value is reduced – no matter whether it is a physical good or an asset of uncertain prospects. Owners feel less attached to the physical good and less regret over trading the asset.24

B. Policy Implications

1. Policy Interventions and their Problems

Two reasons have made the EE so important for the legal literature: First, the bias is immediately relevant for the efficiency of trading. Private ordering rests on the idea that supported by an infrastructure of institutions people will voluntarily trade their entitlements until they are owned by those, who value them the most without external intervention. Of course transaction costs can prevent otherwise beneficial trades. But if the EE affects real trading behavior, then many goods may be in the hand of owners who value them considerably less, than other market participants.

The second reason, why the EE seems to threaten private ordering is its effect size: A meta-analysis of 45 publications by Horowitz and McConnell (2002) found a median gap be-

23 Only after they completed the experiment, we offered them to opt out of the anonymous payment protocol if they wished to get paid electronically.
24 Keep also in mind that regret is not limited to property of uncertain value see the theory section.
between WTA and WTP prices with a ratio of 2.6. The result suggests that people will assign the same good a 2.6 times higher value, once they own it. Furthermore, the size of the EE varies and can increase to a factor of 10 for health and safety goods (see also the meta-analysis by Tunçel, Tuba. and Kammitt, James K. 2014). We can imagine how often potential buyers and owners may not be able to complete or even identify a beneficial exchange if this data on the EE would hold for actual transactions.

Given the massive evidence on the EE it does not surprise how often interventions in private ordering have been proposed in the legal literature to address the bias (Korobkin 2013 counted more than 1.600 articles referring to the EE). We can distinguish between two general types of interventions: Some aim to reduce the EE directly by weakening the feeling of entitlement that people have for their property (Buccafusco and Sprigman 2011; Korobkin 2000; Rachlinski and Jourden 1998). For example authors propose to substitute liability with property rules. Not considering the EE property rules can be more effective because they should allow private ordering to efficiently allocate entitlements; liability rules on the other hand let people gain entitlements for a price below the owner’s valuation (Calabresi & Malmend 1972). Limiting property rights can increase efficiency in a world where entitlement holders are biased by ownership, because involuntary appropriations can bring goods to those who value them more (see Arlen & Tontrup 2015).

A second category of interventions does not weaken the EE directly but aims to attenuate its symptoms: Scholars want to adopt contractual default rules and resource allocations that favour groups who supposedly value the entitlement more absent the bias, but who will not enter a trade when valuations are biased (e.g., Jolls 2000; Jolls et al. 1998; Korobkin 1998; Sunstein 2002).

Both types of policy interventions impose costs and face a severe information problem: When market participants make choices that are not affected by ownership bias, then policymakers can identify the default contract terms that most likely maximize welfare by observing people’s actual choices (Coase 1960). However, if most market participants are biased, then policymakers cannot rely on the evolutionary capacity of the market; they have to adopt provisions they expect to be welfare enhancing on theoretical grounds (see Sunstein 1986, 2002). The task to identify groups that may on average value a good more than the current owners is difficult and the matter is subject to change and uncertainty.

The interventions are suboptimal whenever the EE is less influential than assumed. If a majority of owners is not affected by the EE, then liability rules cannot substantially increase the number of transfers that would occur under a regime of property rules. Yet, the intervention would impose costs on all owners independently of whether they are in fact biased or not (see Arlen & Tontrup 2015). The effect of the interventions is not selective: They do not distinguish whether an entitlement holder is biased or not in order to change the behavior of the one but not the other; they cannot identify the transactions that should occur if the bias was absent. Therefore the suggested interventions have to presume that the EE typically affects trading behavior in the target area. Whenever this presumption is invalid the intervention is
inefficient and even more aggravating its inefficiency will hardly be detected\textsuperscript{25}. Our results suggest that a general presumption that trading behavior is substantially biased and impaired may often be false and may cause more costs than benefits.

2. Cognitive Complexity of Trading: Incentives for Strategic Behavior Reduce EE

Policy interventions rest on the presumption that the EE prevails in the social and institutional decision making context that is typical for actual trading behavior. We argue that the apparently large body of psychological and economic evidence for the EE can mislead policy recommendations, because it does not address the legal policy question, whether the EE substantially affects beneficial private exchange. The two standard paradigms used in EE experiments - the random allocation and the random price design - incentivize subjects to reveal the true valuation owners have for their entitlement (see the theory section). The paradigms were developed to analyze and proof loss aversion. They present the subjects with a single task: figuring out the value the good has for them; when the subjects price the good, they only need to retrieve and consider its value increasing and decreasing attributes, but no other information.

By contrast the goal of trading is typically to earn a profit and this leads to a distinctively different and much more complex cognitive task: A seller does not only consider the positive and negative attributes of his entitlement he also accesses and processes information about his trading partner, his reputation and solvency, information on potential alternative partners, the behavior of other sellers, about market prices, a potential for future deals and many other economic, social and strategic factors. Our theory and evidence suggest that the complex cognitive task of trading weakens the owners` focus on their entitlement and thereby reduces or even eliminates their bias. We increase the complexity of the cognitive task across our three treatments approximating actual trading behavior: In the True Valuation treatment subjects can focus on their entitlement, only the good`s attributes are relevant for their pricing decision. In the Incentive conditions participants have to process new information: a probability function informs them about the potential and the risk of exaggerating the price; when they make a decision they have to find a balance between the profit and the risk they are willing to take. In the Real Partner treatment finally, the subjects interact with each other and have to anticipate and respond to the strategic behavior of their counterpart. The strategic complexity of the decision making task and the higher quantity of information subjects have to process reduces and almost eliminates the EE. Indeed, the subjects who respond to the incentives by strategically exaggerating their true WTA for the ticket do not show an EE at all. The finding is line with the literature reporting that professional traders often do not reveal any bias (see List 2003). While List attributes this finding to the sellers` market experience our theory and evidence suggest that they may focus their attention fully on the gains from trade while their personal valuation for the good has little relevance for the price they demand.

We propose in this study that the size of the EE depends on the cognitive task the owners are presented with or want to solve: If they focus their attention on their entitlement ownership can strongly bias their valuation; however, when they trade in a business context,

\textsuperscript{25} It would require field work to uncover whether a gap between WTP and WTA prices exists in the actual target area or not.
where pricing decisions are strategic and where their goal is to earn a profit, the EE seems to be much weaker or may vanish.

3. Policy Relevance of our Theory and Evidence

Our results should apply to many transactions, as trading choices typically have strategic elements. Strategic behavior is ever-present in all markets in which competition is not complete, when goods are not standardized and prices are not easily comparable or transparent. Sometimes goods are not perfectly substitutable like real property, some services or qualifications may even be unique. Assets with uncertain prospects are often priced with a large prognostic element for example when patents are licensed or sold. The more difficult the future return is to estimate the larger is the space for strategic pricing and bargaining: The value of used goods for example, in particular when the warranty has ended is often uncertain, and the uncertainty can be exploited. Also the trading situation can assign strategic market power. In a hold up for example we expect subjects to focus their attention primarily on information how to strategically price the good that is up for trade. In an Anticommons dilemma many subjects can affect each other’s outcome by strategically pushing up prices (see Glöckner et al. 2014). Assumed transaction costs can also complicate the direct comparison of prices and enable market participants to strategically exploit the lack of transparency. For many products and services bargaining over additional terms is typical.

In real markets the complexity of the decision making task will often be considerably higher than in the controlled setting of our study. Traders regularly face multiple layers of strategic incentives; they can reach far beyond the actual trading situation: reputation costs for future exchanges, when sellers exploit their partners, long term price trends of their entitlement, suggesting to sell or keep the property, outside offers that may occur at a later point, other deals they could use the sales price for and many more. Our theory and results suggest that if seller’s make a strategic choice their attention is preoccupied reducing their focus on their entitlement and as a result their bias, when they trade.

Policy proposals should also consider the interplay with other sources of debiasing in order to estimate the relevance of the EE for private ordering. For example professionals typically employ institutions when they make trading decisions; transactions are performed through agents or they are approved in boards. Arlen & Tontrup (2015) have shown when decision makers share responsibility in institutions they experience less regret over trading and their EE is strongly reduced. People even purposely use costly institutions in order to

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26 We do not explicitly test in this study whether expected social effects of a trade also affect the EE. Strategic behavior and social effects are typically tied together. Strategic behavior shifts the division of gains from trade to the disadvantage of the partner, or it may cost the other party all profit if the deal fails. In a hold up another party can be exploited, in social dilemma situations, one defecting owner can spoil a large group’s benefits. Considering social consequences might further increase the complexity of the decision making task and reduce the EE; an open question for future research.

27 Note our theory does not suggest that strategic incentives affect the EE per se; they affect the EE if the owner seriously considers them in his decision making process. We can imagine subjects who do not pay attention to the strategic dimension of a trade and their EE may not be affected.

28 People employ institutions purposely in order to debias. In a different study Arlen & Tontrup (2016) show that if anticipated regret prevents people from entering a beneficial trade, they strategically use the choices of others in the market. They acquire information about market participants who they expect traded, in order to take their decision as a reference point for their own choice. Switching their focus from their own endowment to the decision others have taken allows them to overcome regret.
debias. Important for the interplay of strategic incentives and institutions as separate sources of debiasing is that they interfere with the causal process that drives the EE on a different cognitive level: Our theory and evidence suggest that strategic incentives reduce the owner’s attentional focus on his property and thereby debias his valuation of the good’s positive attributes. The institutions by contrast prevent that the owner anticipates regret over trading, but not because they reduce his valuation for the good, but because he can share the responsibility for the trade. Thus strategic incentives and institutions present separate sources of debiasing. As a typical trading decision will often involve both strategic elements and institutions their effects should interact in dissolving the EE, however the interaction of separate debiasing sources is an important question of future research.

VIII. Conclusions

In this study we have presented evidence that incentives for strategic behavior can substantially reduce or even eliminate the EE. The bias should less frequent impair actual trading behavior or be smaller in size than often presumed in the legal literature. This conclusion may surprise given the overwhelming evidence Psychology and Economics have collected demonstrating that the EE is a robust phenomenon of human decision making. Our study does not aim to cast doubt on the validity of these results; we argue instead that while the studies are tailored to promote theory building and testing in Economics and Psychology they disregard the strategic nature of the private exchanges the law is concerned with and therefore lead to policy recommendations that seem to overestimate the relevance of the bias for private ordering. Most EE experiments incentivize the subjects to focus on and state their true valuation for the entitlement they are offered to trade. This experimental design is well suited to demonstrate that valuation depends on ownership and expectations, to proof loss aversion and Prospect theory; however, it may mislead legal policy.

When people trade they typically want to earn a profit. Their behavior is often strategic and they process a lot of information that has little connection to the attributes of the good and their personal valuation for it, such as market prices and trends, their reputation in business and community, potential future deals or strategic situations like hold ups. The cognitive task market participants solve is often complex and in contrast to most EE experiments the true valuation for the good is only one cue among many relevant for their pricing decision.

We do not question that losses loom larger than gains. Our theory assumes that ownership focuses peoples’ attention on the positive attributes of their property and biases their valuation for it. But the strategic elements of trading can absorb attention and draw it from the entitlement. In our study the incentives substantially reduce and almost eliminate the EE suggesting that the owners’ attentional focus is preoccupied by strategic information and reasoning. Indeed, our results show the subjects who set a strategic price, did not reveal a bias at all suggesting that in particular professional traders who want to make a profit may entirely focus on the gains from trade instead of the loss of their entitlement.

The external interventions the legal literature has often proposed in the past cannot distinguish whether a transaction does not occur because the owner is biased or because it is not beneficial. Liability rules for example weaken the sense of entitlement of all owners, biased or not. The interventions rely on the presumption that the EE substantially affects trading behavior in the target area. However, our current findings suggest that this presumption may often not be valid. We conclude it may be the best policy recommendation to handle interven-
tions cautiously to avoid that they impose more costs than they produce benefits and interfere only upon actual empirical evidence of relevant price gaps in a particular market.

References


Appendix for Online Publication
This is an English translation of the German instructions that we used in our study. In the main text we will report the instructions of the No-Endowment condition. The text of the manipulation that differs between the No-Endowment and Endowment treatments is reported in italics. We report the corresponding text for the Endowment treatment in squared brackets directly after the manipulation and also in italics. Only when it seems more transparent, we present the whole text of the two conditions in separate sections.

We first (A) report the instructions for the two True-Valuation treatments; second (B) we present the two Incentive conditions and finally (C) the instructions for the Real Partner treatments. Finally we report the instructions for the additional regret and loss aversion measures that we used.

A) Instructions True Valuation Condition [Endowment and No-Endowment]

General
Thank you very much for participating in our experiment! All necessary instructions will be presented on the screen. Note that you cannot use your login key more than once. If you logout before you have fully completed the experiment you will not be able to finish and receive a payment. You will be able to earn a sum of money, depending on the decisions you make. It is therefore very important that you read these instructions carefully.

Anonymity
In the study you will be given the opportunity to trade an online lottery ticket in a market. The receipt of the lottery ticket is sent to you before the experiment begins. It states all winnings numbers. Note however, you do not own the ticket. The receipt does not establish ownership. For claiming any winnings you need an authentication code. In the course of the experiment you will be presented with choice options. If you choose the ticket you will be send the authentication code. [Endowment Condition: You are also send an authentication code, which identifies you as the owner of the ticket and allows you to claim any winnings of the ticket.]

All data will be anonymous. Therefore, in order to receive the lottery ticket you need an anonymous email account. Please go to this website and create an account for this study: https://securemail.hidemyass.com/

You do not have to provide any personal information. When prompted to state your “real” email address make one up. Please use an alias for your new email address. The account is created within 30 seconds. Please keep the new account open, until you have completed this study.

Please register here with the email address of your new account:

@Hmamail.com

Once we have received your message we will send you the receipt of the [Endowment Condition: your] lottery ticket to the new email address.

Payment
Your income is calculated in €. Your payment is going to be anonymous. You can either choose a pick up or payment via PayPal. You can pick up your earnings in the main office of the AStA in the University castle of Münster. You will be asked to make up a 5 digit code for
identification. Your earnings will be put in an envelope marked with your code and deposited for pick up under this code. The employee who will had you the envelope was not involved in the study and does not know what content is in the envelope. Alternatively you can be paid using PayPal if you register your mail address at PayPal. If you choose PayPal, you earnings will be sent to your Hmamail account.

Lottery

In this study you can receive [Endowment Condition: trade] a real lottery ticket in a market transaction. The lottery ticket was sent to your anonymous email account. The header of the mail is: Lottery Ticket. Please open the email. The ticket receipt [Endowment Condition: Your ticket] looks like this:

```
  1  2  3  4  5
  6  7  8  9 10
 11 12 13 14 15
 16 17 18 19 20
 21 22 23 24 25
 26 27 28 29 30
 31 32 33 34 35
 36 37 38 39 40
 41 42 43 44 45
 46 47 48 49 50

Field A

Field B
```

The lottery ticket that you can receive in the market was selected randomly [Endowment Condition: Your lottery ticket was assigned randomly to you]. We purchased the lottery tickets for the targeted number of experimental participants in advance. Then we randomly drew the tickets and numbered them following the order of the draw. The ticket selected first is sent to the first subject that starts with the experiment, the second is sent to the second participant and so forth.

In the lottery, 5 numbers for field A ranging from 1 to 50 and 2 numbers in field B from 1 to 10 are drawn (see the picture). The rule of the game is therefore: “5 out of 50 plus 2 out of 10.”

As explained above, you do not own the ticket. The receipt does not establish ownership. For claiming any winnings you need to provide the authentication code. Owner is who can provide the code. In the course of the experiment you will be presented with choice options. If you choose the ticket you will be sent the authentication code [Endowment Condition: Here is your authentication code for the lottery ticket. the code identifies you as the owners of the lottery ticket and allows you to collect any prize the ticket might win:

Order Number: AN 54283402

The code identifies you as the owner of the ticket and allows you to claim the winnings of the ticket.]

The winning numbers are marked on the ticket. We used a computer program to randomly select the winning numbers for each ticket.

The lottery distributes several millions of Euro amongst the victors. The winning numbers are publicized on the lotteries’ website; we will send you the link to the website of the lottery at the end of the study. Your lottery ticket is for this week’s draw.

There are 12 different winning classes in the lottery. For a prize in the lowest winning class, 3 correct numbers (from both fields A & B) are required. For the top prize, all numbers have to be correct (five from field A and two from field B). The table below shows the probability of winning and the expected winnings in the 12 classes (for one ticket).
<table>
<thead>
<tr>
<th>Rank</th>
<th>Number of Correct Numbers Required for a Winning</th>
<th>Probability of Winning</th>
<th>Profit Share*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank 1</td>
<td>(5 correct + 2 Euro numbers) -- TOP</td>
<td>1 : 59,325,280</td>
<td>34,000,000.00 EUR</td>
</tr>
<tr>
<td>Rank 2</td>
<td>(5 correct + 1 Euro numbers)</td>
<td>1 : 4,943,773</td>
<td>567,839.40 EUR</td>
</tr>
<tr>
<td>Rank 3</td>
<td>(5 correct + 0 Euro numbers)</td>
<td>1 : 3,955,019</td>
<td>54,756.30 EUR</td>
</tr>
<tr>
<td>Rank 4</td>
<td>(4 correct + 2 Euro numbers)</td>
<td>1 : 263,668</td>
<td>3,683.20 EUR</td>
</tr>
<tr>
<td>Rank 5</td>
<td>(4 correct + 1 Euro numbers)</td>
<td>1 : 21,972</td>
<td>242.90 EUR</td>
</tr>
<tr>
<td>Rank 6</td>
<td>(4 correct + 0 Euro numbers)</td>
<td>1 : 17,578</td>
<td>113.70 EUR</td>
</tr>
<tr>
<td>Rank 7</td>
<td>(3 correct + 2 Euro numbers)</td>
<td>1 : 5,992</td>
<td>56.10 EUR</td>
</tr>
<tr>
<td>Rank 8</td>
<td>(3 correct + 1 Euro numbers)</td>
<td>1 : 499</td>
<td>21.80 EUR</td>
</tr>
<tr>
<td>Rank 9</td>
<td>(2 correct + 2 Euro numbers)</td>
<td>1 : 418</td>
<td>15.00 EUR</td>
</tr>
<tr>
<td>Rank 10</td>
<td>(2 correct + 0 Euro numbers)</td>
<td>1 : 399</td>
<td>13.10 EUR</td>
</tr>
<tr>
<td>Rank 11</td>
<td>(1 correct + 2 Euro numbers)</td>
<td>1 : 80</td>
<td>9.70 EUR</td>
</tr>
<tr>
<td>Rank 12</td>
<td>(2 correct + 1 Euro numbers)</td>
<td>1 : 35</td>
<td>8.50 EUR</td>
</tr>
</tbody>
</table>

* The top-prize may be split.

Please confirm that you received and read the E-mail with the receipt of the [Endowment Condition: your] lottery ticket. Please state below the first three winning numbers of the ticket you were sent. You will be paid for the experiment only if the numbers you submit are correct.

```
2 9 14
```

**Market Transaction**

You are given the opportunity to choose between an amount of money that is offered to you and the lottery ticket [Endowment Condition: trade your lottery ticket] in a market. If you receive the ticket, then the experimenter will immediately send you the authentication code making you the ticket owner.

The outcome of the market, does not depend on your decision alone, it also depends on a random price that will be drawn publicly. Contingent on your decision you will either receive [Endowment Condition: keep] the lottery ticket or you will obtain an amount of money. Please note this is not a hypothetical transaction. Your pricing decisions are final and binding!

**The Rules of the Market:**

You will be presented with a list of all prices between €0.25 and €10.00. [0.25; 0.50; 0.75...9.75; 10.00] You have to decide for each price whether you prefer to obtain the money or the lottery ticket [Endowment Condition: to sell or keep your lottery ticket].

At a price of …

€ 10.00:          ○ I would choose the money          ○ I would choose the lottery ticket
€ 9.75:           ○ I would choose the money          ○ I would choose the lottery ticket
…
€ 5.50:           ○ I would choose the money          ○ I would choose the lottery ticket
€ 0.25:           ○ I would choose the money          ○ I would choose the lottery ticket

[For the Endowment Condition]
At a price of …
€ 10.00:  ○ I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 9.75:  ○ I would sell the lottery ticket  ○ I would keep the lottery ticket
...
€ 0.50:  ○ I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 0.25:  ○ I would sell the lottery ticket  ○ I would keep the lottery ticket

Your decisions will be compared with a random price that will be drawn in a public lottery after the experiment is over. If you stated that for the random price and all higher prices you prefer to obtain the money [Endowment Condition: to sell your lottery ticket], then you receive the random price. If you stated by contrast that you prefer to receive [Endowment Condition: to keep] the lottery ticket at the drawn price and at all lower prices, then you receive [Endowment Condition: keep] the lottery ticket and the experimenter will send you right after the Eurojackpot draw the authentication code for the ticket [Endowment Condition: no text].

Here are two examples:

1) Assume the random price is 4 Euro. Then the experimenter will check in your price list, what decision you have made for this price:

At a price of …
€ 10.00:  • I would choose the money  ○ I would choose the lottery ticket
€ 9.75:  • I would choose the money  ○ I would choose the lottery ticket
...
€ 4.00:  ○ I would choose the money  • I would choose the lottery ticket
€ 3.75:  ○ I would choose the money  • I would choose the lottery ticket
...
The list shows that for the random price and for all lower prices, you want to obtain the lottery ticket. So the experimenter would send you the authentication code for the lottery ticket.

2.) Now assume that the random price would have been 4.25 Euro.

At a price of …
€ 10.00:  • I would choose the money  ○ I would choose the lottery ticket
€ 9.75:  • I would choose the money  ○ I would choose the lottery ticket
...
€ 4.25:  • I would choose the money  ○ I would choose the lottery ticket
€ 4.00:  ○ I would choose the money  • I would choose the lottery ticket

In this case the list shows that for the random price and all higher prices, you want to obtain the money. So you would receive the random price and the experimenter pays you 4.25 Euro.

[For the Endowment Condition]
At a price of …
€ 10.00:  • I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 9.75:  • I would sell the lottery ticket  ○ I would keep the lottery ticket
...
€ 4.00:  ○ I would sell the lottery ticket  • I would keep the lottery ticket
€ 3.75:  ○ I would sell the lottery ticket  ● I would keep the lottery ticket

... The list shows that for the random price and all higher prices, you want to keep the lottery ticket.

Now assume that the random price would have been 4.25 Euro.

At a price of ...
€ 10.00:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 9.75:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
...
€ 4.25:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 4.00:  ○ I would sell the lottery ticket  ● I would keep the lottery ticket

In this case the list shows that for the random price and for all higher prices, you want to obtain the money. So you would sell your lottery ticket and would receive the random price in return; the experimenter pays you 4.25 Euro.

How We Determine the Random Price

We use the last two numbers that are drawn in the online lottery to determine the random price. The last two numbers are all one-digit numbers, except the “10”; we transform “10” into a zero, so the numbers that can be drawn are: 0.1.2.3.4.5.6.7.8.9. We take the first number as the first digit of the price, so it determines the Euro amount; the second number serves as the second digit and determines the decimal place of Euro Cent; we add a “0” for the single Cent. Finally, we round up the price to the next full 25 Cent for instance 1.20 > €1.25 or 4.32 > €4.50.

Here are two examples: Assume the drawn numbers are: First Number: 9; Second Number: 8. Then the drawn price would be 9.80 Euro. Rounding up to the next full 25 Cent gives us a random price of exactly 10 Euro. Here is a second example: First Number: 10; Second Number: 6. This leads to a price of 0.60 Euro, transforming “10” into “0”. Since we round up to the next full 25 Cent we get a random price of 0.75 Euro. The random price can range from 0.25 Cent up to 10 Euro with each price having an equal chance to be drawn.

Please confirm by checking the box that you accept the rules of the market.

Questions about the Market Transaction

To ensure that you fully understand the rules of the market, we will present you with a set of short scenarios. Please select the correct answer (notice, you can only proceed with the experiment, if you answer the questions correctly):

1) The random price drawn in the lottery is €4.00. Max has stated that for €3.00 and all higher prices he prefers to obtain the money [Endowment Condition: wants to sell his ticket]. What happens?
   ● Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]
   ○ Max receives the lottery ticket. [Endowment Condition: Max keeps the ticket.]
   ○ Max receives €3.00. [Endowment Condition: Max sells his ticket for €3.00.]
2) The random price drawn in the lottery is €4.00. Max has stated that for €4.50 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. What happens?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

3) The random price drawn in the lottery is €4.00. Assume now that Max has overstated the price. He indicated that for €4.50 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. In truth however, he prefers to obtain the money [Endowment Condition: wants to sell his ticket] already for a price 4.00 and all higher prices. What happens?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if Max would have stated his true preference of €4.00?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if €5.00 was drawn as the random price?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

4) The random price drawn in the lottery is €4.00. Assume now that Max has understated the price. He indicated that for €4.00 and all higher prices he prefers to obtain the money [Endowment Condition: wants to sell his ticket] only at a price of 4.50 and all higher prices. What happens?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if Max would have stated his true preference of €4.50?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if €5.00 was drawn as the random price?
   - Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   - Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   - Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]
At what price do you prefer the money over the ticket?
Please state for each of the listed prices whether you would like to receive the money or obtain the lottery ticket. Your decisions are binding!

At a price of …
€ 10.00:  ○ I would choose the money ○ I would choose the lottery ticket
€ 9.75:  ○ I would choose the money ○ I would choose the lottery ticket
…
€ 0.25:  ○ I would choose the money ○ I would choose the lottery ticket

[For the Endowment Condition]:
At what price do you want to sell your ticket?
Please indicate for each of the listed prices whether you would like to sell the lottery ticket or keep the ticket. Your decisions are binding!

At a price of…
€ 10.00:  ○ I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75:  ○ I would sell the lottery ticket ○ I would keep the lottery ticket
…
€ 0.25:  ○ I would sell the lottery ticket ○ I would keep the lottery ticket

Second Market
Please assume that you can choose between the ticket and the money [Endowment Condition: sell your ticket] in a market just as you did before. A random price is drawn and you receive the money [Endowment Condition: sell your ticket], if you have preferred the money over the ticket for this price. The rules of the market are the same as in the first market you just participated in, except for one rule: In this market, when you receive the money [Endowment Condition: sell your ticket], then you are paid the lowest price for which you prefer the money [Endowment Condition: are willing to sell], not the random price.

Assume for example the lowest price for which you prefer the money over the ticket [Endowment Condition: are willing to sell your ticket] is 4€ and a random price of 5€ is drawn. In this case you would receive 4€. If the lowest price for which you prefer the money would be 6 € [Endowment Condition: would demand 6€ for selling your ticket] - one Euro more than the random price - then you would keep your ticket. Let’s assume now that you overstate your valuation and indicate that you prefer the money over the ticket at a price of 5€ [Endowment Condition: ask for 5€ for selling your ticket], while your actual valuation is only 4€. In this case you would receive 5€. However, if you would indicate to prefer money over the ticket at 6€ [Endowment Condition: ask for 6€ for selling your ticket], while your true valuation is in fact 5€, then you would receive the ticket [Endowment Condition: have to keep your ticket], even though you would have preferred the money over the ticket at [Endowment Condition: to sell the ticket for] the random price of 5€.

Just as in the market before we ask you now

at what price do you prefer the money over the ticket?
Please state for each of the listed prices whether you would like to receive the money or obtain the lottery ticket. Your decisions are binding!

At a price of …

€ 10.00:   ○ I would choose the money ○ I would choose the lottery ticket
€ 9.75:    ○ I would choose the money ○ I would choose the lottery ticket
…
€ 0.25:    ○ I would choose the money ○ I would choose the lottery ticket

[For the Endowment Condition]:

At what price do you want to sell your ticket?
Please indicate for each of the listed prices whether you would like to sell the lottery ticket or keep the ticket. Your decisions are binding!

At a price of …

€ 10.00:   ○ I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75:    ○ I would sell the lottery ticket ○ I would keep the lottery ticket
…
€ 0.25:    ○ I would sell the lottery ticket ○ I would keep the lottery ticket

B) Incentive Conditions [Endowment & No-Endowment]

Note that we only report the section about “The Rules of the Market”. All other passages of the instructions do not differ from the True-Valuation conditions that we presented above.

The Rules of the Market:
You will be presented with a list of all prices between €0.25 and €10.00. [0.25; 0.50; 0.75…9.75; 10.00] You have to decide for each price whether you prefer to obtain the money or the lottery ticket [Endowment Condition: to sell or keep your lottery ticket].

At a price of …

€ 10.00:   ○ I would choose the money ○ I would choose the lottery ticket
€ 9.75:    ○ I would choose the money ○ I would choose the lottery ticket
…

[For the Endowment Condition]
At a price of …

€ 10.00:   ○ I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75:    ○ I would sell the lottery ticket ○ I would keep the lottery ticket

Your decisions will be compared with a random price that will be drawn in a public lottery after the experiment is over. If you stated that for the random price you prefer to obtain the money [Endowment Condition: to sell your lottery ticket], then you are paid the lowest price for which you prefer the money [Endowment Condition: are willing to sell]. If you stated by contrast that you prefer to receive [Endowment Condition: to keep] the lottery ticket at the
drawn price and at all lower prices, then you receive [Endowment Condition: keep] the lottery ticket and the experimenter will send you the authentication code for the ticket [Endowment Condition: no text].

Here are two examples:

1) Assume the random price is 4 Euro. Then the experimenter will check in your price list, what decision you have made for this price:

<table>
<thead>
<tr>
<th>Price</th>
<th>Decision</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 10.00</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 9.75</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 9.00</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 4.00</td>
<td>I would choose the lottery ticket</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 3.75</td>
<td>I would choose the lottery ticket</td>
<td>I would choose the lottery ticket</td>
</tr>
</tbody>
</table>

The list shows that for the random price and all lower prices, you want to obtain the lottery ticket. So the experimenter would send you the authentication code for the lottery ticket.

2.) Now assume that the random price would have been 4.50 Euro.

<table>
<thead>
<tr>
<th>Price</th>
<th>Decision</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 10.00</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 9.75</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 9.00</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 4.50</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
<tr>
<td>€ 4.25</td>
<td>I would choose the money</td>
<td>I would choose the lottery ticket</td>
</tr>
</tbody>
</table>

In this case the list shows that for the random price of €4.50, you want to obtain the money. So you would receive the lowest price for which you in fact prefer to obtain the money; the experimenter pays you 4.25 Euro.

[For the Endowment Condition]
1) Assume the random price is 4 Euro. Then the experimenter will check in your price list, what decision you have made for this price:

<table>
<thead>
<tr>
<th>Price</th>
<th>Decision</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 10.00</td>
<td>I would sell the lottery ticket</td>
<td>I would keep the lottery ticket</td>
</tr>
<tr>
<td>€ 9.75</td>
<td>I would sell the lottery ticket</td>
<td>I would keep the lottery ticket</td>
</tr>
<tr>
<td>€ 9.00</td>
<td>I would sell the lottery ticket</td>
<td>I would keep the lottery ticket</td>
</tr>
<tr>
<td>€ 4.00</td>
<td>I would sell the lottery ticket</td>
<td>I would keep the lottery ticket</td>
</tr>
<tr>
<td>€ 3.75</td>
<td>I would sell the lottery ticket</td>
<td>I would keep the lottery ticket</td>
</tr>
</tbody>
</table>

The list shows that for the random price and all lower prices, you want to keep your lottery ticket.

2.) Now assume that the random price would have been 4.50 Euro.
At a price of …
€ 10.00:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 9.75:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
…
€ 4.50:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 4.25:  ● I would sell the lottery ticket  ○ I would keep the lottery ticket
€ 4.00:  ○ I would sell the lottery ticket  ● I would keep the lottery ticket

In this case the list shows that for the random price of €4.50, you want to sell your lottery ticket. So you would receive the lowest price for which you in fact are willing to sell the ticket; the experimenter pays you 4.25 Euro.

Questions about the Market Transaction
To ensure that you fully understand the rules of the market, we will present you with a set of short scenarios. Please select the correct answer (notice, you can only proceed with the experiment, if you answer the questions correctly):

1) The random price drawn in the lottery is €4.00. Max has stated that for €3.00 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. What happens?
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]
   ○ Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ● Max receives €3.00. [Endowment Condition: Max sells his ticket for €3.00.]

2) The random price drawn in the lottery is €4.00. Max has stated that for €4.50 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. What happens?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ● Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

3) The random price drawn in the lottery is €4.00. Assume now that Max has overstated the price. He indicated that for €4.50 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. In truth however, he prefers to obtain the money [Endowment Condition: wants to sell his ticket] already for a price of 4.00 and all higher prices. What happens?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ● Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if Max would have stated his true preference of €4.00?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ○ Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ● Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if €5.00 was drawn as the random price?
   ● Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
Max receives the ticket  \[\text{Endowment Condition: Max keeps the ticket.}\].
Max receives €4.00.  \[\text{Endowment Condition: Max sells his ticket for €4.00.}\]

4) The random price drawn in the lottery is €4.00. Assume now that Max has understated the price. He indicated that for €4.00 and all higher prices he prefers to obtain the money  \[\text{Endowment Condition: to sell his ticket}\]. In truth however, he prefers to obtain the money only at a price of 4.50 and all higher prices. What happens?
Max receives €4.50  \[\text{Endowment Condition: Max sells his ticket for €4.50.}\]
Max receives the ticket  \[\text{Endowment Condition: Max keeps the ticket.}\].
Max receives €4.00.  \[\text{Endowment Condition: Max sells his ticket for €4.00.}\]

What happens if Max would have stated his true preference of €4.50?
Max receives €4.50  \[\text{Endowment Condition: Max sells his ticket for €4.50.}\]
Max receives the ticket  \[\text{Endowment Condition: Max keeps the ticket.}\].
Max receives €4.00.  \[\text{Endowment Condition: Max sells his ticket for €4.00.}\]

What happens if €5.00 was drawn as the random price?
Max receives €4.50  \[\text{Endowment Condition: Max sells his ticket for €4.50.}\]
Max receives the ticket  \[\text{Endowment Condition: Max keeps the ticket.}\].
Max receives €4.00.  \[\text{Endowment Condition: Max sells his ticket for €4.00.}\]

At what price do you prefer the money over the ticket?
Please state for each of the listed prices whether you would like to receive the money or obtain the lottery ticket. Your decisions are binding!

\[
\begin{array}{llll}
\text{At a price of …} & \text{€ 10.00:} & \text{I would choose the money} & \text{I would choose the lottery ticket} \\
& \text{€ 9.75:} & \text{I would choose the money} & \text{I would choose the lottery ticket} \\
& \text{...} & \text{I would choose the money} & \text{I would choose the lottery ticket} \\
& \text{€ 0.25:} & \text{I would choose the money} & \text{I would choose the lottery ticket} \\
\end{array}
\]

[For the Endowment Condition]:
At what price do you want to sell the ticket?
Please indicate for each of the listed prices whether you would like to sell the lottery ticket or keep the ticket. Your decisions are binding!

\[
\begin{array}{llll}
\text{At a price of…} & \text{€ 10.00:} & \text{I would sell the lottery ticket} & \text{I would keep the lottery ticket} \\
& \text{€ 9.75:} & \text{I would sell the lottery ticket} & \text{I would keep the lottery ticket} \\
& \text{...} & \text{I would sell the lottery ticket} & \text{I would keep the lottery ticket} \\
& \text{€ 0.25:} & \text{I would sell the lottery ticket} & \text{I would keep the lottery ticket} \\
\end{array}
\]

Second Market
Please assume that you can choose between the ticket and the money [Endowment Condition: sell your ticket] in a market just as you did before. A random price is drawn and you receive the money [Endowment Condition: sell your ticket], if you have preferred the money over the ticket [Endowment Condition: to sell your ticket] for this price. The rules of the market are the same as in the first market you just participated in, except for one rule: In this market, when you receive the money [Endowment Condition: sell your ticket], then you are paid the random price not the lowest price for which you prefer the money [Endowment Condition: are willing to sell].

Assume for example the lowest price for which you prefer the money over the ticket [Endowment Condition: are willing to sell your ticket for] is 4€ and a random price of 5€ is drawn. In this case you would receive 5€. If the lowest price for which you prefer the money would be 6 € [Endowment Condition: you would demand 6€ for selling your ticket] - one Euro more than the random price - then you would keep your ticket. Let’s assume now that you overstate your valuation and indicate that you prefer the money over the ticket at a price of 5€ [Endowment Condition: ask for 5€ for selling your ticket], while your actual valuation is only 4€. In this case you would still receive the random price of 5€. However, if you would indicate to prefer money over the ticket at 6€ [Endowment Condition: ask for 6€ for selling your ticket], while your true valuation is in fact 5€, then you would receive the ticket [Endowment Condition: have to keep your ticket], even though you would have preferred the money over the ticket at [Endowment Condition: to sell the ticket for] the random price of 5€.

Just as in the market before we ask you now

**at what price do you prefer the money over the ticket?**
Please state for each of the listed prices whether you would like to receive the money or obtain the lottery ticket. Your decisions are binding!

**At a price of …**
€ 10.00: 
- I would choose the money
- I would choose the lottery ticket

€ 9.75: 
- I would choose the money
- I would choose the lottery ticket

…

€ 0.25: 
- I would choose the money
- I would choose the lottery ticket

**[For the Endowment Condition]:**

**At what price do you want to sell your ticket?**
Please indicate for each of the listed prices whether you would like to sell the lottery ticket or keep the ticket. Your decisions are binding!

**At a price of…**
€ 10.00: 
- I would sell the lottery ticket
- I would keep the lottery ticket

€ 9.75: 
- I would sell the lottery ticket
- I would keep the lottery ticket

…

€ 0.25: 
- I would sell the lottery ticket
- I would keep the lottery ticket
C) Real Partner Conditions [Endowment & No-Endowment]

Note that we only report the sections about the “Market Transaction” and “The Rules of the Market”. All other passages of the instructions do not differ from the True-Valuation condition that we presented above (A).

Market Transaction
You are given the opportunity to choose between an amount of money and the lottery ticket [Endowment Condition: to trade your lottery ticket] in a market. If you receive the ticket, then the experimenter will immediately send you the authentication code making you the owner of the ticket [Endowment Condition: no text].

The outcome of the market does not depend on your decision alone, it also depends on a second participant who is randomly selected and assigned to you. Contingent on your decision and the decision of your partner you will either receive [Endowment Condition: keep] the lottery ticket or you will obtain an amount of money. Please note this is not a hypothetical transaction. Your pricing decisions and the decisions of your partner are final and binding!

The Rules of the Market:
You will be presented with a list of all prices between €0.25 and €10.00. [0.25; 0.50; 0.75…9.75; 10.00] You have to decide for each price whether you prefer to obtain the money or the lottery ticket [Endowment Condition: to sell or keep your lottery ticket].

At a price of …
€ 10.00: ○ I would choose the money ○ I would choose the lottery ticket
€ 9.75: ○ I would choose the money ○ I would choose the lottery ticket
...
[For the Endowment Condition]
At a price of ...
€ 10.00: ○ I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75: ○ I would sell the lottery ticket ○ I would keep the lottery ticket
...

Your decisions will be compared with the highest price that your partner is willing to pay for the ticket. We refer to this price as the offer of your partner. If you stated that for your partner’s offer price you prefer to obtain the money [Endowment Condition: to sell your lottery ticket], then you are paid the lowest price for which you prefer the money. If you stated by contrast that you prefer to receive [Endowment Condition: to keep] the lottery ticket at the price that your partner offers, then you receive [Endowment Condition: keep] the lottery ticket and the experimenter will send you authentication code for the ticket [Endowment Condition: no text.]

Here are two examples:

1) Assume your partner has offered a price of 4 Euro. Then the experimenter will check in your price list, what decision you have made for this price:

At a price of …
€ 10.00: ● I would choose the money ○ I would choose the lottery ticket
€ 9.75: ● I would choose the money ○ I would choose the lottery ticket

... € 4.00: ○ I would choose the money ● I would choose the lottery ticket
€ 3.75: ○ I would choose the money ● I would choose the lottery ticket

... The list shows that for the price of €4.00 that your partner offers, you want to obtain the lottery ticket. So the experimenter would send you the authentication code for the lottery ticket.

2) Now assume that your partner has offered 4.50 Euro.

At a price of …
€ 10.00: ● I would choose the money ○ I would choose the lottery ticket
€ 9.75: ● I would choose the money ○ I would choose the lottery ticket

... € 4.50: ● I would choose the money ○ I would choose the lottery ticket
€ 4.25: ● I would choose the money ○ I would choose the lottery ticket
€ 4.00: ○ I would choose the money ● I would choose the lottery ticket

In this case the list shows that for the price of €4.50 that your partner offers, you want to obtain the money. So you would receive the lowest price for which you in fact prefer to obtain the money; the experimenter pays you 4.25 Euro.

[For the Endowment Condition]

1) Assume your partner has offered a price of 4 Euro. Then the experimenter will check in your price list, what decision you have made for this price:

At a price of …
€ 10.00: ● I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75: ● I would sell the lottery ticket ○ I would keep the lottery ticket

... € 4.00: ○ I would sell the lottery ticket ● I would keep the lottery ticket
€ 3.75: ○ I would sell the lottery ticket ● I would keep the lottery ticket

... The list shows that for the price of €4.00 that your partner offers, you want to obtain the lottery ticket. So the experimenter would send you the authentication code for the lottery ticket.

2) Now assume that your partner has offered 4.50 Euro.

At a price of …
€ 10.00: ● I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75: ● I would sell the lottery ticket ○ I would keep the lottery ticket

... € 4.50: ● I would sell the lottery ticket ○ I would keep the lottery ticket
€ 4.25: ● I would sell the lottery ticket ○ I would keep the lottery ticket
€ 4.00: ○ I would sell the lottery ticket ● I would keep the lottery ticket

In this case the list shows that for the price of €4.50 that your partner offers, you want to sell your lottery ticket. So you would receive the lowest price for which you in fact are willing to sell the ticket; the experimenter pays you 4.25 Euro.
Questions about the Market Transaction

To ensure that you fully understand the rules of the market, we will present you with a set of short scenarios. Please select the correct answer (notice, you can only proceed with the experiment, if you answer the questions correctly):

1) Max stated that for €3.00 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. His partner has offered a price of €4.00. What happens?
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]
   ○ Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ● Max receives €3.00. [Endowment Condition: Max sells his ticket for €3.00.]

2) Max has stated that for €4.50 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. His partner has offered a price of €4.00. What happens?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ● Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

3) Assume now that Max has overstated the price. He indicated that for €4.50 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. In truth however, he prefers to obtain the money [Endowment Condition: wants to sell his ticket] already for a price of 4.00 and all higher prices. His partner has offered a price of €4.00. What happens?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ● Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if Max would have stated his true preference of €4.00?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ○ Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ● Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if €5.00 was drawn as the random price?
   ● Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ○ Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ○ Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

4) Assume now that Max has understated the price. He indicated that for €4.00 and all higher prices he prefers to obtain the money [Endowment Condition: to sell his ticket]. In truth however, he prefers to obtain the money [Endowment Condition: to sell his ticket] only at a price of 4.50 and all higher prices. His partner has offered a price of €4.00. What happens?
   ○ Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
   ○ Max receives the ticket [Endowment Condition: Max keeps the ticket.].
   ● Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]
What happens if Max would have stated his true preference of €4.50?

- Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
- Max receives the ticket [Endowment Condition: Max keeps the ticket.]
- Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

What happens if €5.00 was drawn as the random price?

- Max receives €4.50 [Endowment Condition: Max sells his ticket for €4.50.]
- Max receives the ticket [Endowment Condition: Max keeps the ticket.]
- Max receives €4.00. [Endowment Condition: Max sells his ticket for €4.00.]

At what price do you prefer the money over the ticket?

Please state for each of the listed prices whether you would like to receive the money or obtain the lottery ticket. Your decisions are binding!

At a price of ...

€ 10.00: ○ I would choose the money ○ I would choose the lottery ticket
€ 9.75: ○ I would choose the money ○ I would choose the lottery ticket
...
€ 0.25: ○ I would choose the money ○ I would choose the lottery ticket

[For the Endowment Condition]:

At what price do you want to sell the ticket?

Please indicate for each of the listed prices whether you would like to sell the lottery ticket or keep the ticket. Your decisions are binding!

At a price of...

€ 10.00: ○ I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75: ○ I would sell the lottery ticket ○ I would keep the lottery ticket
...
€ 0.25: ○ I would sell the lottery ticket ○ I would keep the lottery ticket

Second Market

Please assume that you can choose between the ticket and the money [Endowment Condition: sell your ticket] in a market just as you did before. However, this time you are not matched with a real partner. Instead of a real partner making an offer, a random price is drawn from an urn. Each price between 0.25, 0.50, 0.75 …9.75, 10 is represented once in the urn. The price you indicate is compared with the random price. You receive the money [Endowment Condition: sell your ticket], if you have preferred the money over the ticket [Endowment Condition: to sell your ticket] for this random price. When you receive the money [Endowment Condition: sell your ticket], then you are paid the random price.

Assume for example the lowest price for which you prefer the money over the ticket [Endowment Condition: are willing to sell your ticket for] is 4€ and a random price of 5€ is drawn. In this case you would receive 5€. If the lowest price for which you prefer the money would be 6 € [Endowment Condition: you would demand 6€ for selling your ticket] - one Euro more than the random price - then you would keep your ticket. Let’s assume now that
you overstate your valuation and indicate that you prefer the money over the ticket at a price of 5€ [Endowment Condition: ask for 5€ for selling your ticket], while your actual valuation is only 4€. In this case you would still receive the random price of 5€. However, if you would indicate to prefer money over the ticket at 6€ [Endowment Condition: ask for 6€ for selling your ticket], while your true valuation is in fact 5€, then you would receive the ticket [Endowment Condition: have to keep your ticket], even though you would have preferred the money over the ticket at [Endowment Condition: to sell the ticket for] the random price of 5€.

Just as in the market before we ask you now

**at what price do you prefer the money over the ticket?**
Please state for each of the listed prices whether you would like to receive the money or obtain the lottery ticket. Your decisions are binding!

**At a price of ...**
€ 10.00: ○ I would choose the money ○ I would choose the lottery ticket
€ 9.75: ○ I would choose the money ○ I would choose the lottery ticket
...
€ 0.25: ○ I would choose the money ○ I would choose the lottery ticket

**[For the Endowment Condition]:**

**At what price do you want to sell your ticket?**
Please indicate for each of the listed prices whether you would like to sell the lottery ticket or keep the ticket. Your decisions are binding!

**At a price of...**
€ 10.00: ○ I would sell the lottery ticket ○ I would keep the lottery ticket
€ 9.75: ○ I would sell the lottery ticket ○ I would keep the lottery ticket
...
€ 0.25: ○ I would sell the lottery ticket ○ I would keep the lottery ticket

**D. Information Subjects Received about their Partner`s Instructions**
The instructions are identical for all conditions.

**Your Partner`s Instructions**
Your partner is asked at what price he would buy the lottery ticket. He received an endowment of 10 Euro. He can spend any portion of his endowment on buying the ticket; he keeps the rest of the endowment that he does not spend.

He will be presented with a list of all prices between €0.25 and €10.00 and has to decide for each price whether he wants to buy the lottery ticket or not.

**Your Partner`s Payoff**
Your partner buys the lottery ticket, if he states that he values the ticket at a higher price or at the same price as you. As any buyer in the real world, your partner keeps the money that he does not spend on buying the ticket. Thus he earns the more the less he spends on the ticket.
However, if he offers a price for the ticket that is lower than the price you indicate then he does not get the ticket.

D. Instructions for the Real Partner
The instructions are identical for all conditions. We only report the relevant sections that differ from the instructions that the subjects received.

The Rules of the Market:
You are given an endowment of 10 Euro for which you can buy a lottery ticket in a real market. You can spend any portion of your endowment on buying the ticket; you keep the rest of the endowment that you did not spend on the transaction.
You will be presented with a list of all prices between €0.25 and €10.00. [0.25; 0.50; 0.75…9.75; 10.00] You have to decide for each price whether you want to buy the lottery ticket or not.

At a price of …
€ 10.00: ○ I would buy the ticket ○ I would keep the money
€ 9.75: ○ I would buy the ticket ○ I would keep the money
...
€ 5.50: ○ I would buy the ticket ○ I would keep the money
€ 0.25: ○ I would buy the ticket ○ I would keep the money

Your Payoff
You buy the lottery ticket, if you state a higher price for the ticket as your partner or the same price. Otherwise no transaction takes place and you will keep the money, but will not get a lottery ticket.

Here are examples:
1.) Assume you have stated to value the lottery ticket at a price of 4€.
a) Your partner indicates that he prefers to receive the money over the ticket at a price of 3.75€. Then you get the ticket and keep a rest of 6 Euro of your endowment. Your partner is paid €3.75.
b) Your partner indicates that he prefers to receive the money over the ticket at a price of 4.25€. Then the transaction fails and you keep your full endowment. Your partner gets the lottery ticket.

E. Additional Measures

1.) Regret

[No-Endowment Condition]
Regret over Choosing the Money
Assume that you consider choosing the money over the ticket. When you choose the money, you will not be eligible to collect a prize. How much regret do you anticipate to feel over choosing the money while being aware that with a small probability you forgo winning a prize?
Please mark one of the boxes you see below.
Low values express little regret; high values represent a strong feeling of regret.

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<thead>
<tr>
<th>1</th>
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</table>

**Regret over Choosing the Ticket**
Assume that you consider choosing the ticket over the money. When you choose the ticket, you cannot collect the money. How much regret do you anticipate to feel over choosing the ticket while being aware that you forgo the money for a ticket that with a large probability will be a blank?
Please mark one of the boxes you see below.
Low values express little regret; high values represent a strong feeling of regret.

<table>
<thead>
<tr>
<th>1</th>
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<th>6</th>
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</thead>
</table>

**[Endowment Condition]**

**Regret over Selling the Ticket**
Assume that you consider selling your ticket. When you sell the ticket, you will not be eligible to collect a prize. How much regret do you anticipate to feel over selling the ticket while being aware that with a small probability you forgo winning a prize?
Please mark one of the boxes you see below.
Low values express little regret; high values represent a strong feeling of regret.

<table>
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</tr>
</thead>
</table>

**Regret over Keeping the Ticket**
Assume that you consider keeping your ticket. When you keep the ticket, you cannot collect a sales price. How much regret do you anticipate to feel over keeping the ticket while being aware that you forgo the sales price for a ticket that with a large probability will be a blank?
Please mark one of the boxes you see below.
Low values express little regret; high values represent a strong feeling of regret.

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**2.) Loss Aversion**

**The Lotteries**
You are given the option to participate in two lotteries. To enable you to participate, you receive an endowment of 2.50€. You can increase your earnings when you participate in the lotteries, but you can also lose your endowment. You can decide separately for each lottery whether you want to participate in it or not. So you may decline to participate in one lottery, but take part in the other; you can also reject both lotteries, or participate in both of them.
The outcome of both lotteries will be determined by the public draw of the online lottery. The first drawn number decides the outcome of the first lottery, the second number determines the outcome of the second lottery. You win either lottery if the drawn number is even and you lose either lottery if the drawn number is uneven. You will only be paid for one of the two lotteries. Which lottery is paid for, will also be determined randomly by the online lottery. If the third number drawn in the online lottery is uneven, then the first lottery is selected for payment, if it turns out to be even, then the second lottery is selected.

**Lottery 1**
Lottery 1 has the following payoff: You win €4 with a probability of ½ and you lose €2.50 with a probability of ½. If you reject to participate in Lottery 1 then you neither win an additional payoff, nor can you lose your endowment.

Please click on the “Yes” button if you want to participate in the lottery and the “No” button if you do not want to participate in Lottery 1.

Yes [ ] No [ ]

**Lottery 2**
Lottery 2 has the same payoff as Lottery 1: You win €4 with a probability of ½ and lose €2.50 with a probability of ½. However, the lottery is repeated for six times. You are paid the average of the six outcomes.

Here is an example: Assume you win the lottery three times (3x€4) and you lose the lottery three times (3x€2.50). In this case the overall payoff for Lottery 2 would be: \[
\frac{3\times4 - 3\times2.50}{6} = \€0.75
\]
If you reject to participate in Lottery 2 then you neither win an additional payoff, nor can you lose your endowment.

Please click on the “Yes” button if you want to participate in the lottery and the “No” button if you do not want to participate in Lottery 2.

Yes [ ] No [ ]