

# DOES THE ENDOWMENT EFFECT JUSTIFY LEGAL INTERVENTION?

## THE DEBIASING EFFECT OF INSTITUTIONS

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## *Abstract*

*We claim that the endowment effect rarely justifies legal intervention in private ordering. To our knowledge, we present the first theory to explain how institutions inhibit the endowment effect without altering people's rights to their entitlements. The endowment effect is substantially caused by anticipated regret. We show that people experience regret only when they feel responsible for the decision and can mute regret by trading through institutions that let them share responsibility with others. As entitlement-holders typically transact through institutions, we expect most people to make unbiased trading decisions in real markets. We test two common institutions—agency and voting—that divide responsibility between multiple actors. Each caused most subjects to debias and trade in our study. We also show that people intentionally debias by employing institutions in order to share responsibility. Thus, when people can freely transact, private ordering generally overcomes the endowment effect.*



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## 1. INTRODUCTION

Legal scholars have long argued that the endowment effect requires legal intervention in private ordering. According to the Coase Theorem, law should not interfere with private ordering, because people will transact until entitlements flow to those who value them most, when there are no transactions costs or other impediments to contracting (Coase 1960). Endowment effect experiments contradict this claim. They show that people's Willingness to Accept to part with an entitlement exceeds their Willingness to Pay to obtain it. Consequently, entitlements tend to remain with their original owners, even when others would value ownership more (e.g., Thaler 1980; Knetsch and Sinden 1984; Knetsch 1989; Tversky and Kahneman 1991; Kahneman et al. 1991).

Relying on this evidence, legal scholars claim, in more than a thousand articles, that the endowment effect leads to suboptimal allocation of important entitlements, including intellectual property, contractual default rules, real property, legal settlements, corporate control, consumer debt, employment, and environmental protection. They advocate interventions to reallocate entitlements, alter contractual default rules, or weaken people's sense of endowment by replacing property rules with liability rules or bright-line rules with standards (e.g., Sunstein 1986; Coates and Subramanian 2000; Jolls et al. 1998; Korobkin 1998; McCaffery et al. 1995; Rachlinski and Jourden 1998; Buccafusco and Sprigman 2011; see generally Korobkin 2013, finding more than 1,600 legal articles citing the endowment effect).

We claim that legal intervention to address the endowment effect is rarely needed. We present, to our knowledge, the first theory to show that common institutions, such as agency relationships and voting, debias the endowment effect, without interfering with private ordering.<sup>1</sup> We show that the endowment effect roots in the responsibility entitlement holders have for the decision to trade. Institutions debias when they allow sellers to share responsibility for the decision with others.

Our theoretical claim that decision-making responsibility causes the endowment effect builds on the regret account of the endowment effect (e.g., Knetsch and Sinden 1984; Baron and Ritov 1994; Bar-Hillel and Neter 1996; see Korobkin 2013, discussing the evidence).<sup>2</sup> Under regret theory, people resist parting with their entitlements because they anticipate that they may regret the decision to trade. As losses loom larger than foregone gains, people anticipate more regret over trading than over failing to obtain an entitlement in error. The disutility of anticipated regret causes owners to reject transactions or insist on additional compensation above the value they place on the asset alone. Anticipated regret can cause an endowment effect across all forms of entitlements. People anticipate regret over parting with an

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<sup>1</sup> Under the regret account, the endowment effect can be understood as a motivational bias. People can cognitively identify the rational choice given the value they attach to the entitlement itself, but are deterred from trading by the emotional cost of making a wrong trading decision. Throughout this article, we use the term "unbiased decisions" to refer to decisions that are unaffected by the endowment effect. We are aware that other biases may be present.

<sup>2</sup> We recognize that the endowment effect also may be caused by loss aversion or attachment. See generally Korobkin (2013). We discuss the interaction of institutions and other sources of the endowment effect *infra* Section 5.3.

entitlement whose future value is uncertain—either in the market or to the owner personally (Plott 1996)—because the trade may produce a loss once the future outcome is known. As the future value of most entitlements is uncertain, anticipated regret can induce an endowment effect in a wide range of entitlements. This includes real, intellectual and personal property, corporate control, legal settlements, securities, and material contract clauses. Regret theory also can explain the endowment effect for simple consumer goods, such as mugs and pens, whose value is known and stable. People experience disutility from anticipated regret when an exchange at their personal valuation would be a bad deal as judged by the market. Consequently, owners who place a lower value on a good than the market, may require more than their actual valuation to trade, even when they cannot sell the entitlement as a result (Weaver and Frederick 2012).

Literature shows that responsibility is a necessary prerequisite to regret (e.g., Zeelenberg et al. 1998). Building on this, we claim that the anticipated regret that causes the endowment effect requires more than endowment alone. People should only anticipate regret over losses from trading, and exhibit the endowment effect, when they are responsible for making the decision to trade.

Our theory uncovers that institutions systematically debias entitlement holders. Institutions, such as agency relationships and voting, involve others in the decision to sell, dividing responsibility for the transaction between multiple actors. Since sharing responsibility mutes regret, people transacting through these institutions should not experience the regret that causes the endowment effect. Our theory also reveals that entitlement holders have an incentive to use institutions to debias themselves.

We selected two institutions to test our theory: principal-agent relationships and voting. Voting divides the responsibility for the transaction between all voters. Agency relationships distribute decision-making responsibility between the principal and agent, limiting the individual responsibility of each. The agent decides and often executes the transaction, and the principal provides instructions or retains veto power.

We tested our theory in the laboratory and online. In the basic setting, each subject obtained one of two lottery tickets. Each ticket had a 50% chance of winning. Winners earned a substantial payoff. Subjects were offered the opportunity to exchange their ticket for the other ticket plus a monetary bonus of 25 €-cent. Trading to obtain the bonus is the rational decision. Participants who keep their ticket exhibit an endowment effect. Consistent with prior evidence, more than 70% of the laboratory subjects exhibit an endowment effect (e.g., Knetsch and Sinden 1984; Bar-Hillel and Neter 1996; Isoni et al. 2011; Korobkin 2013, discussing the evidence).

In our first agency treatment, we assigned each subject an agent who made the initial trading decision, which the subject could accept or veto. The subject shares responsibility with his agent, and should be debiased. In support of our theory, almost 70% of subjects trade their ticket in the lab and almost 80% online. In a second treatment, subjects were assigned an agent. The agent decided whether to trade the principal's ticket, but principals could determine whether the agent was incentivized to keep or trade the ticket. Supporting our theory, 75.6% of the principals incentivized their agent to trade. In our voting treatments, subjects determined by majority vote whether all tickets should be traded. In one treatment, subjects were bound by the majority's decision; in the other, each participant could veto the decision for his ticket. Almost 80% of the participants voted to trade. Even when participants had a veto, more than 85% traded. Subjects reported to feel significantly less responsibility for,

and regret over, a negative outcome when trading through agents or voting than when deciding alone.

In a second set of experiments, we tested our claim that entitlement holders will overcome the endowment effect on their own. Legal scholars tend to assume that owners do not self-debias when calling for external intervention. Our theory reveals that entitlement-holders are motivated to self-debias. They delegate to institutions that distribute responsibility in order to relieve their disutility of regret. To test our theory, we offered subjects the option to employ an institution instead of deciding on their own. In the first treatment, subjects could incur a cost to delegate to an agent. In the second, participants could delegate to a majority vote. Supporting our self-debiasing claim, we find that approximately half of the subjects delegate. Participants who delegated reported less anticipated regret and overwhelmingly traded. Providing voluntary access to institutions significantly increased trading and had a debiasing effect similar to mandatory institutions.

Our theory and findings have important implications for legal policy. They reveal that the endowment effect seldom justifies legal intervention. People rarely should exhibit the bias because they normally transact through institutions that distribute responsibility. Businesses transact through agents, voting or both. Individuals selling real property, intellectual property, legal claims and corporate control typically transact through agents. Institutions are omnipresent because they provide many benefits. In most cases, institutions are used for reasons other than debiasing, including expertise and reduced transactions costs. Some are even mandated by law: corporate shareholders and directors must decide by voting. People also employ institutions solely to self-debias, as we have shown. Regardless of why they are used, institutions that divide responsibility debias. Thus, we expect that in real markets transacting will rarely be affected by the bias. Debiasing is even costless when people would still employ the institution if they did not benefit from debiasing. We conclude that private ordering will in most cases overcome the bias, leaving little necessity for legal intervention. Therefore, we propose a presumption against intervention: Unless evidence shows that entitlement holders in a particular market are not efficiently debiased by available institutions, intervention to address the endowment effect should be considered unnecessary.

This article proceeds as follows. Section 2 presents our basic experimental design. Section 3 presents our test of the debiasing effect of agents and voting. Section 4 tests whether people voluntarily use institutions purely to debias. Section 5 discusses the internal and external validity of our experiment and its implications for legal policy. Section 6 concludes.

## **2. METHODS – BASIC EXPERIMENTAL DESIGN AND PROCEDURES**

### **2.1. BASIC EXPERIMENTAL DESIGN – BASE CONDITION**

We conducted our study in the laboratory and online. The basic design was identical. Subjects were endowed with a lottery ticket marked either “Heads” or “Tails,” representing a 50% chance of winning the lottery. Subjects won 8 € (~\$11) in the laboratory or 4 € in the online study if the ticket they held at the end of the session matched the outcome of the lottery; otherwise they earned nothing. Subjects could trade their ticket for a ticket with the alternative symbol (Heads/Tails) plus a monetary payment of 25 €-cent. Each ticket had the same expected value; thus expected earnings were higher if the subject traded. Since both tickets had an equal probability

of winning the same payoff, uncertainty about the true value of the goods exchanged could not confound results. Our lottery design provides a salient rational benchmark and identifies who is biased: A rational subject should trade; any subject who retains the ticket exhibits an endowment effect. We use this basic setup as our benchmark treatment *Base*, against which we test the debiasing effect of institutions both in the laboratory and online.

This type of study is well tested. Many foundational experiments on the endowment effect use lottery designs and participants exhibited a strong bias (see, e.g., Knetsch and Sinden 1984; Marshall et al. 1986; Bar-Hillel and Neter 1996; Isoni et al. 2011, replicating the endowment effect following the experimental protocols of Plott and Zeiler 2005, 2007).

## 2.2. PROCEDURE - LABORATORY EXPERIMENT

We conducted the study in the laboratory of the University of Jena. We had 210 participants across treatments. Participants study a variety of disciplines; we also had non-students in the sample. In our post-experimental questionnaire we obtained demographic variables, sex and age (18-41, mean=23.4), which were balanced between treatments. We also elicited the subjects' disciplines and whether they worked outside of the University. Regression results show that demographic characteristics did not affect our findings.

Subjects were seated in separate booths with no ability to observe or hear each other and received the instructions in writing. They withdrew their sealed ticket from a box containing many tickets. For each subject, a coin was tossed and covered before the subject made any decisions. The instructions clarified that subjects either could accept the unknown outcome or toss the coin themselves after they made their decision whether to trade.

After reading the instructions, participants were asked control questions. Principals had to calculate their earnings, assuming that they traded or kept their ticket and won or lost the lottery. They had to answer these questions correctly in order to proceed. Misunderstandings appeared only in one out of ten times. We had to exclude three of 210 participants.

Subjects had to make all choices explicitly. Thus when asked whether they wanted to trade they had to write "Yes" or "No," imposing the same transaction costs no matter whether they decided to trade or keep their ticket. Subjects who decided to trade turned in their original for the alternative ticket. They were paid in cash.

## 2.3. PROCEDURE - ONLINE EXPERIMENT

The online experiment largely replicated the laboratory treatments, except that a winning lottery ticket paid 4 € instead of 8 €. We kept the bonus for trading at 25 €-cent. Subjects did not receive a physical lottery ticket, but instead were told that they had been randomly assigned a ticket through a code hidden in the instructions they received for the experiment. The code would identify whether they started with a Heads or Tails ticket, and would be revealed only after the session was over. Subjects determined whether Heads or Tails won the lottery. At the end of the session, they learned that the e-mail inviting them to the experiment contained the code stating the type of ticket they were assigned. Thus, subjects could be sure that the outcome of the lottery was determined by chance. We minimized the risk that subjects told other participants about this procedure by conducting the study on a single day. The

frequency of wins and losses was indeed consistent with chance. We asked the same control questions as in the laboratory experiment.

In addition to measuring trading frequency, we also elicited subjects' sense of responsibility and regret over a negative outcome of the lottery. We used a ten point Likert scale ranging from 1 (very little responsibility/regret) up to 10 (very strong responsibility/regret) for this item.

All subjects were students from the University of Münster who were invited to participate by email through the university's server. We had 603 online subjects across all treatments. The dropout rate was less than 10%, probably because subjects were only paid if they completed the study which only took around eight minutes. To ensure that subjects participated only once, each invitation contained a personal key which became invalid once a subject used it to enter the experiment. Participants received their payment after completing the study via direct electronic bank transfer or PayPal. They had various disciplinary backgrounds, gender was balanced, and few had done experiments before. We controlled for demographics in logistic regressions; sex, age, and discipline did not significantly affect the effects we report.

### 3. DEBIASING BY INSTITUTIONS

We claim that entitlement holders anticipate regret and exhibit the endowment effect because they feel responsible for the decision to trade. Many institutions divide decision-making and outcome responsibility between multiple actors, instead of focusing it entirely on the entitlement holder. People operating within such institutions should anticipate substantially less regret over a trade since they share decision-making responsibility with others. As a result, institutions should enable them to make unbiased trading decisions.

In this study we test two institutions commonly used for trading that distribute responsibility between actors: principal-agent relationships and voting. The principal and agent both causally contribute to the transaction. The agent often makes the initial trading decision and executes the transaction. The principal provides ex ante instructions or may retain a veto. Although the division of authority between the principal and agent varies, generally both principals and agents share the responsibility for the decision. The debiasing effect of the institution should enable principals to make unbiased decisions when providing instructions or incentives to their agents ex ante. Principals presented with an agent's optimal recommendation to trade should not be biased against trading and allow the trade to go through.

The second institution we analyze is voting, which is used in many business contexts by co-owners, boards of directors, and shareholders. Voting divides decision-making responsibility amongst the voters. A single voter bears responsibility only when he is pivotal. Increasing the number of voters reduces individual responsibility by reducing the likelihood that any particular voter is decisive. Ex ante, all voters share the same responsibility for the outcome. Thus, no matter how they vote, their vote is not biased by anticipated regret. The debiasing effect of majority voting without veto is particularly strong: A majority vote to trade produces an unbiased outcome for all, even if a minority still manifests an endowment effect.

#### 3.1. PRINCIPAL-AGENT-RELATIONSHIPS - EXPERIMENTAL DESIGN

In *Mandatory Agent* (hereinafter *Mandatory*), each principal was instructed that he had been assigned an agent who would decide whether his ticket would be traded for the alternative ticket plus a bonus. Agents were real participants who made

their choices in the laboratory. Subjects were informed that the agents' decision would be binding unless the subject vetoed it. A principal who vetoed the agent's choice could decide for himself whether to trade or keep his initial ticket. Each principal was instructed that the agent would receive 2 € from the experimenter if, but only if, the agent decided to trade the principal's ticket.<sup>3</sup> To rule out other-regarding motivations, principals were informed that their veto decision would not affect the agent's payoff and that the agent would not learn about their veto. Agents did not share in the outcome of the lottery. Control questions confirmed that subjects understood what the design made salient: Agents could not have better information on the outcome of the lottery than the principal.

In our second agency treatment, *Guided Agent*, principals were assigned an agent who decided whether the ticket would be traded. But principals could incentivize their agent's choices. If the principal incentivized trading, then the agent received 2 € if he exchanged the principal's ticket, and nothing if he rejected the trade. If a principal incentivized the agent to keep the ticket for him, the agent earned nothing if he traded. The agent was incentivized but not bound. Payments were made by the experimenter. Principals could not veto the agent's decision.

To rule out potential confounds, we conducted two control treatments: *Default* and *Information-only*. *Default* is identical to *Base*, except that subjects were informed their ticket would be traded automatically unless they vetoed the exchange. *Default* controls for two alternative explanations of our results: a shift of the status quo and omission bias (see Baron and Ritov 1994). In *Base*, being entitled to the ticket is the clear status quo. By contrast, in *Mandatory*, the agent trades the ticket unless the subject vetoes. This may weaken the principal's sense of endowment or even shift the status quo entirely. In *Guided Agent*, this confound is unlikely because the principal decides whether the agent receives an incentive to trade or keep the ticket. Still, the treatment could change the status quo should the principal believe that the agent will trade, no matter what the incentives are. A shift in subjects' perception of their endowment status could increase trading independently of responsibility-sharing (see Köszegi and Rabin 2006).

*Default* also rules out omission bias as an alternative explanation for debiasing in *Mandatory*. The principal can trade by inaction, while in *Base* he has to actively trade his ticket. People generally experience less responsibility for and regret over omissions (e.g., Ritov and Baron 1992; Ritov and Baron 1994). Thus, the switch from action to inaction could reduce regret and the endowment effect. In *Guided Agent* omission bias is not a concern, as the principal only takes action.

In *Information-Only*, participants made the trading decision on their own as in *Base*, except that prior to making their choice they were informed about the trading decision of an agent acting on behalf of a different principal. Thus, *Information-Only* disentangles the potential effect of the agent's recommendation from responsibility-sharing. Our main observation is the frequency of trades. In addition, we asked principals to indicate how responsible they would feel and how much regret they would expect to experience assuming first that they confirmed their agent's trade and

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<sup>3</sup> Each agent was assigned to six principals, and received 2 € for each ticket he traded. Thus, agents could make up to 12 € by trading all tickets of their six principals. Agents completed the experiment in separate sessions in advance of the principals. They were assigned ex post to their partners. Principals were not aware that their agent was assigned to several partners. As expected, agents followed their strong incentives and all but one decided to trade.

next that they rejected it. We also elicited how much responsibility principals attribute to their agent for a negative outcome.

### 3.2. BEHAVIORAL PREDICTIONS

The regret theory of the endowment effect predicts that subjects do not trade because they anticipate that they will experience regret should they lose the lottery because they exchanged their ticket. They keep their ticket to avoid the disutility of anticipated regret. Thus, even though trading is the rational choice, we expect a significant number of subjects (tested against the rational choice prediction of trading) to keep their ticket and exhibit a bias in *Base* (**Hypothesis H<sub>1</sub>**).

By contrast, in our agency treatments, the principal-agent relationship should mute the regret that triggers the endowment effect. We argue that regret presupposes responsibility (Zeelenberg et al. 1998). People experience regret over losses caused by a decision for which they feel responsible. The agency treatments divide the responsibility for the decision to trade between the principal and his agent. In *Mandatory*, the agent makes the initial decision and the principal decides whether to veto it. In *Guided Agent* the principal provides the agent with incentives and the agent decides whether to trade or not. Evidence shows that people rank the responsibility for an outcome according to contributions. They attribute the greatest responsibility to the last affirmative action in a causal chain as it is closest to the outcome, even when followed by a subsequent inaction (see Spellman 1997). In both treatments, agents take the last affirmative action, even though in *Guided Agent* the principal strongly influences the agent's decision. Thus, principals share the responsibility for the trading decision with their agents, and should anticipate less regret. We predict that more subjects in both *Agency* treatments will trade their ticket not exhibiting an endowment effect compared with *Base* (**Hypothesis H<sub>2</sub>**).

We claim that the principal-agent relationship debiases because it divides the responsibility for the trade between the principal and his agent (**Hypothesis H<sub>3</sub>**). If responsibility is indeed shared, as we hypothesize, principals should report that they anticipate less responsibility and regret over trading in *Mandatory* and *Guided Agent* than in *Base*. In addition, principals should indicate that they attribute some responsibility for the trade to their agent.

### 3.3 RESULTS

Table One presents the summary statistics of all laboratory treatments while Table Two shows the summary statistics of all online experiments. Regression results which control for demographic variables (sex, discipline, work experience outside of the university) did not deviate from the non-parametric tests we present here.

#### **H<sub>1</sub>: In *Base*, subjects exhibit an endowment effect**

As can be seen in Tables One and Two, in our *Base* condition 70.3% of the laboratory subjects and 44.4% of the online subjects do not trade their ticket. The results are significantly different ( $p < 0.01^{**}$ ) from the rational choice prediction that all participants should trade.<sup>4</sup> This strong evidence of an endowment effect is consistent with the existing literature (e.g., Knetsch 1989; Bar-Hillel and Neter 1996; Isoni et al. 2011). We likely observed more trading online than in the lab because the stakes in the lottery were lower and subjects did not have physical possession of their

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<sup>4</sup> Note that if we treat the experience of regret as a psychological cost, we can reconstruct the endowment effect in rational choice terms see Loomes and Sugden (1982).

lottery ticket. Both should have reduced the intensity of regret participants experienced.

**Table One: Laboratory Experiment**

	Total N	Keep	Trade	Fisher 2-tailed
Base	64	45 (70.3%)	19 (29.7%)	
Information-Only	39	28 (71.8%)	11 (28.2%)	p=1
Mandatory	45	14 (31.1%)	31 (68.9%)	p<0.01** p<0.01**
Optional	59	29 (49.1%)	30 (50.9%)	p=0.04* p=0.03*
Optional: Delegate	29 (49.2%)	3 (10.3%)	26 (89.7%)	p<0.01** p<0.01**
Optional: Not Delegate	30 (50.8%)	26 (86.6%)	4 (13.4%)	p=0.12 p=0.15

We report two *p*-values (1) Treat vs Base; (2) Treat vs Information-Only.

## **H<sub>2</sub>: Agency increases trading**

Supporting our theory that responsibility-sharing mutes the endowment effect, we find that subjects in *Mandatory* are significantly more willing to trade than in *Base*. In the lab, 68.9% of the *Mandatory* subjects trade, compared with 29.7% of the participants in *Base* ( $p < 0.01^{**}$ ). Online 77.8% of the *Mandatory* participants trade, whereas only 55.5% exchanged their ticket in *Base* ( $p < 0.01^{**}$ ), as presented in Table Two. In *Guided Agent*, 75.3% of the principals incentivized their agent to trade their ticket. Thus, significantly more principals wanted to trade than in *Base* ( $p < 0.01^{**}$ ).

Our two agency treatments differ in that in *Guided Agent* the principal decides before and independent of his agent, while in *Mandatory* the principal decides on his veto in response to the agent's choice. The veto in *Mandatory* could be a source of confound. Our two control treatments address these potential confounds. The first control condition, *Default*, shows that the debiasing results are not driven by either a shift in participants' reference points or by omission bias. In *Default*, subjects obtain a ticket that the computer will trade automatically unless they veto. They cannot share responsibility for their decision because there is no other player. If debiasing is caused by sharing responsibility in the principal-agent relationship as we claim, then fewer participants should trade in *Default* than in *Mandatory*. By contrast, if we observe more trading in *Mandatory* than in *Default*, and more trading in *Default* than in *Base*, then omission bias or a shift in status quo could have caused our results. Supporting our theory, we find that significantly more participants trade in *Mandatory* (77.8%,  $p = 0.03^*$ ) than in *Default* (61.1%), as shown in Table Two. *Base* and *Default* do not differ significantly. So, neither of the two potential confounds explain our results. As principals take action, omission bias cannot affect results in *Guided Agent*. A shift of reference point is also unlikely since the principal influences his agent's incentives decision by setting his incentives.

Our second control treatment rules out information as an alternative explanation of our results in *Mandatory*. If principals traded more often in *Mandatory* because they assumed that the agent's choice revealed valuable information, we should observe an increase of trading in *Information-Only*. Yet, as shown in Table One, the frequency of trades in *Information-Only* (28.2%,  $p < 0.01^{**}$ ) is significantly lower than in *Mandatory* (68.9%), and not statistically different from *Base*. As principals decide ex ante, an information confound is impossible in *Guided Agent*.

**Table Two: Online Experiment**

	Total N	Keep	Trade	Fisher 2-tailed
Base	90	40 (44.4%)	50 (55.5%)	
Default	90	35 (38.9%)	55 (61.1%)	p=0.54
Mandatory	81	18 (22.2%)	63 (77.8%)	p<0.01** p=0.03*
Guided Agent	81	20 (24.7%)	61 (75.3%)	P<0.01**
Optional	82	23 (28%)	59 (72%)	p= 0.02*
No Agent	82	38 (46.3%)	44 (53.6%)	p=0.87
Optional – Delegate	43 (52.4%)	6 (13.9%)	37 (86.1%)	p<0.01**
Optional – Not Delegate	39 (47.6%)	17 (43.5%)	22 (56.5%)	p=1
No Agent: Keep Optional: Trade or Keep	38	21 (55.3%)	17 (44.7%)	
Voting without Veto	91	19 (20.9%)	72 (79.1%)	p<0.01** p=0.01*
Voting without Veto (Group of Three)	48	6 (12.5%)	42 (87.5%)	p<0.01** p<0.01**
Voting with Veto (veto decisions)	88	10 (11.4%)	78 (88.6%)	p<0.01** p<0.01**
Voting with Veto (submitted votes)	88	13 (14.7%)	75 (85.3%)	p<0.01** p<0.01**
Optional Voting with Veto	90	22 (24.4%)	68 (75.6%)	p<0.01**
Optional Voting – Delegate	41 (45.5%)	3 (7.3%)	38 (92.7%)	p<0.01**
Optional Voting – Not Delegate	59 (54.5%)	19 (38.7%)	30 (61.2%)	p=0.07 <sup>+</sup>
Base: Keep Optional: Trade or Keep	37 (41.1%)	16 (43.3%)	21 (56.7%)	

We report two *p*-values (1) Treatment vs Base; (2) Treatment vs Default. We only report comparisons to Default if the treatment could have changed the status quo.

### H<sub>3</sub>: Agency reduces reported responsibility and regret

We claim that sharing responsibility debiases by reducing regret over trading. As shown in Table Three, when we compare reported regret and responsibility across treatments we find that subjects indeed experience significantly less responsibility for, and anticipate less regret over trading in *Mandatory* (4.72, 6.12), where subjects can share responsibility, than in *Base* (6.35,  $p<0.01^{**}$ ; 7.2  $p=0.04^*$ ). The level of responsibility and regret is also lower than in *Default* (6.17,  $p=0.01^*$ ; 6.66,  $p=0.16$ ).

We find the same pattern in *Guided Agent*. Subjects experience substantially less regret over (6.24,  $p=0.02^*$ ) and responsibility for (5.64  $p=0.09^+$ ) a decision to trade comparing results to *Base*.

The principal-agent relationship also limits individual responsibility and regret when we compare results within-subjects. In *Mandatory*, participants feel significantly less responsibility for (4.72; 7.07  $p<0.01^{**}$ ), and regret over (6.12; 7.38,  $p<0.01^{**}$ ), a negative outcome if they assume they accept the agent's decision to trade compared to if they assume they keep the ticket. In *Guided Agent* for both keep and trade, the levels for responsibility (5.64, 5.87) and regret (5.99, 6.24) barely differ. By contrast, in *Base* and *Default* participants report feeling significantly more responsibility and regret when assuming that they trade (6.35, 7.2) compared with when they assume that they keep their ticket (5.48,  $p<0.01^{**}$ ; 6.5  $p=0.02^*$ ).

We also find direct evidence that subjects share responsibility in the principal-agent relationship: Assuming that the transaction results in a loss, principals attribute a larger part of the responsibility for the negative outcome to their agent (6.23,  $p < 0.01^{**}$ ) than to themselves in *Mandatory*; in *Guided Agent* they attribute a substantial amount to their agent (4.8,  $p = 0.17$ ) even though they incentivize his choices trading (see Table Three).

**Table Three: Responsibility and Regret**

	Resp. Keep	Resp. Trade	p-value trade vs. keep	Regret Keep	Regret Trade	p-value trade vs. keep	Responsibility to Agent (vs. Resp. Trade)
Base	5.48	6.35	0.01*	6.5	7.2	0.02*	
Default	6.17 0.05 <sup>+</sup>	6.17 0.63	1	6.78 0.39	6.66 0.09 <sup>+</sup>	0.74	
Mandatory	7.07 <0.01** 0.02*	4.72 <0.01** 0.01*	<0.01**	7.38 <0.01** 0.10 <sup>+</sup>	6.12 0.04* 0.16	<0.01**	6.23 <0.01**
Guided Agent	5.87 0.4	5.64 0.09 <sup>+</sup>	0.68	5.99 0.18	6.24 0.02*	0.31	4.8 0.17
Optional	7.06 <0.01**	5.42 0.02*	<0.01**	7.54 <0.01**	6.28 0.01*	<0.01**	6.32 0.02*
No Agent		7.05 0.08 <sup>+</sup> 0.02*			7.34 0.69 0.44		
Voting – Without Veto		4.75 <0.01** <0.01**			5.47 <0.01** <0.01**		
Voting - with Veto	7.68 <0.01** <0.01**	5.37 0.01* 0.03*	<0.01**	6.65 0.86 0.31	5.89 0.01* 0.05 <sup>+</sup>	0.04*	

All *p*-values are two-tailed *T*-tests. We report two *p*-values (1) Treatment vs Base; (2) Treatment vs Default. We only report comparisons to Default if the treatment could have changed the status quo.

We also show that responsibility and anticipated regret indeed motivate participants' trading choices. Logistic regressions find that subjects' choices are strongly correlated with the level of responsibility and regret they report. Across treatments, subjects are significantly more likely to choose the action (trade or keep the ticket) that allows them to reduce their responsibility and regret. When we control for either reported responsibility or regret in our regression analysis the effect of agency on the probability of trading disappears. This result supports our theoretical claim that subjects' responsibility for trading triggers anticipated regret and drives the endowment effect. When subjects share responsibility with their agent they bear lower decision-making disutility and are less likely to be biased against trading.

**Table Four: Responsibility and Regret Motivate Trading Choices**

	Responsibility Trade	Regret Trade
Base	<0.01**	0.02*
Default	<0.01**	0.241
Mandatory	0.02*	0.02*
Guided Agent	0.07 <sup>+</sup>	0.03*
Optional	0.01*	<0.01**
Voting with Veto	<0.01**	0.06 <sup>+</sup>
Voting without Veto	<0.01**	<0.01**
All Treatments	<0.01**	<0.01**

Results logistic regression, *p*-values for dependent variable trade

#### 3.4. VOTING—EXPERIMENTAL DESIGN

We conducted the voting experiment online, using the same basic design and experimental protocol as for the other online treatments. We implemented two

treatments and one hypothetical scenario. In the first treatment, *Voting without Veto*, the majority vote decided whether all participants would trade or keep their ticket. In the second condition, *Voting with Veto*, the majority vote decided about the trade, but each subject could veto the application of the majority decision to his own ticket. The right to veto establishes a strong rational benchmark because it allows each subject to determine his own payoff and allows us to directly compare the effect of voting with our control treatment *Default*.<sup>5</sup>

Participants were informed that the session would include at least 80 subjects.<sup>6</sup> In addition, we presented subjects with a hypothetical scenario asking them to imagine that the group consisted of only three eligible voters. Subjects had to indicate whether they would vote for or against the transaction.

Our dependent variables are the vote and the veto decision. We elicit subjects' vote whether to trade for both treatments. In *Voting without Veto* the majority vote determines the outcome for all. In *Voting with Veto*, we elicit each subject's veto decision, which determines his outcome.

### 3.5. BEHAVIORAL PREDICTIONS AND RESULTS

People should feel less responsible for trading their tickets when the decision is determined by majority vote because each voter shares responsibility with the others. Irrespective of a voter's expectation of the outcome of the majority vote, each voter knows that his vote is unlikely to be pivotal and therefore shares responsibility with the others. If sharing responsibility reduces regret participants should be willing to vote for the trade in both voting treatments. In *Voting with Veto* voting also should debias participants' veto decision. As the majority should be unbiased and vote to trade, we expect participants to accept the majority's decision to trade as it allows them to share responsibility. Thus, we hypothesize that subjects will be more likely to decide to trade in both voting treatments compared to *Base* (**Hypothesis H<sub>1</sub>**).

We were interested in the impact group size may have on debiasing. While the debiasing effect of voting in a small group could be weaker because responsibility is divided between fewer voters, voting in a small group still distributes responsibility across multiple people. As a result, we expect the trading frequency to be higher in the *Group-of-Three* treatment than in *Base* (**Hypothesis H<sub>2</sub>**).

Finally, subjects should report lower levels of responsibility and regret in all voting treatments than in *Base* (**Hypothesis H<sub>3</sub>**).

#### **H<sub>1</sub>: Voters are more likely to decide to trade than subjects in *Base* or *Default***

Supporting our predictions, voting strongly increases subjects' willingness to trade: 85.3% of the participants in *Voting with Veto* and 79.1% in *Voting without Veto* voted to trade the ticket, as shown in Table Two. Both results are significantly different from *Base* (55.5%  $p < 0.01^{**}$ ), but do not differ statistically from one another.

In *Voting without Veto* not all participants vote to trade, but the majority rule produces a collective outcome that is unaffected by the endowment effect: everyone trades. By contrast, subjects in *Voting with Veto* are not bound by the majority vote. Nevertheless, 88.6% ( $p < 0.01^{**}$ ) follow the majority's vote and trade their ticket.

<sup>5</sup> Each voter's option to veto the majority is similar to shareholders' right to use appraisal to reject the merger consideration accepted by the majority vote in favor of a court determination of the fair price.

<sup>6</sup> After 80 subjects had completed the treatment, access was blocked and only those participants who had already started the experiment were allowed to finish it.

We compare our results with *Default* to establish that they are not caused by either a shift in subjects' reference point or omission bias. In *Voting with Veto*, subjects know the majority voted to trade before they decide about their veto. The expectation to trade could cause them to feel less entitled to their ticket. They also trade through inaction, potentially implicating omission bias. In *Default*, 61.1% trade their ticket and 38.9% of subjects keep. By contrast, in *Voting with Veto*, significantly more subjects trade their ticket (88.6%,  $p < 0.01^{**}$ ). We conclude that responsibility sharing causes the debiasing effect we find.

### **H<sub>2</sub>: Voting in small groups increases trading compared to *Base* and *Default***

Group size did not have an impact on results. In our hypothetical small group, *Group of Three*, 87.5% of the subjects reported that they would vote for the trade, which is a significantly higher rate than in *Base* ( $p < 0.01^{**}$ ) and *Default* ( $p < 0.01^{**}$ ). There is no difference compared to the treatments with large voting groups. Since the tickets cannot be traded unless at least two subjects share the responsibility for the trade the endowment effect was muted.

### **H<sub>3</sub>: Subjects experience less responsibility and regret in the *Voting* treatments**

As shown in Table Three, participants in *Voting with Veto* indicated that they would feel less responsibility (5.37) assuming that they traded and accepted the majority decision, than subjects in *Base* (6.35,  $p = 0.01^*$ ) and *Default* (6.17,  $p = 0.03^*$ ). Voting also significantly reduces regret over trading (5.89) compared to *Base* (7.2,  $p = 0.01^*$ ) and *Default* (6.66,  $p = 0.05^+$ ). The results for *Voting without Veto* show the same effect (see Table Three).

Supporting our theory, subjects in *Voting with Veto* report that they expected to feel less responsibility assuming that they accepted the majority's vote to trade (5.37) than if they vetoed the majority in order to keep their ticket (7.68,  $p < 0.01^{**}$ ). Similarly, subjects anticipate significantly less regret (5.89) assuming that they voted with and accepted the majority's vote to trade than if they vetoed the majority vote (6.65,  $p = 0.04^*$ ).

Responsibility and anticipated regret motivate the participants' trading choices in both voting treatments. The subjects' decision to trade or keep their ticket is strongly correlated with the level of responsibility and regret they report. Our logistic regressions show that they decide depending on what choice lets them experience a lower level of responsibility ( $p < 0.01^{**}$ ) and regret ( $p = 0.06^+$  with veto;  $p < 0.01^{**}$  without veto), as shown in Table Four.

## **4. VOLUNTARY DEBIASING**

Legal scholars implicitly assume that entitlement holders have no ability or incentive to self-debias when scholars assert that external intervention is required.<sup>7</sup> By contrast, we reveal that people are able and motivated to self-debias. This concept of self-debiasing is new to the literature.

The endowment effect results from the disutility people experience when they are responsible for the decision to trade. Owners have higher welfare if they reduce their decision-making disutility. We claim that they can do so by intentionally

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<sup>7</sup> Thus, even though studies show that agents are unbiased when trading on behalf of principals (see Marshall et al. 1986), scholars do not expect the institution of agency to debias the principal and they do not expect the biased principal to be motivated to use the agent to debias.

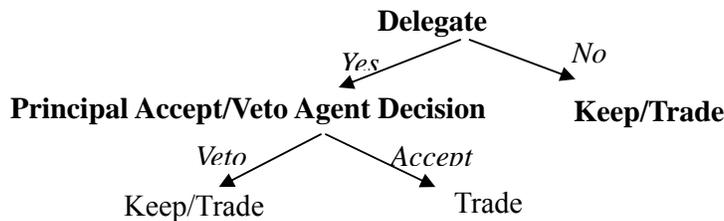
transacting through institutions that divide responsibility. Thus, even when owners have no other reason to use institutions, we predict that they will voluntarily employ institutions in order to debias.<sup>8</sup> Accordingly, private ordering can produce optimal allocations by inducing private debiasing.

In this section, we test whether subjects voluntarily delegate to an institution solely to debias. Participants choose between conducting the trade themselves and delegating the decision to an institution that divides responsibility. In the first treatment, *Optional Agent*, we test whether subjects are willing to pay to delegate their choice to an agent. In the second treatment, *Optional Voting*, we analyze whether participants prefer deciding through a majority vote over deciding alone.

#### 4.1. OPTIONAL AGENT - EXPERIMENTAL DESIGN

We conducted *Optional Agent* both in the lab and online. The treatment builds on the same basic design as *Mandatory*, with one subject in the role of principal and another in the role of agent. In this treatment, the agent is not mandatory. In the first stage, subjects are offered a choice: They can either decide on their own whether they want to trade or they can delegate the initial decision to an agent. Subjects who delegate can accept or veto the decision of their agent. If they veto, they can decide on their own whether or not they want to trade.

**Figure 1: Decision Tree for Principals**



To ensure that rational subjects should not delegate, we imposed a cost on delegation. We informed laboratory subjects that a decision to delegate would increase the experiment's duration by 10 minutes, prolonging the study from a total of 15 to 25 minutes. Online participants were instructed that delegation would cost them 5 €-cent (20% of their gains from trade). In addition, we asked online participants to indicate their maximum willingness to pay for using the agent.

As in *Mandatory*, subjects were informed that the agent would receive his 2 € payment only if he trades the principal's ticket. This incentive ruled out curiosity as a reason to delegate, and ambiguity aversion as a reason not to, because principals could easily predict what their agent would do. Principals also were informed that they would even learn the agent's choice should they decide not to delegate. To eliminate any effect of other-regarding preferences, we instructed the participants that the agent would get 2 € independently of whether they delegate or not and that a veto of the agent's decision would not influence the agent's payment. In addition participants also were informed that agents would not learn the participants' decisions.

<sup>8</sup> Our result that entitlement holders are motivated to use institutions to debias is not brought into question by the finding of Loewenstein and Adler (1995) that people fail to predict their behaviour under a different endowment status. In our study, subjects offered the opportunity to delegate their trading choice do not need to predict the regret they would feel were they endowed, because they are endowed. They directly experience the regret over trading their entitlement that motivates them to use institutions to share responsibility.

Subjects marked down “yes” or “no” for each of their choices (delegate, veto, and, if veto, trade or not). The experimenter informed them about their agent’s decision.

In the online treatment, we implemented a within-subject design to test whether subjects intentionally delegate to an agent in order to debias. We instructed participants that they would complete two separate experiments, one of which would be randomly selected and would determine their payoff (strategy method). Subjects first completed the *Optional Agent* treatment. Afterwards, they received new instructions presenting them with the *Base* condition (which we refer to as *No-Agent* to distinguish it from the stand-alone *Base* treatment). Evidence suggests that our within-subject design does not distort results: The frequency of trades in *No-Agent* is not statistically different from the results in the stand-alone *Base* condition.

To show that subjects delegate in order to debias we directly tested subjects reported responsibility for and anticipated regret over their decision assuming first that they traded and lost the lottery and second that they delegated or did not delegate the transaction to their agent.

#### 4.2. BEHAVIOURAL PREDICTIONS

Rational Choice Theory predicts that participants will not delegate because they can trade as informed and at a lower cost if they decide on their own. By contrast, according to our theory, subjects have an incentive to delegate, because the agent allows them to share responsibility and thereby reduce anticipated regret over the trading decision. Beyond that they can earn gains from trade: Subjects who would otherwise keep their entitlement because regret prevents them from trading can earn the bonus for selling if they delegate. In addition, principals have an incentive to delegate even if they would trade on their own notwithstanding the regret they experience: Delegation enables them to reduce the psychological cost of trading.

Of course if principals delegate to an agent whom they expect to trade they assume more responsibility for the outcome than they have in *Mandatory*, where they only confirm the agent’s choice. Yet delegation still reduces the principal’s responsibility as the agent initially decides about the trade. Recall that people divide the responsibility for an outcome between all actors in a causal chain and tend to attribute the main responsibility to the last affirmative action that is closest to the outcome (Spellman 1997). Thus, principals in *Optional* should assign primary responsibility to the agent who makes the trade even though they intentionally delegate to him. As in *Mandatory*, the principal’s subsequent decision not to veto constitutes an inaction to which less responsibility is attributed (Baron and Ritov 1994). We conclude that delegation should allow principals to reduce regret and hypothesize that a significant number of subjects will delegate in order to self-debias (**Hypothesis H<sub>1</sub>**).<sup>9</sup>

Our within-subject design identifies the participants who want to debias in order to trade: they trade in *Optional*, when they can delegate and share responsibility, but keep their ticket in *No-Agent*, where they have to decide on their own. We expect the self-debiasing principals to cause a significantly higher rate of trading in *Optional* compared to *Base* (**Hypothesis H<sub>2</sub>**).

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<sup>9</sup> The hypothesis that subjects will delegate to reduce personal responsibility is also supported by evidence from Dictator Games (Bartling and Fischbacher 2012; see Hamman et al. 2010). Instead of choosing an unfair allocation, dictators prefer to delegate their decision to a second subject who they expect to make the payoff maximizing but unfair decision. Third parties attribute less blame to principals who delegate, even though the agent’s choice was predictable and desired by the principal.

Finally subjects in *Optional* should report a lower level of felt responsibility and anticipated regret relative to *Base* or *Default*, as delegation should allow them to share responsibility and reduce regret (**Hypothesis H<sub>3</sub>**).

### 4.3. RESULTS

#### **H<sub>1</sub>: Subjects delegate in order to debias**

We find that 49.2% of principals in the lab and 52.4% of online subjects delegate the trading decision to their agent, as shown in Table One and Two. Both results are significantly different ( $p < 0.01^{**}$ ) from the rational choice prediction that no subject delegates.

If subjects delegate to enable trading at a lower cost as we claim, then subjects who delegate should trade. Supporting our theory, we find that 89.7% of the laboratory and 86.1% of the online subjects who delegated decide to trade. Our within-subject design shows that 44.7% of subjects used the agent to debias: They keep in *No-Agent* and trade in *Optional*.

The direct evidence on subjects' felt responsibility and regret confirms our interpretation that delegators debias intentionally. The subjects ( $N=17$ ) who delegate and trade in *Optional* but retain their ticket in *No-Agent* report that they would feel substantially less responsibility (4.88 vs. 6.82,  $p=0.02^*$ , Cohen's  $d$  -0.83) and anticipated regret (6 vs. 7.11  $p=0.09^+$ , Cohen's  $d$  -0.58) when trading through the agent than when trading on their own in *No-Agent*, as shown in Table Five. The average values do not change when we consider those principals who trade in both *Optional* and *No-Agent*, suggesting that they delegate to reduce their psychological costs of trading. On average, delegators reported feeling less responsibility for (4.9) and regret over (5.88) trading than those principals who decided not to delegate (responsibility 6.03,  $p=0.04^*$ , and regret 6.72,  $p=0.01^*$ , respectively), see Table Five.

**Table Five: Why People Delegate - Responsibility and Regret**

	Respon. Trade Optional	Respon. Trade No Agent	Responsibility ascribed to Agent (vs. Resp. Trade)	Regret Trade Optional	Regret Trade No Agent
Delegation N=43	4.90	7.09	6.32 <0.01**	5.88	7.1
	<0.01*			0.01	
No Delegation N=39	6.03	7	6.33 0.62	6.72	7.54
	0.13			0.13	
Debias (N=17) No Agent: keep Optional: Trade	4.88	6.82	6.88 0.02*	6	7.11
	0.02*			0.09+	

All p-values are two-tailed T- tests

Our claim that debiasing motivates delegation implies that principals who prefer to decide on their own expect to benefit less from delegation. To compare delegators and non-delegators, we subtract the level of responsibility and regret participants indicated in *Optional* from the value they reported in *No-Agent*. A positive difference indicates that a subject benefits from sharing responsibility with the agent. We find that delegators expect the agent to reduce their felt responsibility (2.19 vs. 1.02,  $p=0.05^*$ ) and regret (1.22 vs. 0.86,  $p=0.43$ ) substantially stronger than compared to the expectations of non-delegators. Moreover subjects who delegate attributed more responsibility for the trade to the agent (6.32,  $p=0.02^*$ ) than to themselves (4.72), see Table Five. The result suggests that delegators indeed perceive responsibility as being shared with their agent, as we claim.

Finally, evidence on principals' reported willingness to pay (WTP) for employing the agent supports our hypothesis. Principals who use delegation to debias and trade have a significantly higher WTP (37.12 €-cent) than the remaining *Optional* subjects who indicate an average WTP of only 13.61 €-cent ( $p < 0.01^{**}$ ). The difference suggests that subjects are aware that the agent allows them both to trade earning them the 25 €-cent bonus and to reduce their disutility of decision-making. Therefore they are willing to invest a higher amount into delegation and debiasing than the other subjects.<sup>10</sup>

### **H<sub>2</sub>: Subjects trade significantly more often in *Optional* than in *Base***

If participants can debias by delegation, we should observe more transactions in *Optional*. Supporting our theory, significantly more subjects trade in *Optional* than in *Base*: 50.9% of our laboratory subjects trade in *Optional* as compared with only 29.7% in *Base* ( $p = 0.04^*$ ). The treatment effect is replicated online where 72% of the subjects trade in *Optional* as compared with 55.5% in *Base* ( $p = 0.02^*$ ). The debiasing effect of the optional agent also holds in our within-subject design: in *No-Agent* only 53.6% of the participants trade ( $p = 0.02^*$ ).

### **H<sub>3</sub>: Optional agent reduces felt responsibility and regret**

Subjects indicated lower responsibility (5.42) and anticipated regret (6.28) in *Optional* compared to either *Base* (responsibility 6.35,  $p = 0.02^*$ ; regret 7.2,  $p = 0.01^*$ ), or within-subjects to *No-Agent* (responsibility 7.05,  $p < 0.01^{**}$ ; regret 7.34,  $p < 0.01^{**}$ ), as shown in Table Three. The debiasing effect we observe in the frequency of trades should be caused by a reduction of responsibility and regret over trading.

#### 4.4. OPTIONAL VOTING - EXPERIMENTAL DESIGN AND RESULTS

The incentive to reduce the disutility of trading should extend to any institution that allows people to share responsibility, as long as the benefits of debiasing exceed the costs of employing the institution. To test the generality of this claim, after participants completed the online *Base* treatment, we asked them to indicate whether they would have preferred to make the trading decision through a majority vote that would leave them with a right to veto. In this hypothetical scenario, we asked them to imagine that they would incur a cost of 5 €-cent if they delegated. We also asked participants whether they would accept or veto the trade of their ticket assuming that the majority opted to trade. Subjects had no reason to choose delegation in order to learn the outcome of the majority vote. The scenario instructed participants to assume that they would be informed about the result of the vote before making their trading decision even if they did not delegate.

We expect subjects to choose delegation as it would enable them to debias, in contrast to the rational choice prediction that they should prefer to decide alone (**Hypothesis H<sub>1</sub>**). Also, more subjects should be willing to trade in *Optional Voting* than in *Base* (**Hypothesis H<sub>2</sub>**).

Supporting our hypothesis, 45.5% of the participants preferred to decide through majority voting with veto over deciding on their own, which is significantly different from the rational prediction that they should not delegate ( $p < 0.01^{**}$ ). Only

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<sup>10</sup> The finding that the WTP for delegation can exceed the gains from trade is consistent with our theory. Subjects who delegate in order to trade not only obtain the bonus for trading but also reduce their disutility of anticipated regret. In theory, the costs of regret for those who resisted trading in *No-Agent* must be larger than 25 €-cent, otherwise they should have traded without delegation.

7.3% of the subjects who preferred to delegate indicated that they would have vetoed a majority decision for the trade. Out of the 41 subjects who were willing to delegate their choice, 51.2% wanted to use voting to self-debias: They did not trade in *Base* but indicated that they would vote for the trade, as shown in Table Two. Those delegators who trade in *Base* and in *Optional Voting* likely were willing to debias to reduce their psychological cost of trading as our design rules out all other potential reasons for delegation.

In total, in *Optional Voting* 75.6% of the subjects were willing to trade—which is significantly more ( $p < 0.01^{**}$ ) than the 55.5% who exchanged their ticket in *Base*. We conclude that providing people with the option to self-debias significantly facilitates trading.

## 5. DISCUSSION AND IMPLICATIONS FOR LEGAL POLICY

### 5.1. INTERNAL VALIDITY OF RESULTS

Plott and Zeiler (2005, 2007, 2011) question the validity of endowment effect evidence, identifying potential confounds in earlier studies. We structured our experiment to avoid the methodological problems they identified. Plott and Zeiler argue that an experimenter's decision to endow a subject with one good instead of another may signal its value to subjects, increasing prices. Our design eliminates any basis for such a signal as it gives subjects no reason to conclude that the experimenter cares which good the subject obtains. The tickets are identical, with the same payoff and probability of winning. In addition, the experimenter did not determine the initial endowment: Laboratory subjects drew their own ticket and online participants were informed that the computer assigned the tickets randomly. Plott and Zeiler also contend that subjects often face complicated pricing mechanisms that can distort true valuations of a good. Here the design of our lottery game is simple. To evaluate the exchange, participants only needed to understand that each ticket had the same prospect of winning and the same payoff, which we verified with control questions.

Additionally, Plott and Zeiler claim that experiments often impose higher transaction costs on those who trade, which can deter trading. By contrast, our participants had to take the same action whether they decided to trade or keep the ticket, leveling the transaction costs for both choices. Our experiment also avoids their concern that subjects who can observe each other are influenced by others' decisions or the desire for social approval. Our participants could not see or hear each other in their individual booths. Having addressed the concerns of Plott and Zeiler, we find strong evidence of the endowment effect. Subjects exhibited the bias independently in three of our treatments: *Base*, *Information-Only*, and *Default*. Our results are consistent with Isoni et al. (2011) who also find evidence of endowment effects using an experimental design that controls for the confounds Plott and Zeiler describe.<sup>11</sup>

Our experiment is designed to ensure that the treatment effects we observe are caused by responsibility-sharing alone. To rule out alternative explanations, we conducted two separate control treatments. The first, *Information-Only*, confirmed that participants do not follow their agent's decision on the misimpression that they were better informed about the lottery. Participants in *Voting without Veto* and *Guided Agent* decided on the trade before they learned what choices the other subjects made, which rules out even unconscious information effects. The second control treatment, *Default*, demonstrates that neither a shift of subjects' reference point or omission bias

<sup>11</sup> For a critique of their results, which does not apply to our experiment, see Plott and Zeiler (2011).

explain our results. The decision to trade—by the agent in *Mandatory* and the majority in the *Voting* treatments—may weaken the subjects’ sense of endowment to their ticket. *Default* should have the same effect as tickets are traded unless the subjects veto. Second, subjects in *Default*, *Mandatory* and *Voting with Veto* can all trade through inaction, which may trigger less regret. Thus our finding that the trading frequency is higher in *Mandatory* and the *Voting* treatments than in *Default* rules out both explanations as causes for our treatment effects.<sup>12</sup> In addition, omission bias cannot drive our results in *Voting without Veto* and *Guided Agent*, as they both require action. A reference point shift in *Guided Agent* also seems implausible as the principal determines the decision of the agent to a large degree.

Other potential confounds of our findings are directly addressed by our experimental design and did not require us to control for them in separate treatments. First, our subjects should not be influenced by risk aversion because they face the same probability of losing the same prize whether they keep or exchange their ticket. We held the risk of loss constant across all treatments in the lab as well as online. In addition, we ensured that principals were not motivated by other-regarding preferences. In the agency treatments, principals understood that their decisions to delegate and veto could not affect their agents’ payoffs and would not be known by the agent. In the voting treatments, each subject affects others only to the extent that his vote determines the outcome of the majority vote. In a group of over 80 voters, it is unlikely that any voter is pivotal. In *Voting with Veto*, each participant determined his own payoff alone as he had a veto.

Finally, the debiasing effect varies slightly across the institutions we test, but the differences do not suggest that an alternative mechanism is driving them. The frequency of trades in *Optional* is smaller than in *Mandatory* ( $p=0.07^+$ ) in the laboratory; but the effect is not robust—online it disappears. Moreover, subjects who delegate in *Optional Agent* report as little anticipated regret over the trade as subjects in *Mandatory*. Comparing *Optional Voting* with *Mandatory Voting* we find a difference: significantly more subjects trade when voting is mandatory ( $p=0.03^*$ ). Yet the treatments are difficult to compare directly as *Optional Voting* is a hypothetical treatment. While the evidence is not conclusive, it is consistent with our theory which predicts that optional institutions should not have a stronger debiasing effect than mandatory institutions. Our theory, however, does not provide a clear prediction whether mandating institutions should increase their debiasing effect, because people may either attribute responsibility largely to the last action in the causal chain (Spellman 1997) or bear more responsibility when they choose to delegate their choice to an institution. Whether debiasing is more effective when institutions are mandatory rather than optional remains a question for future research.

## 5.2 EXTERNAL VALIDITY AND IMPLICATIONS OF OUR RESULTS

In this section we discuss the broad applicability of our theory and results beyond the specific settings of our study.

Our theory reveals that where the endowment effect is caused by regret, institutions that divide responsibility should mute the bias. People manifest an endowment effect for a wide range of entitlements, from simple consumer goods to

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<sup>12</sup> Omission bias and a shift in reference point cannot confound either our delegation or our voting results. Subjects in *Optional* delegate in order to debias even though delegation requires action and their initial reference point is the same as in *Base* condition. In the voting treatments the decision to vote also requires action.

legal rights (e.g., Kahneman et al. 1991; Depoorter and Tontrup 2014). Anticipated regret can induce an endowment effect in all these entitlements. Sellers anticipate regret when they trade any entitlement whose future value is uncertain; even when the transaction maximized the seller's expected utility *ex ante*, it may leave them worse off once future values are realized. As the future value of most entitlements is uncertain, anticipated regret causes the endowment effect for real, intellectual and physical property, creative works, inventions, trademarks, legal claims, settlements, corporate control, and material contract clauses. Anticipated regret also can cause an endowment effect for simple consumer goods whose values are relatively certain. Weaver and Fredrick (2012) show that people will reject a trade at a price that exceeds their true Willingness To Accept if the offer falls short of the market price for their entitlement, even if they cannot sell their property at all as a result. They reject trading to avoid experiencing the disutility of making a bad deal as judged by the market. Weaver and Frederick's study demonstrates how regret causes subjects to exhibit an endowment effect for easily replaceable goods, such as mugs or pencils. Thus, institutional debiasing should be effective independent of the nature of the entitlement that is to be traded.

Our finding that institutions debias applies to the many institutions that distribute outcome responsibility between multiple actors, beyond the two we chose to test in this study. For example, principal-agent relationships can be structured in many ways, beyond the precise forms we analyze. A principal's responsibility should depend on how much control he retains over the trade and how much decision-making authority he allocates to the agent. Our study implements a hard test for our hypothesis, providing the principal with a strong control. He either has full outcome control through an *ex post veto* in *Mandatory* or *ex ante* control by determining what action is rewarded in *Guided Agent*. Real world principals, by contrast, often share responsibility more broadly when they direct agents only through loose guidelines or low powered financial incentives. Debiasing should at least be equally effective in these cases.

While this study focuses on principals, our theory suggests that the principal-agent relationship should debias both the principal and his agent. We claim that people experience the regret that causes the endowment effect when they feel responsible for a decision that could cause them to suffer a loss. The bias thus depends on both the decision-maker's stake in the outcome and responsibility for the decision. Some agents have no direct or indirect stake in the outcome and therefore should not exhibit an endowment effect. Other agents participate in the success or failure of the transaction or may have other-regarding preferences for the principal. We expect these agents nevertheless to make unbiased decisions because principal-agent relationships usually divide responsibility between the principal and the agent. Principals tend to constrain agents' choices through *ex ante* guidelines, incentives, or *ex post veto*. Thus, Marshall et al. (1986) find that participants acting as agents provide unbiased advice about whether to trade an asset. Korobkin (1998) seemingly reports a contradictory result: He assigns law students the role of an attorney and observes that they exhibit a status quo bias when choosing a default term of a contract. Yet in his study, agents both participated in the outcome of their choice and had full authority over the decision. The study did not include a principal who shared responsibility by giving directives, monitoring, or retaining *ex post* authority. Our theory explains both Marshall's and Korobkin's results and resolves any apparent contradiction: If agents do not share decision-making responsibility and suffer losses

they may exhibit an endowment effect, just like an owner who trades autonomously. Otherwise if they either have no stakes in the trade or can share responsibility in a principal-agent relationship they should make unbiased decisions.

Yet even when the principal-agent relationship does not debias the agent, another institution may. For example, corporate directors, who have ultimate authority and usually have a residual claim, nonetheless should be unbiased because they decide by majority vote. Our findings thus suggest that most agency relationships will produce unbiased agents and principals.

Our voting results also apply to many types of group decisions. Whenever groups vote, responsibility is divided between the decision-makers. We show that group size is not a crucial factor. Thus, voting in large meetings—like shareholders of publicly held firms—and in small groups—such as a board of directors—each should produce unbiased collective decisions. As only the majority's decision becomes effective, the debiasing effect of voting is very strong: The institution produces unbiased outcomes for all, even if a minority of voters does not overcome their bias. In our study, voting debiases almost 80% of the subject population in *Voting without Veto*. Thus, in the real world, we rarely would expect biased subjects to be in the majority.

Our conclusion that voting debiases is not contradicted by evidence that group discussion can reinforce preexisting biases. Galin (2013) and Blumenthal (2012) report a pronounced endowment effect when subjects were asked to discuss a trade before making a sales decision. We show that voting debiases when people share responsibility for the decision. In the Galin and Blumenthal studies, by contrast, responsibility was not institutionally divided between decision-makers. Blumenthal tested an individual trading decision following a collective discussion. As his subjects could not share responsibility for the sales decision with others, they should have been biased prior to and after the discussion. Galin asked three person groups to reach a sales decision by open discussion, without specifying the procedure, and required them to collectively report their decision. Thus, their discussion would not have been debiased by a decision-making process that effectively divided the responsibility between them. By contrast, under a majority vote, group members should be unbiased from the outset because they share responsibility. Group discussion prior to the vote should strengthen their unbiased preferences.

Our results should underestimate the impact of institutional debiasing in real world domains. In our study, participants transact through institutions that fulfil only one function: they distribute responsibility. The experimental design excludes all other motivations for using the institution. In real world domains, however, people usually obtain multiple benefits from institutions. For example, agents often provide expertise. Sellers should be more willing to delegate their decision to an agent when the agent both enables them to self-debias and provides expertise than in our study. Also, we test each institution independently to isolate its debiasing effect yet entitlement holders often transact through multiple debiasing institutions. Most organizations have several layers of agents. Many organizations also use both agency and voting, as when corporate boards rely on agents to negotiate and recommend transactions which they decide on by majority vote. Each institution or organizational layer further divides responsibility and should enlarge the debiasing effect.

### 5.3 SHOULD THE LAW INTERVENE?

Our findings suggest that legal intervention to address the endowment effect is seldom needed because, in most contexts, sellers are debiased by the institutions they operate within or decide to employ. External legal intervention that reallocates or weakens entitlements is unlikely to provide a more efficient remedy for the bias than private ordering.

Debiasing institutions are everywhere and the welfare costs of private debiasing often are small. People routinely operate within an institution that distributes responsibility for reasons other than debiasing. In some cases, the institution is prescribed by law: Under corporate law, shareholders and directors decide by majority vote. In other cases, institutions are used for the many benefits they provide. Businesses usually rely on agents when selling entitlements. Many owners either have insufficient time or expertise to personally conduct every transaction or leave the management of their firm entirely to others. Individuals with valuable entitlements—such as real estate, patents, companies or legal claims—also tend to transact through agents both to take advantage of their expertise and lower transactions costs. Regardless of why they are used, whenever present these institutions mute the endowment effect and facilitate rational contracting.

Even when people do not employ institutions for legal or instrumental reasons, we find that they are motivated to use them to mute the regret they anticipate. People use institutions to debias and trade when they otherwise would be deterred from trading by the endowment effect. Whenever the gains from trade and muting regret exceed the costs of employing an institution, we expect sellers to overcome their bias on their own. In addition, people debias even when the endowment effect does not prevent them from trading. The endowment effect has hidden costs not visible in trading behaviour because people who decide to trade also experience disutility from anticipated regret. They trade if the gains from trade exceed the disutility. Our results show that people who are willing to trade on their own nevertheless prefer to delegate their choices to institutions when debiasing costs are smaller than the psychological costs a trader bears.

The welfare costs of private debiasing will often be small. People operate routinely within or use institutions for other reasons than debiasing. In all these situations, debiasing does not impose any marginal social costs. Of course, the costs of agency and voting procedures are not trivial, but these costs are attributable to the institution's intended purpose—e.g., the provision of expertise or the organization of collective decision making. They are transaction costs, but not debiasing costs. Debiasing imposes marginal social costs only when people use institutions primarily to debias. But self-debiasing should be efficient, as it imposes costs only when the entitlement-holder expects that the benefits of debiasing exceed the cost of employing the institution. Entitlement holders who optimally should not trade, as they rationally place an above market valuation on the good, will not engage in costly debiasing. Thus, unlike legal intervention, which affects all entitlement holders, self-debiasing imposes costs only on those who derive a net benefit from using the institution.

Of course, debiasing will never be perfect. Our data suggests that some people's regret is too strong to be muted by the responsibility sharing effect of institutions. In other cases, people would benefit from trading, but the cost of debiasing exceeds the gains from trade. Our results also do not eliminate the possibility that legal intervention could be welfare-enhancing when loss aversion (Tversky and Kahneman 1991) caused by attachment to entitlements is a substantial

cause of the endowment effect (see Ariely et al. 2005). The degree to which people manifest an endowment effect independent of regret is difficult to determine. But our results and those of Weaver and Frederick (2012) suggest that this effect should not be substantial. Responsibility sharing reduces regret but should not affect peoples' valuation for, or attachment to, a good. Nevertheless, institutions that let traders share responsibility effectively mute the bias in our study. Weaver and Frederick eliminate the endowment effect for consumer goods by giving subjects a low market price as a reference point for estimating the value of their mug. As a result, participants did not experience regret over making a bad deal when they traded their entitlement for a second good. The results seem to suggest either that regret is the more dominant driver of the endowment effect or that attachment and regret may be interdependent causes of the bias. Emotional attachment plausibly increases regret because sellers should anticipate more regret over parting with an entitlement to which they feel attached. For other evidence of the endowment effect a similar interaction may apply: for example, the cognitive process that focuses people's attention on their endowment (Johnson et al. 2007), rather than on the gains from trade, also may trigger the experience of regret and induce the endowment effect. Should regret and other causes of the bias interact, then institutions that distribute responsibility should reduce regret fuelled by attachment or attention as well. This remains a subject for future research.

Our findings suggest that private ordering will, in most cases, lead to transactions and contracts undistorted by the endowment effect. This stands in contrast to many legal scholars who assume that private transacting cannot overcome the endowment effect and thus external intervention is required. Consequently, these interventions are designed for a world in which owners are assumed to be biased. We argue that the welfare effects of legal interventions have to be assessed assuming that most entitlement holders debias through the institutions they use.

Responding to experimental evidence that would seem to suggest that people usually exhibit an endowment effect in real world transactions, scholars have offered policy proposals that fall into two broad categories. Some proposals favour reducing the negative impact of the endowment effect by adopting contractual default rules and resource allocations that favour those groups who truly value the entitlement more, but who may not get the entitlement when trading is biased (e.g., Jolls 2000; Jolls et al. 1998; Korobkin 1998; Sunstein 2002). Social welfare generally is maximized when resources are allocated to those who value goods more and contractual default rules incorporate the provisions that maximize most people's welfare. When people are not biased, policymakers can identify the potentially welfare maximizing allocations and contract terms by examining people's actual choices when contracting is efficient (Coase 1960). Yet when people are biased, relying on actual choices to determine optimal allocations and default rules is misleading. In this case, policymakers may enhance welfare by adopting the provisions they conclude are optimal in their own best judgment, even when they may conflict with private ordering (e.g., Sunstein 1986, 2002). These interventions can enhance welfare as long as people are biased. As our study shows, however, in most situations, the outcomes of private contracting are not distorted by the endowment effect. As traders know best what their preferences are, the endowment effect will usually not provide a reason for policymakers to deviate from private ordering.

A second approach is to reduce the endowment effect by weakening entitlements (Buccafusco and Sprigman 2011; Korobkin 2000; Rachlinski and Jourden 1998), for example by substituting liability rules for property rules, even

when property rules would be superior were the endowment effect absent (see Buccafusco and Sprigman 2011; Rachlinski and Jourden 1998). When owners are unbiased, property rules often are superior because private ordering should optimally allocate entitlements, while liability rules potentially allow people to appropriate entitlements for less than the owner's true valuation (Calabresi and Melamed 1972). Of course, liability rules may enhance welfare when most entitlement holders are biased because they allow involuntary appropriations that can bring goods to those who value them more. But in a world in which the majority of owners make unbiased trading choices, liability rules can facilitate only a few entitlement transfers which would otherwise not take place, while imposing costs on all owners whether they are biased or not.

Generally, both forms of external intervention are plagued by the inability to distinguish between transactions that should occur absent the bias and those which should not. Unlike self-debiasing, external intervention imposes substantial costs on all potential transactions. Thus, even where voluntary debiasing is imperfect, intervention will rarely be a more efficient alternative. Recall that debiasing through institutions imposes no marginal cost when institutions are primarily used to conduct the transaction and not for the purpose of debiasing. When people do not naturally operate within institutions, debiasing should still be optimal as people will only self-debias if the gains exceed the costs.

We therefore suggest that policymakers shift the burden to proposals of external intervention to establish through direct evidence both that a substantial endowment effect persists in a particular domain, notwithstanding institutional debiasing, and that the benefits of intervening in private contracting exceed the costs.

## 6. CONCLUSION

Legal scholars often assume that the endowment effect requires external intervention in private ordering. In this study, we show that intervention to address the endowment effect is rarely needed because people seldom exhibit the bias in the real world contexts in which actual trading decisions are taken. We present, to our knowledge, the first theory to explain how institutions that distribute decision-making responsibility mute the endowment effect without altering peoples' rights to their entitlements. The endowment effect is caused by regret over trading. We claim that people experience this regret only to the extent that they feel responsible for the decision to trade. Trading through institutions allows them to share responsibility with others involved in the transaction. As most transactions are conducted through institutions that divide responsibility, we expect the majority of people to make unbiased trading decisions in real markets.

We test two common institutions—agency and voting—that divide responsibility between multiple actors. Both cause most subjects to debias and trade in our study. We also show that people intentionally employ institutions in order to self-debias. As a result, when people can freely transact, in most cases private ordering should mute the endowment effect on its own, making external intervention unnecessary. This result suggests that policy makers should adopt a presumption against external intervention. Proposals to intervene in private ordering should present proof that the bias does in fact exist in a particular domain and that intervention is efficient.

Our study also opens new paths for future research. Sellers make their decisions in a broader social context than the institutions we analyse in this study. This social context may allow entitlement holders to attribute responsibility to others informally and affect their regret over trading. For example, traders usually can observe the behaviour of other market participants. Evidence on herding suggests people are motivated to conform their behaviour to a group to reduce their decision-making responsibility and mute regret. This herding may extend and amplify the debiasing effect of institutions. We have shown that institutions debias most entitlement holders who use them for their transactions. But even when people do not transact through institutions, they should be motivated to conform to the dominant behaviour in a market, as this reduces their regret over trading. When these traders follow an unbiased majority, herding should also lead them to unbiased outcomes.

Finally, our study demonstrates the importance for legal policy of experiments that analyse decision-making embedded in the institutional and social contexts in which people operate. Laboratory experiments designed to establish the existence of decision making biases tend to abstract from institutions to isolate the behavioural phenomenon being tested. Yet in real world markets, people operate within institutions which alter decision-making. In order to formulate adequate legal responses to behavioural anomalies, we must understand the interaction between decision-making and the institutions that people use. The endowment effect may be just one example of a well-established anomaly that is debiased and disappears in institutional context.

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