Common-Value Fixed-Equity Auctions under Induced Risk Aversion*

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Abstract

Governments often auction natural-resource rights using a combination of an up-front payment and a predetermined equity rate. We use a laboratory experiment to study how this retained equity share affects bidding and revenue in a first-price common-value auction. Our design combines within-subject variation in equity rates with a novel between-subject treatment that *induces* greater risk aversion. We find that higher equity shares reduce bids and their sensitivity to signals while increasing seller revenue, consistent with the linkage principle. Induced risk aversion lowers both bids and revenue, and higher equity shares partially mitigate these effects, although the interaction estimates are imprecise. Despite these effects, subjects overbid at low signals and remain susceptible to the winner's curse.

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1 Introduction

Auctions are widely used to allocate rights to extract natural resources such as oil and gas leases, timber tracts, and mining concessions. In many cases, governments effectively use *fixed-equity auctions*: Payments for these rights include both an up-front payment determined by the auction and an equity (royalty) rate set by law. Across the principal oil-leasing states, equity rates on state trust lands range from 12.5% to 30%—see Figure 1. These rates vary substantially even across geologically similar tracts, from the traditional 16.67% in Wyoming (Wyoming Office of State Lands and Investments, 2025) to the 27.5%–30% rates in the Louisiana Haynesville (Louisiana Department of Energy and Natural Resources, 2025). In this paper, we investigate how changes in the seller's retained equity share affect bidding and revenue in common-value auctions.

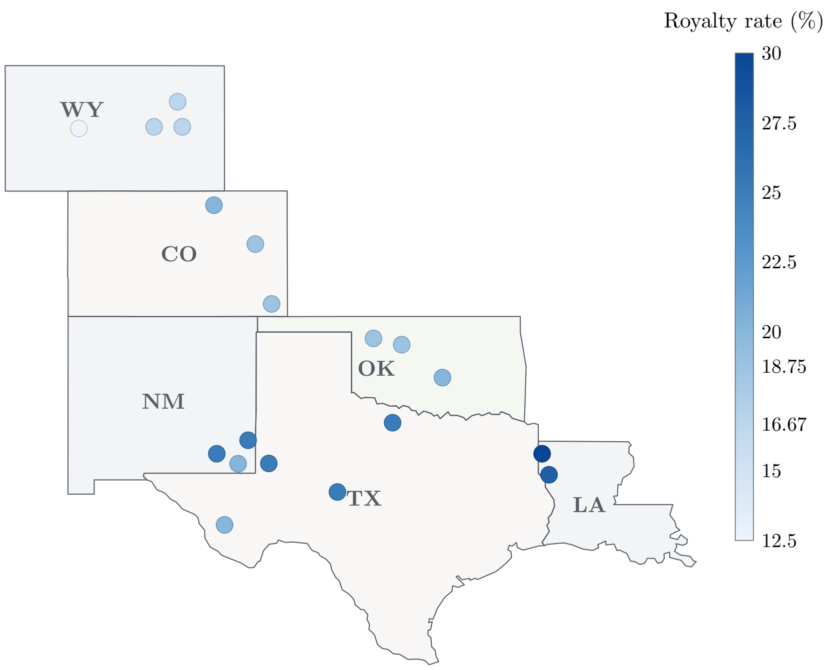

Figure 1: **Dispersion in state-trust equity rates across U.S. oil and gas lease auctions.** Each marker locates a representative oil-producing county within a state, shaded by the fixed equity rate charged on state trust lands; darker shades denote higher rates. Rates are drawn from state land-agency lease-sale records and lease forms (2025–2026): New Mexico (New Mexico State Land Office, 2025), Colorado (Colorado State Land Board, 2025), Texas (Texas General Land Office, 2025), Louisiana (Louisiana Department of Energy and Natural Resources, 2025), Wyoming (Wyoming Office of State Lands and Investments, 2025), and Oklahoma (Oklahoma Commissioners of the Land Office, 2025).

Theory predicts two direct effects of the equity rate on rational bidding behavior in auctions. First, higher equity rates lead to a *linkage effect* (Hansen, 1985; DeMarzo et al., 2005). A higher linkage between the buyer's private information and their expected payment increases the seller's revenue. Second, higher equity rates provide *insurance* to bidders (Fioriti and Hernandez-Chanto, 2022; Bajoori et al., 2024a). The higher rate leads to lower up-front payments in equilibrium and requires higher payments only when the project generates more revenue, thus attenuating the reduction in bidding caused by greater risk aversion. The fact that these auctions typically exhibit common-value components complicates predictions further: equity rates may affect how buyers condition on their private information and how severely they suffer from the winner's curse.

Existing literature captures different elements of our setting, but not their combination. The experimental literature on common-value auctions has focused primarily on non-contingent payments (Kagel and Levin, 2016), while the growing experimental literature on security-bid auctions has studied independent private values and relied on elicited rather than experimentally induced risk preferences (see, for instance, Bajoori et al. (2024b), Bos et al. (2025), and Breig et al. (2026)). A complementary structural literature uses observational rather than experimental data from oil and gas lease auctions to study security bidding in independent- and common-value environments and evaluate counterfactual equity rates and auction designs (Bhattacharya et al., 2022; Kong et al., 2022). Our experiment brings these elements together: We experimentally study security bidding in a common-value environment and independently vary both equity rates and risk aversion. This design allows us to identify how equity rates affect bidding and revenue, and whether these effects depend on bidders' risk tolerance.

In our model we analyze a first-price common-value auction in which the seller chooses a fixed equity share and bidders compete in cash. Bidders receive independent signals, and the realized value of the project equals the sum of those signals. We obtain closed-form solutions for bidding behavior using a simple, single-parameter form of loss aversion. The model delivers sharp predictions for equilibrium bidding and seller revenue as the equity share and risk aversion vary.

We study these auctions using an in-person laboratory experiment. Subjects are randomly matched into groups of three. Each buyer receives an independent private signal, and the realized project value equals the sum of the group's signals. Bidders compete in cash, and the winner pays her bid and receives the remaining share of the project's value after the seller's equity share is deducted. In each round, the seller's equity share is drawn uniformly from $0, 0.2, 0.4, 0.6$ and announced before bidding begins. To examine how risk preferences affect auction outcomes, we directly manipulate the mapping between points earned in the auction and experimental payments. The baseline conversion is linear, while our **risk-aversion treatment** uses a concave, kinked conversion that lowers the marginal monetary return to point earnings above the loser's payoff.

Our risk-aversion treatment provides its own methodological contribution. Experiments comparing institutions often ask whether these institutions have differential effects for more risk-averse decision makers. However, as discussed in Section 2, elicited measurements of risk preferences often have limited predictive power across tasks. Our risk-aversion treatment directly changes the effective curvature of incentives subjects face in the auction rather than classifying subjects using an external elicitation. This permits a causal comparison of institutions under different risk tolerances and provides a design that can be adapted in future experiments studying interactions between risk and market mechanisms.

Bidders in our experiment respond strongly to their private information, with average bidding increasing in the signal. Bidding behavior also exhibits overbidding for lower signals. As predicted by the theory, both the risk-aversion treatment and higher equity rates induce lower bids. Moreover, the interaction of the buyers' signal, the risk-aversion treatment, and equity rates has the theoretically predicted positive sign indicating that higher equity rates provide insurance for more risk-averse bidders.

Despite decreasing bids, increases in the equity rate lead to higher revenue for the seller, as predicted by the theory. The seller's revenue is lower under the risk-aversion treatment. The loss in revenue is mitigated under higher equity rates, but the interaction is imprecisely estimated and is not statistically significant.

Finally, we extend our theoretical results to study how Eyster and Rabin's (2005) Cursed Equilibrium is affected by the equity rate in the linear-payment treatment. We find that auction winners make losses on average and that a χ-cursed equilibrium with χ near 0.5 parsimoniously accounts for bidding behavior.

Overall, we contribute to the study of auction design by presenting the first controlled evidence on security-bid payments in a common-value auction. We provide a methodological contribution with an easily implementable way to causally study how institutions' performance depends on risk aversion without relying on transferability of elicited risk preferences. Our results therefore speak both to the design of resource auctions and to the broader experimental question of how to evaluate institutions when their performance depends on participants' risk tolerance.

2 Related Literature

Common-value auctions The theoretical literature on common-value auctions highlights the sensitivity of bidding and revenue to informational asymmetries and the underlying information structure. Even small differences in information or bidding costs can generate large changes in bidding behavior and prices (Klemperer, 1998), while informational advantages and bidder asymmetries can strongly influence competition and revenue (Bulow et al., 1999; Levin and Kagel, 2005). Uncertainty also plays an important role: Goeree and Offerman (2003) show that greater common-value uncertainty can reduce efficiency, whereas disclosure and increased competition improve information aggregation. These informational forces are also important empirically. Using data from U.S. offshore oil lease auctions, Compiani et al. (2020) show that unobserved heterogeneity at the auction level can obscure evidence of common values if not properly accounted for.

The sensitivity of common-value auctions to information and uncertainty has also motivated a large experimental literature on bidder behavior. Early experiments documented the winner's curse, showing that bidders systematically overbid when they fail to account for the informational content of winning (Bazerman and Samuelson, 1983; Kagel and Levin, 1986; Lind and Plott, 1991). Subsequent work demonstrates that the winner's curse is robust across environments and affects both inexperienced subjects and professionals (Dyer et al., 1989). Other studies examine how information disclosure, auction format, and bidder experience shape bidding behavior and revenue outcomes (Kagel et al., 1987; Kagel and Levin, 1999). Later experiments incorporating both private and common components show that bidding behavior tends to approach equilibrium predictions once subjects gain experience (Goeree and Offerman, 2002; Hendricks et al., 2003). More recent work emphasizes behavioral explanations for the winner's curse, including bounded rationality and mistaken beliefs (Charness and Levin, 2009; Breig and Rosato, 2025; Nagel et al., 2025). Despite these advances, both the theoretical and experimental literatures overwhelmingly study auctions in which bids are made in cash. Our experiment introduces a second dimension—risk preferences—that is particularly relevant when payments are contingent on realized value.

Transferability and Induction of Risk Preferences An extensive experimental literature investigates the extent to which measurements of risk preferences are transferable between domains and decision tasks. Isaac and James (2000) found that risk preferences estimated from choices in first-price auctions and Becker-Degroot-Marschak (BDM) mechanisms differ, while Berg et al. (2005) find that estimated preferences differ between English clock auctions, first-price auctions, and BDM mechanisms. Surveying a representative sample of Germans, Dohmen et al. (2011) finds that risk preferences across more natural domains (e.g. financial matters and health) are strongly but imperfectly correlated. Thus, even when risk attitudes exhibit some cross-domain stability, they remain domain-specific to an empirically meaningful degree. The inconsistency of risk preference measures has proven robust to controlling for statistical numeracy and measurement error, and it appears that subjects are aware that their risk preferences differ between tasks (Pedroni et al., 2017; Holzmeister and Stefan, 2021).

These concerns motivate an alternative approach based on the *induction* of risk preferences, often with the goal of inducing risk neutrality. Roth and Malouf (1979) provides an early example in which subjects bargained over lottery tickets. Evidence on the effectiveness of this procedure has been mixed (Walker et al., 1990; Rietz, 1993; Selten et al., 1999; Kirchkamp et al., 2021). The procedure has found more success applied to belief elicitation (Hossain and Okui, 2013; Erkal et al., 2020). A smaller literature has evaluated whether risk preferences that are *not* risk neutral can be induced (Berg et al., 1986; Dickhaut and Prasnikar, 2006; Dickhaut et al., 2013). However, this work has primarily focused on determining whether particular preferences can be induced rather than using induced preferences to evaluate how preferences interact with institutions. Our use of induction is closer to the latter objective: we use variation in the payoff environment to study whether fixed-equity auctions operate differently when bidders face more concave monetary incentives. This interaction between risk preferences and the form of payment leads directly to the literature on security-bid auctions.

Security-bid auctions The literature on security-bid auctions studies environments in which bids take the form of securities rather than cash payments. In these environments, bidders compete by offering contingent claims written on the realized value of the asset. A central insight is that the slope and curvature of the security shape bidding incentives, with steeper securities inducing more aggressive bidding and higher expected revenue (DeMarzo et al., 2005). Subsequent work has examined how optimal security design responds to adverse selection, moral hazard, competition, endogenous entry, negative externalities, and other institutional frictions (Che and Kim, 2010; Kogan and Morgan, 2010; Gorbenko and Malenko, 2011; Sogo et al., 2016; Hernandez-Chanto and Fioriti, 2019; Ball and Pekkarinen, 2025; Liu and Bernhardt, 2025). Most of this literature focuses on independent private-value environments. DeMarzo et al. (2005) briefly extend their analysis to affiliated signals with private- and common-value components, showing that their revenue ranking of securities continues to hold while common values introduce additional interactions between security design, auction format, and the winner's curse. More recently, Yuan (2025) studies security design by competing bidders with dispersed information about a common value, showing that bidders endogenously select debt to mitigate the winner's curse and informed-selection effects.

Experimental work on security-bid auctions is comparatively recent. Bajoori et al. (2024b), Bos et al. (2025), Breig et al. (2025), Breig et al. (2026), and Heggedal et al. (2025) study bidding and revenue under contingent payments in independent private-value or private-cost environments. Bos et al. (2025) compare cash and profit-share procurement auctions, while Heggedal et al. (2025) compare cash and equity payments across centralized auctions and decentralized bargaining. These studies document how security design affects bidding behavior, allocation, and revenue, but they largely abstract from common values and from the role of risk sharing. The latter becomes especially important when bidders are risk averse, since contingent payments determine not only how surplus is divided but also how risk is allocated between the bidder and the seller.

Risk aversion and security design Accordingly, our paper also contributes to the literature on risk aversion in auctions and security design. Early theoretical work shows that risk attitudes can significantly affect equilibrium bidding behavior and auction outcomes (Matthews, 1987). A recent survey by Vasserman and Watt (2021) summarizes the growing literature on risk preferences in auction environments. In security-bid auctions, risk sharing plays a particularly important role because contingent payments redistribute risk between bidders and the seller.

Fioriti and Hernandez-Chanto (2022) study security design with risk-averse bidders, showing how securities can provide insurance and affect bidding incentives and revenue. Building on this literature, Gershkov et al. (2025) show how heterogeneity in risk aversion and budget constraints can endogenously generate tranching into debt and equity, while Bajoori et al. (2024a) show that greater risk aversion can reduce equilibrium bids in first-price security-bid auctions.

Our paper contributes to this literature by studying fixed-equity securities in a common-value auction with stochastic returns and risk-averse bidders. Combining theory and laboratory evidence, we show how equity payments affect bidding through both surplus extraction and insurance, thereby linking common-value auctions, security design, and risk sharing.

3 The Experiment

The experiment consisted of six sessions conducted at the University of Queensland Centre for Unified Behavioural and Economic Sciences (CUBES) laboratory in September of 2025. Subjects were recruited using Sona Systems, and a total of 165 subjects participated. We report summary statistics for the sample in Appendix Table 5. No subject participated in more than one session. All sessions were conducted in person using computer terminals, and the experiment was programmed using oTree (Chen et al., 2016). Sessions lasted approximately 90 minutes. In addition to any earnings from the experiment, subjects received a show-up payment of \$20 and \$1 per quiz question answered correctly.[1] Average total earnings were approximately \$54.99.

The design combines between-session and within-subject variation. The rule converting experimental points into monetary earnings was assigned at the session level and remained fixed throughout the session.[2] By contrast, the seller's retained equity share varied within subjects across rounds. Thus, each subject faced one of two earnings-conversion rules but repeatedly bid under different equity shares.

All sessions followed the same structure. Upon arrival, subjects were directed to their terminals and given the opportunity to review a participant information sheet and sign a consent form. Subjects then received detailed instructions describing the auction environment. The

[1] Throughout the paper, the symbol \$ denotes Australian dollars.

[2] The three baseline sessions included 30, 30, and 21 subjects, while the three induced-risk-aversion sessions included 30, 30, and 24 subjects.

instructions included three examples illustrating how project values and payoffs are computed. After reviewing the examples, subjects completed a comprehension quiz and received feedback on the correct answers. Subjects then participated in 30 rounds of auctions. At the end of the experiment, one round was chosen at random to determine payments.

Auction environment and equity-share variation In each round, subjects were randomly assigned to groups of three buyers. Each buyer received a private signal drawn independently from the discrete uniform distribution $\{0, 20, 40, \ldots, 1000\}$. Subjects were informed that the realized value of the project equals the sum of the three buyers' signals.

Before bids were submitted, the seller's retained equity share was drawn from the set $e \in \{0, 0.2, 0.4, 0.6\}$ with equal probability and announced to subjects. The seller received the proportion e of the realized project value, while the winning buyer retained the remaining proportion $1 - e$. The equity share therefore varied within subjects across rounds.

All values and bids were expressed in points. Each buyer began every round with an endowment of 3000 points. Buyers submitted bids using a slider interface allowing bids between 0 and 3000 points in increments of 20 as depicted in Figure 2.

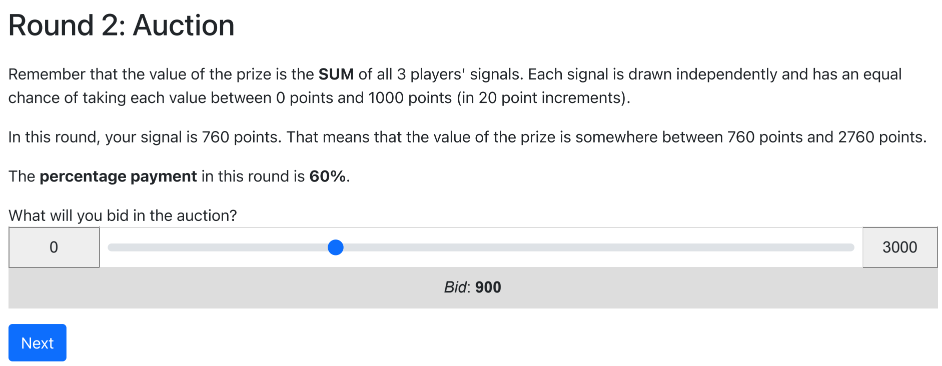

Figure 2: Slider to make bids

The buyer submitting the highest bid won the auction and obtained the right to implement the project. If buyer i submitted bid b_i and won the auction, her payoff in points was

$$3000 - b_i + (1 - e)v(\boldsymbol{s}),$$

where $v(\boldsymbol{s}) = \sum_{i=1}^{3} s_i$ denotes the realized project value given the signal profile $\boldsymbol{s} = (s_1, s_2, s_3)$ drawn by the group, and e is the equity share retained by the seller. Losing buyers received their endowment of 3000 points.

Earnings conversion and induced risk aversion The auction rules and point payoffs were identical across sessions, but the rule converting point payoffs into monetary earnings differed. Each session used one conversion rule throughout all 30 rounds.

In the baseline treatment, points converted linearly at a rate of 100 points per \$1. In the risk-aversion treatment, the conversion from points to dollars was piecewise linear: each 100 points up to 3000 converted to \$1, while each additional 100 points above 3000 converted to \$0.40. The kink was therefore located at the payoff from losing the auction. Thus, point losses relative to losing were converted at the standard rate, whereas positive point profits were converted at 40% of that rate.

Under the maintained theoretical benchmark that subjects maximize expected monetary earnings, the linear and induced-risk-aversion treatments correspond respectively to $\lambda = 1$ and $\lambda = 0.4$ in Section 4. More generally, the kinked conversion applies a concave transformation to payoffs, inducing more risk aversion. The treatment therefore changes the effective curvature of incentives directly rather than classifying subjects according to a separately elicited measure of risk preferences.

Decision interface On each bidding page, subjects were provided with an interactive graphical interface illustrating the consequences of their bid. The interface contained two panels that updated dynamically as the subject moved the bid slider.

The left panel displayed payoffs in points. Before a bid was entered, the panel illustrated the possible project values conditional on the subject's signal and indicated that the payoff from losing the auction was constant at 3000 points. Once a bid was selected, the panel displayed the payoff associated with each possible project value conditional on winning at that bid.

The right panel converted point payoffs into monetary payoffs according to the session's payment rule. Before the slider was activated, the payoff associated with losing the auction was marked. After a bid was selected, the interface displayed the range of possible monetary payoffs conditional on winning at the selected bid.

An example of this interface under the risk-aversion treatment is shown in Figure 3.

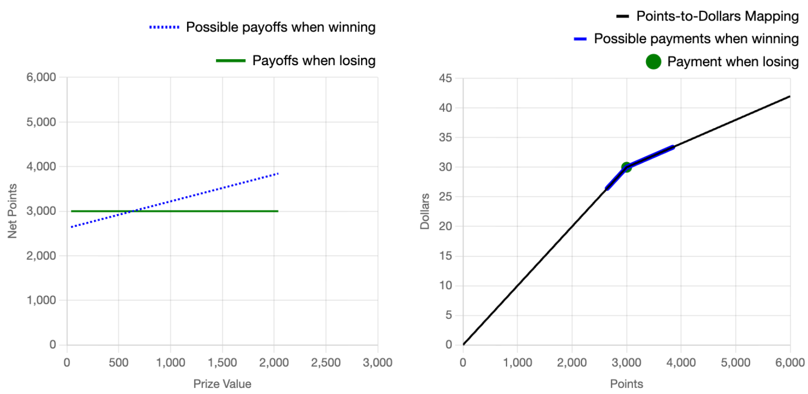

Figure 3: Payoff calculation figure

Feedback After each round, subjects received feedback summarizing the outcome of the auction. They were reminded of their own bid and informed of the winning bid and the realized project value. Subjects were told whether they won the auction and were shown the payoff calculation in both points and dollars. The interface also displayed the mapping between points and monetary payoffs with the realized outcomes for the winner and losers highlighted. Examples of the feedback screens can be found in Figures 18–21 in the Appendix.

4 Theory

In this section, we analyze the theory associated with the experiment from Section 3. We develop a simple auction environment in which bidders compete for the right to exploit an indivisible asset. The model isolates the interaction between a fixed equity contract chosen by the seller and buyers whose Bernoulli utility functions are linear aside from a single kink at the buyers' outside options.

4.1 Equilibrium of the First-Price Fixed-Equity Auction

A risk-neutral seller allocates the right to exploit an indivisible asset to a set of three bidders. Each bidder i receives a private signal s_i, which is independently drawn from the uniform distribution F with support $[0, 1]$. The distribution F is common knowledge among bidders and the seller.

Let $\boldsymbol{s} = (s_1, s_2, s_3)$ denote the signal profile, and write $\boldsymbol{s}_{-i} = (s_j)_{j \neq i}$, so that $\boldsymbol{s} = (s_i, \boldsymbol{s}_{-i})$. To match the design of our experiment, we define the asset value as

$$v(\boldsymbol{s}) = \sum_{i=1}^{3} s_i.$$

The seller commits ex ante to a fixed equity rate $e \in [0, 1)$. Under this mechanism, the seller retains a fraction e of the realized value of the project, while the winning bidder receives the residual share $1 - e$.

Bidders compete in a first-price auction in which bids are submitted in cash. The bidder submitting the highest bid obtains the right to operate the asset and pays her bid upfront. In addition, because the seller retains equity in the project, she also receives a fraction e of the realized project value. Thus, conditional on winning with bid b_i, the total payment to the seller consists of the upfront cash bid together with the retained equity share of the project's realized value.[3]

In the auction, bidders first observe their private signals about the value of the project. They then simultaneously submit cash bids. The bidder submitting the highest bid wins the auction and obtains the right to operate the project. After the auction, the project value is realized and payments are made: the winner pays her bid and receives the share of the realized project value net of the seller's retained equity share.

Let $\boldsymbol{b} = (b_1, b_2, b_3)$ denote the bid profile, and let $\lambda \leqslant 1$ parameterize bidders' attitudes toward risk. If bidder i submits bid b_i and wins the auction, her ex-post payoff given signal profile $\boldsymbol{s}$ is

$$u_i(b_i \mid \boldsymbol{s}, e, \lambda) = \begin{cases} \lambda\big((1-e)v(\boldsymbol{s}) - b_i\big) & \text{if } (1-e)v(\boldsymbol{s}) > b_i, \\ (1-e)v(\boldsymbol{s}) - b_i & \text{otherwise.} \end{cases}$$

If bidder i does not win the auction, her payoff is zero. The parameter λ governs the curvature of payoffs. When $\lambda = 1$, bidders are risk neutral. When $\lambda < 1$, positive profits are discounted relative to losses, capturing a simple form of risk or loss aversion.

Because bidders observe only their own signals, bidding decisions are based on interim expected payoffs. A strategy specifies how bids depend on signals. Formally, a strategy is a

[3]Within the class of fixed-equity contracts, higher equity shares correspond to *steeper* securities in the sense of DeMarzo et al. (2005). Because the seller's payment is linear in the realized project value, the slope of the payment schedule equals the equity rate; hence contracts with larger e are steeper.

function $\beta : [0,1] \to \mathbb{R}_+$, where $\beta(s_i)$ denotes the bid submitted by a bidder who observes signal s_i.

Given a candidate symmetric strategy $\beta(\cdot \mid e, \lambda)$ used by bidders $j \neq i$, the interim expected payoff of bidder i with signal s_i from submitting bid b_i is

$$U(b_i \mid s_i, e, \lambda; \beta) = \mathbb{E}_{\boldsymbol{s}_{-i}}\big[u_i(b_i \mid \boldsymbol{s}, e, \lambda)\, \mathbb{1}\{b_i \geqslant \max\{\beta(s_j \mid e, \lambda) : j \neq i\}\}\big].$$

Definition 1. *A symmetric Bayesian Nash equilibrium is a strategy $\beta(\cdot \mid e, \lambda)$ such that for every signal realization s_i,*

$$\beta(s_i \mid e, \lambda) \in \arg\max_{b_i \in \mathbb{R}_+} U(b_i \mid s_i, e, \lambda; \beta).$$

Proposition 1. *For every $\lambda > 1/19$, there exists a unique symmetric equilibrium. The equilibrium bidding strategy is linear and given by*

$$\beta(s_i \mid e, \lambda) = \phi s_i,$$

where $\phi \equiv \phi(e, \lambda)$ is the unique positive solution to

$$\phi = \frac{2\lambda(1-e)^2\big(5(1-e) - 2\phi\big)}{(1-\lambda)\big(\phi^2 - 2(1-e)\phi\big) + (1+\lambda)(1-e)^2}.$$

Moreover, $\partial\phi/\partial e < 0$, $\partial\phi/\partial\lambda > 0$, and $\partial^2\phi/\partial e\,\partial\lambda < 0$. Hence bids are decreasing in the seller's equity share and increasing in λ, and the effect of an increase in the equity share is stronger when λ is larger. Finally, when $\lambda = 1$,

$$\phi(e, 1) = \frac{5}{3}(1-e).$$

Proposition 1 establishes the theoretical benchmark relationship between signals and bids. In equilibrium, bids are *linear functions* of signals, with the slope depending both on the equity rate and the level of the risk aversion parameter λ. Moreover, the slope of the bidding function is decreasing in the equity rate and increasing in the risk aversion parameter λ. Both of these effects are intuitive: even conditional on the signal, a higher equity rate decreases the returns that accrue to the winning bidder, and because the project is risky, a more risk averse buyer has a lower value of winning.

These predictions are consistent with the theoretical literature on security-bid auctions with risk-averse bidders. Fioriti and Hernandez-Chanto (2022) show that risk aversion reduces bidding incentives in first-price security auctions, while Bajoori et al. (2024a) show that equilibrium bids decrease as the degree of risk aversion increases across several securities. A key distinction is that Fioriti and Hernandez-Chanto (2022) study an independent private values environment, whereas the present model features common values. In common value settings bidders must account for the winner's curse, which may alter bidding incentives even though the qualitative comparative statics remain similar.

We next provide the implications of these bidding functions for revenue.

Proposition 2. *In the symmetric equilibrium expected revenue is equal to $\frac{3}{4}\phi + \frac{3}{2}e$, with ϕ as defined in Proposition 1. Revenue is increasing in e and λ. Moreover, the effect of equity share is stronger for lower λ. When $\lambda = 1$, revenue simplifies to $\frac{5}{4} + \frac{1}{4}e$.*

Proposition 2 states that revenue is increasing in the fixed equity rate, which is expected based on the results of DeMarzo et al. (2005), because higher equity rates define steeper families of securities. But the proposition also demonstrates a key feature of auctions with securities that is stressed by Fioriti and Hernandez-Chanto (2022): steeper securities provide insurance to risk averse bidders, increasing revenue through a mechanism separate to that of the linkage effect. Risk aversion reduces bidders' willingness to bid aggressively, lowering expected revenue. However, steeper securities provide better insurance against downside risk and are therefore less sensitive to bidders' risk attitudes. As a result, the revenue loss induced by risk aversion is mitigated when the seller retains a larger equity share.

4.2 Experimental Hypotheses

We now turn to the formal hypotheses we will evaluate using our experiment. In Table 1, we summarize the point predictions for both revenue and the slope of the bidding function with respect to signals under all experimental conditions.[4] We then formalize the general directional hypotheses that our experiment is designed to test.

[4]In our experiment, signals are uniformly distributed on $[0, 1000]$ instead of $[0, 1]$. Thus, before analyzing the data we divide all revenues, bids, and signals by 1000 to match the theoretical predictions.

		$e = 0$	$e = 0.2$	$e = 0.4$	$e = 0.6$
$\lambda = 1$	Slope	1.667	1.333	1.000	0.667
	Revenue	1.250	1.300	1.350	1.400
$\lambda = 0.4$	Slope	1.550	1.240	0.930	0.620
	Revenue	1.162	1.230	1.297	1.365

Table 1: Point Predictions for Bidding Functions and Revenue

Hypothesis 1. *The slope of bids with respect to signal is lower for higher equity shares and more risk averse bidders (i.e. for lower values of λ). However, the effect of the equity share on the slope is weaker when bidders are more risk averse.*

Hypothesis 1 restates the results of Proposition 1 as applied to our experiment. While both higher equity rates and more risk aversion are expected to lower bids, their interaction is positive due to the insurance effects provided by higher equity rates.

Hypothesis 2. *Average revenue increases with the equity share retained by the seller and decreases with risk aversion. However, the reduction in revenue induced by risk aversion is smaller when the seller retains a larger equity share.*

Hypothesis 2 applies the results of Proposition 2 to our experiment. Higher equity rates are expected to increase revenue, and this effect is expected to be stronger under risk aversion.

5 Results

The focus of our study will be how subjects' choices vary with the information they are provided, the equity rates in the study, and the risk-aversion treatment. The experiment and primary analyses were preregistered in the AEA RCT Registry (AEARCTR-0016839). Following the pre-analysis plan, our main analysis focuses on bids and seller revenue in rounds 6-30; results using all 30 rounds are reported in Appendix A and are qualitatively similar.

5.1 Bidding Behavior

We plot the empirical average of bids alongside the associated theoretical predictions in Figure 4. The figure shows systematic overbidding on average for low signals, with average bids that are close to (or slightly less than) the theoretical prediction for high signals.

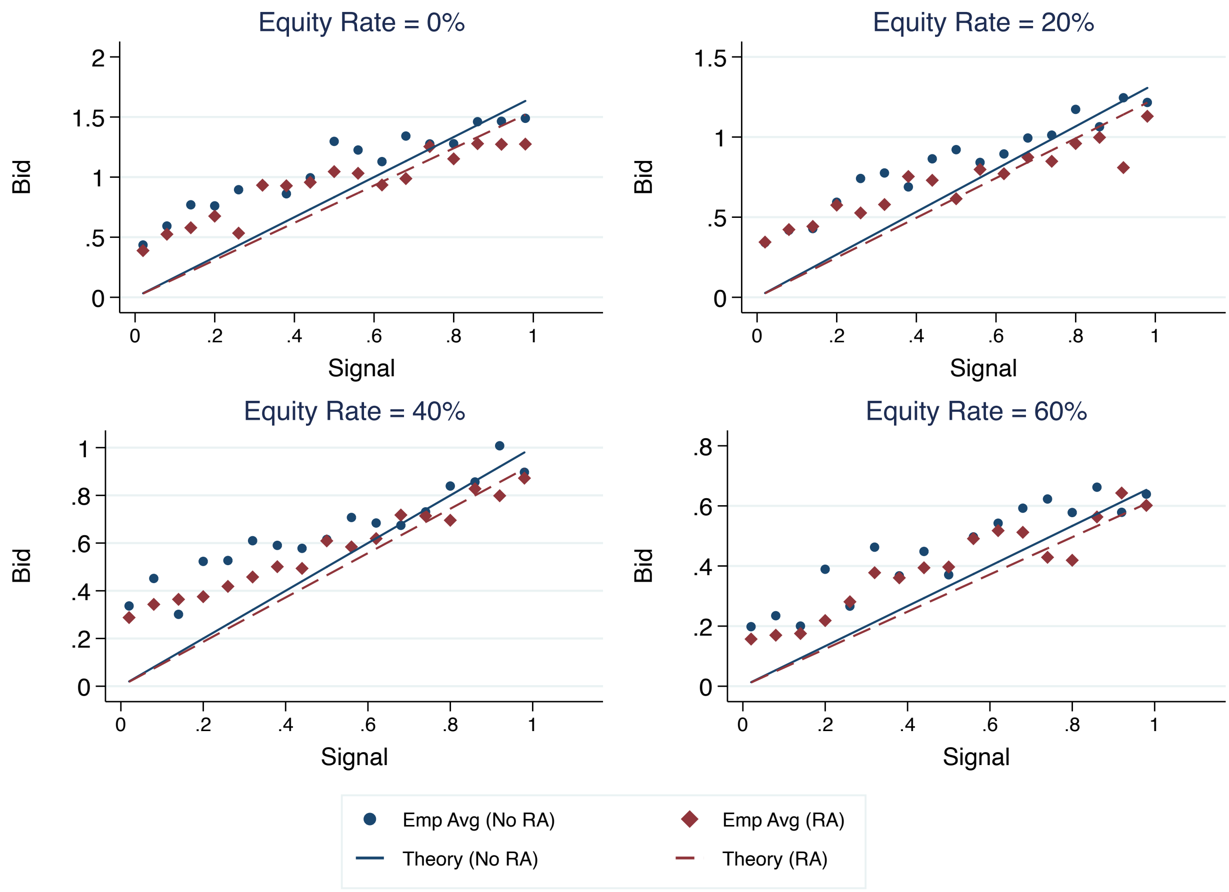

Figure 4: Empirical Bids vs. Theoretical Predictions

To examine how bidding behavior responds to equity rates and risk aversion, we estimate regression specifications in which the dependent variable is the submitted bid Bid_{it} of subject i in round t. The theoretical framework developed in Section 4 delivers sharp predictions about both the level and slope of equilibrium bids: under the symmetric BNE, every bidder employs a linear strategy $b(s_i) = \phi s_i$, so that bids scale proportionally with the private signal and the slope ϕ is the sole object of interest. This motivates a regression design in which all regressors enter multiplicatively with s_{it}, allowing us to recover empirical analogues of ϕ and to test how it responds to changes in the equity rate and the risk-aversion environment.

Our main preregistered specification for bidding corresponds directly to the theoretical predictions made in Proposition 1 and Table 1:

$$\text{Bid}_{it} = (\beta_0 + \beta_1 \text{Eq. Rate}_{it} + \beta_2 \text{RA Treat}_{it} + \beta_3 \text{Eq. Rate}_{it} \times \text{RA Treat}_{it}) \times s_{it} + \varepsilon_{it}. \quad (1)$$

Table 2: Estimation Results for Individual Bidding Behavior

	(1) Bid	(2) Bid	(3) Bid
Signal	1.813***	1.301***	1.277***
	(0.069)	(0.060)	(0.050)
Signal × Equity Rate	-1.721***	-1.728***	-1.742***
	(0.108)	(0.107)	(0.096)
Signal × RA Treat	-0.238**	-0.237***	-0.183***
	(0.093)	(0.091)	(0.069)
Signal × RA Treat × Equity Rate	0.239	0.255*	0.254*
	(0.153)	(0.151)	(0.135)
Constant		0.345***	0.392***
		(0.022)	(0.032)
Subject FE	No	No	Yes
Round FE	No	No	Yes
RMSE	0.40	0.36	0.27
Observations	4125	4125	4125

Notes: Linear regression with standard errors clustered at the subject level. We report RMSE instead of R^2 because Specification (1) has no constant. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

In this specification, the variable Eq. Rate_{it} is the equity rate (ranging from 0 to 0.6). Because Figure 4 reveals a systematic empirical departure from the zero-intercept restriction, we then extend this analysis by augmenting the regression first with an intercept term, then with subject and round fixed-effects. We cluster standard errors at the subject level in all specifications.[5]

The regression estimated in Column (1) of Table 2 provides our sharpest test of the point predictions made by the Nash Equilibrium for a risk-neutral subject. An examination of Table 1 shows that the coefficient on Signal should be 1.667 and the coefficients on the interactions of Signal with Eq. Rate_{it}, RA Treat_{it}, and Eq. $\text{Rate}_{it} \times$ RA Treat_{it} should be -1.667, -0.117, and 0.116 respectively. An F-test rejects the null hypothesis that the estimated coefficients are equal to their theoretical counterparts ($p < 0.01$).[6] We also reject null hypotheses of zero

[5]Although signals and equity rates were randomized within subjects, the risk-aversion treatment was assigned at the session level. We therefore reproduce Table 2 in Appendix Table 7, clustering standard errors by session. Relative to clustering by participant, this generally reduces the estimated standard errors; in Column (3), all four slope coefficients are significant at the 5% level. Because there are only six sessions, we also report wild cluster bootstrap t p-values using Webb weights. For tests of the null hypothesis that each coefficient equals zero, these p-values range from 0.015 to 0.024.

[6]When we cluster standard errors at the session level and compute p-values using wild cluster bootstrap t-tests and Webb weights, we cannot reject the null hypothesis that the estimates are equal to their theoretical predictions ($p \approx 0.28$).

effects of all variables with the exception of the triple interaction between Signal, RA Treat, and Equity Rate.

We augment the specification from Equation (1) first with an intercept in Column (2) of Table 2 and then with subject fixed effects and round fixed effects in Column (3). Allowing for this flexibility substantially decreases the coefficient on Signal, showing that subjects are less responsive to their private information than would be predicted by the Nash Equilibrium. Controlling for subject fixed effects and round fixed effects substantially decreases standard errors, but does not change the patterns of sign and statistical significance. We thus formally summarize how bidding varies with signal, equity rate, and risk aversion as our first result.

Result 1. *Empirically, the slope of bids with respect to signal is lower for higher equity shares and more risk averse bidders. The positive triple interaction is directionally consistent with the predicted insurance effect, but its significance depends on the inference procedure. We therefore find strong support for the two main effects and qualified support for the interaction prediction.*

5.2 Revenue

In Figure 5, we show how average revenue varies empirically with the equity rate and the risk-aversion treatment. The figure clearly shows a positive relationship, on average, between equity rate and revenue. Average revenue is higher than the theoretical prediction under all experimental conditions. Moreover, the figure suggests the presence of a winner's curse (i.e. auction winners receiving lower average payoffs than losers) because the expected value of winning is only 1.5 – a point we return to in Section 6.

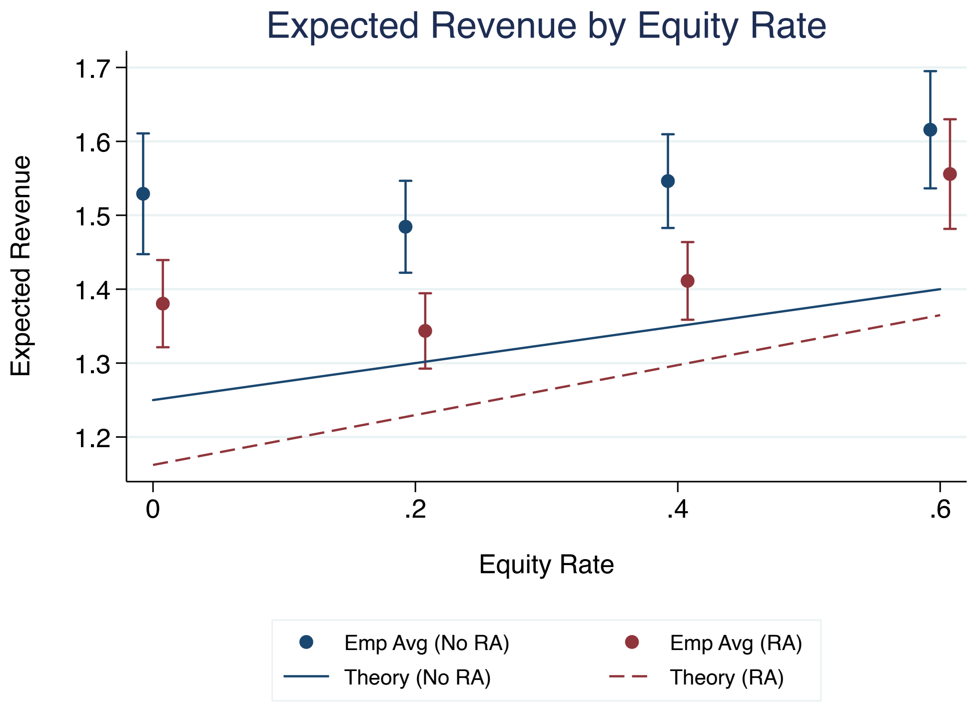

Figure 5: Empirical Revenue vs. Theoretical Predictions

We next statistically examine how equity rates and risk aversion shape auction revenue. Our dependent variable of interest is total revenue Rev_{jt} generated by group j in round t. This is defined as the sum of the winning bid and the seller's equity share of the realized project value (the sum of buyers' signals). Our first specification for revenue corresponds directly to the predictions made in Proposition 2 and Table 1:

$$\text{Rev}_{jt} = \beta_0 + \beta_1 \text{Eq. Rate}_{jt} + \beta_2 \text{RA Treat}_j + \beta_3 \text{Eq. Rate}_{jt} \times \text{RA Treat}_j + \varepsilon_{jt}. \tag{2}$$

Our preregistered specification also extends this to control for the signals buyers received as well as round fixed effects.

Table 3 shows the results of estimating Equation (2) using our data. Column (1), which does not include controls, is the most relevant for testing the specific point estimates of the theoretical model. According to the theory, the constant should be 1.25, with coefficients on Equity Rate, RA Treat, and Equity Rate × RA Treat being 0.250, −0.088, and 0.088 respectively. While the coefficients have their theoretically predicted sign, an F-test rejects the null hypotheses that the coefficients are equal to their theoretically predicted values with ($p < 0.01$).[7]

[7] We reproduce the results from Table 3 in Appendix Table 9 with standard errors clustered at the session

Table 3: Revenue

	(1) Revenue	(2) Revenue
Equity Rate	0.157*	0.154**
	(0.090)	(0.071)
RA Treat	-0.162***	-0.178***
	(0.042)	(0.036)
RA Treat × Equity Rate	0.133	0.127
	(0.117)	(0.089)
Constant	1.497***	0.585***
	(0.033)	(0.046)
Signal Controls	No	Yes
Round FE	No	Yes
R^2	0.032	0.47
Observations	1375	1375

Notes: Linear regression with robust standard errors. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Column (2) of Table 3 controls for buyers' signals as well as round fixed effects. The inclusion of these controls substantially reduces standard errors, leading the estimated effect of the Equity Rate to be statistically significant at the 5% level. However, the estimated interaction remains statistically insignificant ($p \approx 0.15$). We summarize these results with our next result.

Result 2. *Empirically, average revenue is increasing in the equity rate and decreasing in risk aversion. The reduction in revenue induced by risk aversion is smaller for larger equity rates, but this relationship is statistically insignificant. Thus, we find partial support for Hypothesis 2.*

6 The Winner's Curse and Cursed Equilibrium

A large body of existing work using experiments to study common-value auctions finds that subjects consistently overbid, and that there is often a winner's curse: empirical bids are so high that on average, subjects that win the auctions are worse off than they would have been if

level. Similar to the results for bidding, clustering in this way lowers standard errors and leaves all coefficients in the specification corresponding to Column (2) significant at at least the 5% level. For this specification, we test the null hypothesis that each coefficient is zero when using wild cluster bootstrap t-tests with Webb weights; the resulting p-values all lie between 0.05 and 0.10. The hypothesis that coefficients are equal to their theoretical predictions is rejected with $p \approx 0.017$.

they had lost. Figure 6 shows that after converting points to dollars using the predetermined rule, this holds in seven of our eight experimental conditions.[8]

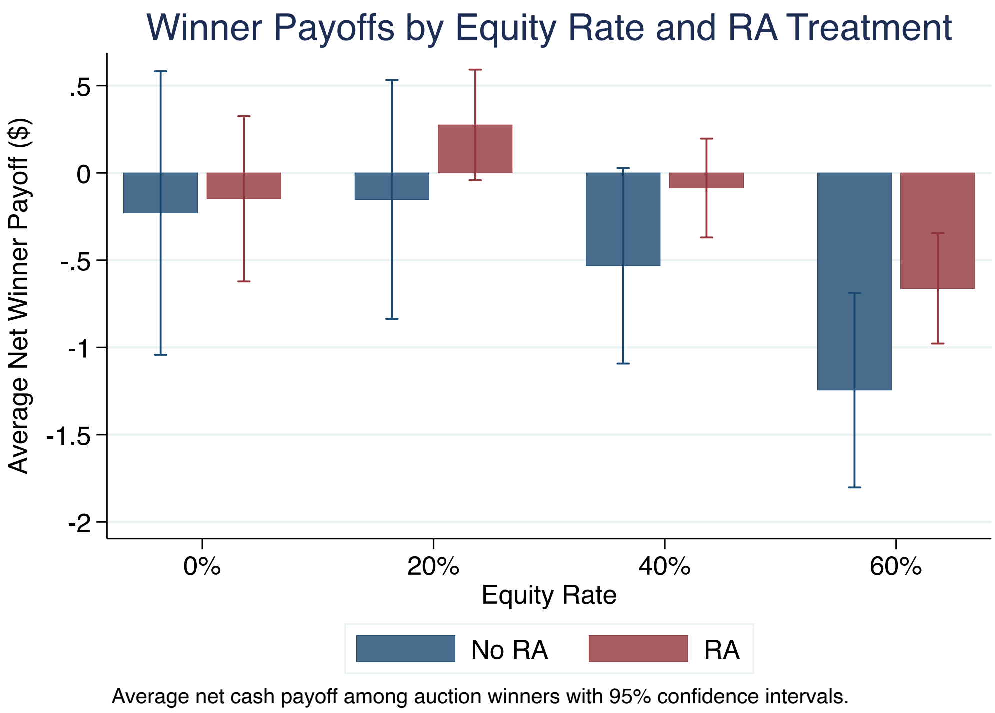

Figure 6: Net Cash Payoffs by Treatment

While the source of the winner's curse is an active area of research (see, for instance, Breig and Rosato (2025) and Nagel et al. (2025)), the classic explanation for this pattern is that bidders do not fully internalize the information that is conveyed by winning the auction. This has been formalized with Eyster and Rabin's (2005) χ-cursed equilibrium.

We next ask whether cursed equilibrium can parsimoniously account for the bidding patterns underlying these losses. For this exercise, we focus on the baseline treatment with a linear conversion from experimental points to monetary payments. This restriction is dictated by the empirical content of the model: as shown below, under linear payoffs, χ-cursed equilibrium generates an affine bidding strategy and a set of cross-equation restrictions through which a single parameter χ must jointly explain the intercept and the effects of the signal and equity rate. The baseline treatment therefore provides a transparent and overidentified test of the model. Under the kinked conversion rule used in the risk-aversion treatment, the cursed-equilibrium bidding function is not in general affine. Estimating χ in that environment would require a

[8]The mean net payoff of the auction winner across the 1,375 auctions is \$$-0.34$, which is significantly less than zero ($p < 0.001$).

different structural exercise based on the complete nonlinear bidding function. Such an exercise would not be directly comparable to the coefficient-restriction test conducted here. We therefore use both treatments to document the winner's curse, but use the baseline treatment alone to evaluate the quantitative restrictions of χ-cursed equilibrium.

We retain the environment of Section 4. Let $s_{(2)} \equiv \max\{s_j : j \neq i\}$ denote bidder i's highest rival signal. Under a symmetric strictly increasing strategy, bidder i wins if and only if her bid exceeds the bid associated with $s_{(2)}$.

A χ-cursed bidder with signal s_i evaluates the project using the perceived conditional value

$$v^{\chi}(s_i, s_{(2)}) = (1-\chi)\mathbb{E}\big[v(\boldsymbol{s}) \mid s_i, s_{(2)}\big] + \chi\, \mathbb{E}[v(\boldsymbol{s}) \mid s_i]\,,$$

where $\chi \in [0,1]$ measures the degree of cursedness. When $\chi = 0$, bidders correctly condition on the event of winning and the model coincides with the rational benchmark. When $\chi = 1$, bidders ignore the informational content of their opponents' signals and evaluate the project using only their own signal.

Given bid b_i, signal profile $\boldsymbol{s}$, equity share e, and the assumption of risk-neutrality, the bidder's perceived ex-post payoff under cursed beliefs is

$$u_i^{\chi}(b_i \mid s_i, s_{(2)}, e) = (1-e)v^{\chi}(s_i, s_{(2)}) - b_i.$$

Let $\beta^{\chi}(\cdot \mid e)$ denote a candidate symmetric bidding strategy used by bidders $j \neq i$. The corresponding perceived interim expected payoff of bidder i with signal s_i from submitting bid b_i is

$$U^{\chi}(b_i \mid s_i, e; \beta^{\chi}) = \mathbb{E}_{s_{(2)}}\big[u_i^{\chi}(b_i \mid s_i, s_{(2)}, e)\, \mathbb{1}\big\{b_i \geqslant \beta^{\chi}(s_{(2)} \mid e)\big\}\big]\,.$$

This allows us to define and find the χ-cursed equilibrium in our setting.

Definition 2. *A symmetric χ-cursed equilibrium is a strategy $\beta^{\chi}(\cdot \mid e)$ such that for every signal realization s_i,*

$$\beta^{\chi}(s_i \mid e) \in \arg\max_{b_i \in \mathbb{R}_+} U^{\chi}(b_i \mid s_i, e; \beta^{\chi}).$$

Proposition 3. *The symmetric χ-cursed equilibrium of the first-price fixed-equity auction is affine,*

$$\beta^{\chi}(s \mid e) = (1-e)\chi + \frac{1-e}{3}\,(5-3\chi)\,s,$$

with intercept $(1-e)\chi$, strictly positive for $\chi > 0$. At $\chi = 0$ it coincides with the equilibrium of Proposition 1.

Proposition 3 delivers sharp predictions that differ from those made by the symmetric Bayesian Nash equilibrium. Under the χ-cursed equilibrium, bidding functions can have an intercept that is strictly higher than zero—a characteristic of average bidding functions that we already found in Section 5.1. The proposition also shows that both the intercept and the slope of the bidding function should be systematically related to the level of cursedness, χ. Specifically, when estimating the equation

$$\text{Bid}_{it} = \beta_0 + \beta_1 \text{Eq. Rate}_{it} + \beta_2 s_{it} + \beta_3 \text{Eq. Rate}_{it} \times s_{it} + \varepsilon_{it} \tag{3}$$

using data from the baseline treatment, Proposition 3 implies the restriction that $\beta_0 = -\beta_1 = \frac{5}{3} - \beta_2 = \frac{5}{3} + \beta_3$. Furthermore, the regression constant provides a direct estimate of χ.

Table 4 reports the results of estimating Equation (3) using data from the baseline treatment. The specification from Column (1), which does not include a constant or the equity rate as a regressor, is included as a point of comparison. Column (2) estimates Equation (3) directly. The estimated constant and coefficient on the Equity Rate imply a cursedness parameter near 0.5, while the coefficients on Signal and Signal $\times$ Equity Rate imply a cursedness parameter closer to 0.6. More importantly, a test of the null hypothesis that $\beta_0 = -\beta_1 = \frac{5}{3} - \beta_2 = \frac{5}{3} + \beta_3$ cannot be rejected ($p \approx 0.25$). Thus, Column (3) *imposes* this constraint on the estimation, leading to an estimated value of χ of 0.48.

Our estimate of χ is broadly consistent with existing evidence: for example, Eyster and Rabin (2005), using data from Avery and Kagel (1997), report a best-fitting value of $\chi = 0.63$. More importantly, the empirical support for the model does not rest solely on finding a value of χ that fits average bids. The model requires the intercept and the effects of the signal and equity rate to be jointly generated by a single parameter, and we cannot reject these restrictions. Imposing them also produces essentially no deterioration in fit, while allowing for cursedness reduces the RMSE from 0.43 to 0.38 relative to the specification without a constant. Taken together, these results indicate that a χ-cursed equilibrium with $\chi = 0.48$ provides a parsimonious description of average bidding in the baseline treatment.

Table 4: Estimation of χ-Cursed Equilibrium

	(1) Bid	(2) Bid	(3) Bid
Signal	1.81***	1.05***	1.18***
	(0.069)	(0.066)	(0.060)
Signal × Equity Rate	-1.72***	-1.01***	-1.18***
	(0.11)	(0.14)	(0.060)
Equity Rate		-0.48***	-0.48***
		(0.084)	(0.060)
Constant		0.51***	0.48***
		(0.047)	(0.060)
RMSE	0.43	0.38	0.38
Observations	2025	2025	2025

Notes: Linear regression with standard errors clustered at the subject level. We report RMSE instead of R^2 because Specification (1) has no constant. Specification (3) imposes the restriction described in the text. Significance indicated by: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

7 Concluding Remarks

We study how fixed-equity payments affect bidding and revenue in common-value auctions. Higher equity rates are predicted to both strengthen the linkage between buyers' private information and their payments and provide insurance to risk-averse bidders. We evaluate these forces in a laboratory experiment that varies both the sellerâs equity share and the curvature of bidders' monetary incentives. The latter treatment provides a direct way to study how the performance of an institution changes when decision-makers are more risk averse without relying on risk preferences elicited in a separate task.

We find that bids are increasing in buyers' private signals, but find evidence of systematic overbidding and a winner's curse. Higher equity shares reduce bids and their sensitivity to signals while still increasing seller revenue, as predicted by the theory. The risk-aversion treatment reduces bids and revenue. This effect is mitigated by higher equity shares, although the interaction is estimated imprecisely and not statistically significant. In the baseline treatment, a χ-cursed equilibrium with $\chi = 0.48$ provides a parsimonious description of average bidding, suggesting that subjects only partially account for the informational content of winning.

Our findings suggest that contingent payment schemes such as fixed equity can significantly shape auction outcomes in environments with common values and uncertainty. More broadly, the results highlight how security design interacts with behavioral responses such as the winner's curse and with bidders' attitudes toward risk. These interactions are likely to be important in many applications beyond resource auctions, including concession contracts and other settings in which payments depend on realized project performance.

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Proofs

Proof of Proposition 1

Fix bidder i with signal s_i. Consider a deviation in which bidder i submits the bid prescribed by the candidate symmetric strategy for signal z, namely $\beta(z \mid e, \lambda)$, while the remaining bidders follow $\beta(\cdot \mid e, \lambda)$. In equilibrium, the interim payoff as a function of z must be maximized at $z = s_i$.

Derivation of the equilibrium condition. Let $s_{(1,-i)} := \max\{s_j : j \neq i\}$ denote the highest rival signal and let $t = \sum_{j \neq i} s_j$ denote the sum of the two rival signals. Thus $v(\boldsymbol{s}) = s_i + t$. Since the candidate strategy is strictly increasing, bidder i wins with report z if and only if $s_{(1,-i)} \leqslant z$. Conditional on this event, the two rival signals are independent and uniformly distributed on $[0, z]$. Hence t has density

$$f(t \mid z) = \begin{cases} t/z^2, & t \in [0, z], \\ (2z - t)/z^2, & t \in [z, 2z]. \end{cases}$$

Write $\beta(z) := \beta(z \mid e, \lambda)$ and define $\bar{t}(z) := \beta(z)/(1 - e) - s_i$, the realization of t at which the winning payoff changes sign. The interim payoff from reporting z is

$$\begin{aligned} U(\beta(z) \mid s_i, e, \lambda; \beta) = z^2 \int_0^{\bar{t}(z)} & \big((1 - e)(s_i + t) - \beta(z)\big) \frac{t}{z^2}\, dt \\ & + z^2 \int_{\bar{t}(z)}^{z} \lambda \big((1 - e)(s_i + t) - \beta(z)\big) \frac{t}{z^2}\, dt \\ & + z^2 \int_{z}^{2z} \lambda \big((1 - e)(s_i + t) - \beta(z)\big) \frac{2z - t}{z^2}\, dt. \end{aligned} \tag{4}$$

Evaluating these integrals gives

$$\begin{aligned} U(\beta(z) \mid s_i, e, \lambda; \beta) = & \frac{1 - e}{3}(1 - \lambda)\bar{t}(z)^3 + \lambda(1 - e)z^3 \\ & + \frac{(1 - e)s_i - \beta(z)}{2} \left((1 - \lambda)\bar{t}(z)^2 + 2\lambda z^2\right). \end{aligned} \tag{5}$$

Substituting $\bar{t}(z) = \beta(z)/(1 - e) - s_i$, differentiating with respect to z, and imposing the equilibrium condition at $z = s_i$ yields

$$\beta'(s_i \mid e, \lambda) = \frac{2\lambda s_i(1-e)^2\left(5(1-e)s_i - 2\beta(s_i \mid e, \lambda)\right)}{(1-\lambda)\left(\beta(s_i \mid e, \lambda)^2 - 2(1-e)\beta(s_i \mid e, \lambda)s_i\right) + (1+\lambda)(1-e)^2 s_i^2}. \tag{6}$$

Linear equilibrium. We now verify that the equilibrium is linear. Suppose $\beta(s \mid e, \lambda) = \phi s$. Substituting this expression into (6) gives

$$\phi = \frac{2\lambda(1-e)^2\big(5(1-e) - 2\phi\big)}{(1-\lambda)\big(\phi^2 - 2(1-e)\phi\big) + (1+\lambda)(1-e)^2}. \tag{7}$$

When $\lambda = 1$, (7) reduces to $\phi = 5(1-e) - 2\phi$, and hence

$$\beta(s \mid e, 1) = \frac{5}{3}(1-e)s,$$

which is the risk-neutral wallet-game equilibrium adjusted by the residual equity share $1 - e$.

Existence and uniqueness. It remains to establish that, for $\lambda \in (1/19, 1)$, the fixed-point equation ((7)) has a unique admissible solution. Define

$$g(\phi) := \phi - \frac{2\lambda(1-e)^2\big(5(1-e) - 2\phi\big)}{(1-\lambda)\big(\phi^2 - 2(1-e)\phi\big) + (1+\lambda)(1-e)^2}.$$

Then $g(0) = -10\lambda(1-e)/(1+\lambda) < 0$, while $g(5(1-e)/3) > 0$. Hence, by continuity, there exists a solution $\phi^* \in (0, 5(1-e)/3)$.

To prove uniqueness, multiply both sides of (7) by the denominator and rearrange. The equilibrium slope is a root of

$$\tilde{g}(\phi) = (1-\lambda)\phi^3 + 2(1-e)(\lambda-1)\phi^2 + (1-e)^2(5\lambda+1)\phi - 10\lambda(1-e)^3.$$

Moreover,

$$\tilde{g}'(\phi) = 3(1-\lambda)\phi^2 + 4(1-e)(\lambda-1)\phi + (1-e)^2(5\lambda+1).$$

The discriminant of this quadratic is $4(1-e)^2(\lambda-1)(19\lambda-1)$, which is negative whenever $\lambda > 1/19$. Therefore $\tilde{g}'(\phi) > 0$ for all ϕ, so $\tilde{g}$ is strictly increasing and has at most one real root. Since existence has already been established, the solution ϕ^* is unique.

Therefore, for every $\lambda \in (1/19, 1)$, the unique symmetric linear equilibrium is

$$\beta(s \mid e, \lambda) = \phi^* s,$$

where ϕ^* is the unique solution to (7). The risk-neutral case $\lambda = 1$ is obtained as the limiting special case $\phi^* = 5(1-e)/3$.

We now turn to the comparative statics of the equilibrium bidding strategy.

Comparative statics. Recall that the equilibrium slope ϕ satisfies

$$\phi\Big[(1-\lambda)\big(\phi^2 - 2(1-e)\phi\big) + (1+\lambda)(1-e)^2\Big] = 2\lambda(1-e)^2\big(5(1-e) - 2\phi\big).$$

Writing $\phi = k(\lambda)(1-e)$ and dividing by $(1-e)^3$ yields

$$(1-\lambda)k^3 - 2(1-\lambda)k^2 + (1+5\lambda)k - 10\lambda = 0.$$

Hence $\phi(e, \lambda) = k(\lambda)(1-e)$, where $k(\lambda) > 0$ is independent of e, and therefore

$$\beta(s_i \mid e, \lambda) = k(\lambda)(1-e)s_i.$$

It follows immediately that $\partial\beta(s_i \mid e, \lambda)/\partial e = -k(\lambda)s_i < 0$.

It remains to show that $k(\lambda)$ is increasing. Implicit differentiation of the cubic equation gives

$$k'(\lambda) = \frac{(5-k^2)(2-k)}{(1-\lambda)(3k^2-4k) + 1 + 5\lambda}.$$

For the relevant equilibrium root, $1 \leqslant k(\lambda) \leqslant 5/3$. Hence the numerator is strictly positive. Moreover,

$$(1-\lambda)(3k^2 - 4k) + 1 + 5\lambda \geqslant -(1-\lambda) + 1 + 5\lambda = 6\lambda > 0,$$

so the denominator is also positive. Therefore $k'(\lambda) > 0$, implying $\partial\beta(s_i \mid e, \lambda)/\partial\lambda = k'(\lambda)(1-e)s_i > 0$. Finally, $\partial^2\beta(s_i \mid e, \lambda)/(\partial e\, \partial\lambda) = -k'(\lambda)s_i < 0$.

Hence bids decrease in the sellers' equity share, increase in λ, and the effect of an increase in the equity share is stronger when λ is larger.

Proof of Proposition 2

Since the equilibrium bidding strategy is strictly increasing, the winning bid is submitted by the bidder with the highest signal. Let $s_{(1)} = \max\{s_1, s_2, s_3\}$. Using $\beta(s_i \mid e, \lambda) = k(\lambda)(1-e)s_i$, expected seller revenue is

$$\Pi(e, \lambda) = \mathbb{E}\big[\beta(s_{(1)} \mid e, \lambda)\big] + e\,\mathbb{E}\left[\sum_{i=1}^{3} s_i\right].$$

Because $\mathbb{E}[s_{(1)}] = 3/4$ and $\mathbb{E}[\sum_i s_i] = 3/2$, it follows that

$$\Pi(e, \lambda) = \frac{3}{2}e + \frac{3}{4}k(\lambda)(1-e) = \left(\frac{3}{2} - \frac{3}{4}k(\lambda)\right)e + \frac{3}{4}k(\lambda).$$

Comparative statics. Differentiating with respect to e yields

$$\frac{\partial \Pi(e, \lambda)}{\partial e} = \frac{3}{2} - \frac{3}{4}k(\lambda).$$

Since $k(\lambda) \leqslant 5/3$ by Proposition 1, we have $\partial \Pi(e, \lambda)/\partial e \geqslant 1/4 > 0$. Hence expected seller revenue is strictly increasing in the retained equity share.

Differentiating with respect to λ gives

$$\frac{\partial \Pi(e, \lambda)}{\partial \lambda} = \frac{3}{4}(1-e)k'(\lambda).$$

Since $e < 1$ and $k'(\lambda) > 0$ by Proposition 1, expected seller revenue is strictly increasing in λ. Equivalently, revenue decreases as bidders become more risk averse.

Finally,

$$\frac{\partial^2 \Pi(e, \lambda)}{\partial \lambda\, \partial e} = -\frac{3}{4}k'(\lambda) < 0.$$

Thus the marginal revenue gain from increasing the retained equity share is smaller when λ is higher. Equivalently, retaining a larger equity share mitigates the revenue loss induced by greater risk aversion, completing the proof.

Proof of Proposition 3

Fix bidder i with signal s_i and suppose that the rivals use a strictly increasing symmetric strategy β^χ. If bidder i bids as type z, she wins if and only if both rivals' signals are below z, an event with probability z^2. Let $t = s_j + s_k$. Conditional on winning, t has mean z, while under the cursed component of beliefs it has the unconditional mean 1. Since $\lambda = 1$, the perceived interim payoff from bidding as type z is

$$U^\chi(z \mid s_i) = z^2\Big[(1-e)\big(s_i + \chi + (1-\chi)z\big) - \beta^\chi(z)\Big].$$

In a symmetric equilibrium, $z = s_i$ maximizes $U^\chi(z \mid s_i)$ for every s_i. The first-order condition at $z = s_i = s$ is therefore

$$2\Big[(1-e)\big(s + \chi + (1-\chi)s\big) - \beta^\chi(s)\Big] + s\Big[(1-e)(1-\chi) - (\beta^\chi)'(s)\Big] = 0.$$

Equivalently,

$$s(\beta^\chi)'(s) + 2\beta^\chi(s) = 2(1-e)\chi + (1-e)(5-3\chi)s.$$

Multiplying by s gives

$$\frac{d}{ds}\big[s^2\beta^\chi(s)\big] = 2(1-e)\chi s + (1-e)(5-3\chi)s^2.$$

Integrating and imposing boundedness at $s = 0$ yields

$$\beta^\chi(s \mid e) = (1-e)\chi + \frac{1-e}{3}(5-3\chi)s.$$

It remains to verify optimality. Substituting this strategy into the payoff gives

$$\frac{\partial U^\chi(z \mid s_i)}{\partial z} = 2(1-e)z(s_i - z),$$

which is positive for $z < s_i$ and negative for $z > s_i$. Hence $z = s_i$ is the unique maximizer. Therefore the strategy above is the symmetric χ-cursed equilibrium. At $\chi = 0$, it reduces to

$$\beta(s \mid e) = \frac{5}{3}(1-e)s,$$

which coincides with Proposition 1.

A Additional Empirical Results

Table 5: Summary Statistics

	Mean	Std. Dev.
CRT Score	1.81	1.12
Female	0.72	0.45
Age	23.61	3.82
English	0.12	0.33
Economics	0.21	0.41
Subjects	165.00	

Notes: CRT Score is the number of correct answers on a Cognitive Reflection Test, ranging from 0 to 3. Female, English, and Economics are equal to one if the subjects report being female, speaking English as a first language, and majoring in Economics, respectively.

Table 6: Estimation Results for Individual Bidding Behavior - Full Sample

	(1) Bid	(2) Bid	(3) Bid
Signal	1.844***	1.293***	1.259***
	(0.062)	(0.057)	(0.050)
Signal × Equity Rate	-1.698***	-1.710***	-1.737***
	(0.093)	(0.095)	(0.086)
Signal × RA Treat	-0.247***	-0.248***	-0.164**
	(0.087)	(0.087)	(0.068)
Signal × RA Treat × Equity Rate	0.269*	0.286*	0.268**
	(0.144)	(0.145)	(0.131)
Constant		0.372***	0.522***
		(0.022)	(0.042)
Subject FE	No	No	Yes
Round FE	No	No	Yes
RMSE	0.44	0.40	0.32
Observations	4950	4950	4950

Notes: Linear regression with standard errors clustered at the subject level. We report RMSE instead of R^2 because Specification (1) has no constant. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Estimation Results for Individual Bidding Behavior - Session Level Clustering

	(1) Bid	(2) Bid	(3) Bid
Signal	1.813***	1.301***	1.277***
	(0.037)	(0.032)	(0.022)
Signal × Equity Rate	-1.721***	-1.728***	-1.742***
	(0.013)	(0.013)	(0.039)
Signal × RA Treat	-0.238***	-0.237***	-0.183***
	(0.048)	(0.050)	(0.043)
Signal × RA Treat × Equity Rate	0.239***	0.255**	0.254**
	(0.058)	(0.075)	(0.069)
Constant		0.345***	0.392***
		(0.024)	(0.045)
Subject FE	No	No	Yes
Round FE	No	No	Yes
RMSE	0.40	0.36	0.27
Observations	4125	4125	4125

Notes: Linear regression with standard errors clustered at the session level. We report RMSE instead of R^2 because Specification (1) has no constant. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Revenue - Full Sample

	(1) Revenue	(2) Revenue
Equity Rate	0.208**	0.200***
	(0.088)	(0.071)
RA Treat	-0.155***	-0.166***
	(0.041)	(0.036)
RA Treat × Equity Rate	0.104	0.115
	(0.117)	(0.093)
Constant	1.535***	0.662***
	(0.031)	(0.046)
Signal Controls	No	Yes
Round FE	No	Yes
R^2	0.030	0.41
Observations	1650	1650

Notes: Linear regression with robust standard errors. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Revenue - Session Level Clustering

	(1) Revenue	(2) Revenue
Equity Rate	0.157***	0.154***
	(0.026)	(0.029)
RA Treat	-0.162**	-0.178**
	(0.056)	(0.066)
RA Treat × Equity Rate	0.133	0.127**
	(0.076)	(0.046)
Constant	1.497***	0.585***
	(0.054)	(0.088)
Signal Controls	No	Yes
Round FE	No	Yes
R^2	0.032	0.47
Observations	1375	1375

Notes: Linear regression with standard errors clustered at the session level. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Estimation of χ-Cursed Equilibrium

	(1) Bid	(2) Bid	(3) Bid
Signal	1.84***	1.03***	1.13***
	(0.062)	(0.072)	(0.057)
Signal × Equity Rate	-1.70***	-0.95***	-1.13***
	(0.094)	(0.16)	(0.057)
Equity Rate		-0.52***	-0.54***
		(0.086)	(0.057)
Constant		0.55***	0.54***
		(0.044)	(0.057)
RMSE	0.46	0.41	0.41
Observations	2430	2430	2430

Notes: Linear regression with standard errors clustered at the subject level. We report RMSE instead of R^2 because Specification (1) has no constant. Specification (3) imposes the restriction described in the text. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

B Screenshots/Instructions

Below, we include screenshots from the experiment.

Introduction

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

Thank you for participating in this study. This study is about decision-making. It should take about 90-120 minutes, and you will be paid based on your earnings from the experiment. The money you earn will be paid either in cash at the end of the study or electronically within a few days of the end of the study.

Please do not use any electronic devices or talk with other participants during this study.

There will be no deception in this study. Every decision you make will be carried out exactly as it is described in the instructions. Anything else would violate the human ethics protocol under which we run the study (UQ Human Research Ethics Approval 2024/HE001521).

In the study you will make decisions that will affect the amount of money you earn. The study will consist of games that you will play with other randomly selected players. The players that you are paired with in a match are selected independently of who you play with in any other match.

Please pay close attention to the instructions on the next page. After you read these instructions, there will be a short quiz on the instructions. You will receive $1 for each question you answer correctly.

If you have questions at any point, please raise your hand and we will answer your questions privately.

Next

Figure 7: Introduction

Instructions

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

AFTER THESE INSTRUCTIONS THERE WILL BE A SHORT QUIZ ABOUT THE MATERIAL. YOU WILL RECEIVE $1 FOR EACH QUESTION YOU ANSWER CORRECTLY.

All participants will receive a show-up fee of $20, regardless of what happens during the study.

In this study, you will participate in 30 rounds of decision-making. Each round begins with the computer randomly pairing you with two other participants. The players you are paired with in one round are selected independently of the players you are paired with in any other round. You will not know who the other players are.

In each round, you will participate in a special type of auction. The value of winning the auction is random and will change from round to round. While no player will know the actual value of winning, each player will receive a private signal about the value. Each signal is drawn independently and has an equal chance of taking any value between 0 and 1000 points (in 20 point increments). The value of winning the auction is the **SUM** of all three players' signals.

All players will be given a budget of 3000 points from which to make bids. If you are the highest bidder (with ties broken randomly), you will win the auction. You will receive your budget and the value of winning the auction, but must **pay your bid** and **a percentage of the value** of winning the auction. This percentage payment will vary from round to round and will range between 0% and 60%. You will be informed of the percentage before making your bid. If you do not win the auction, you will keep your budget.

In each round, your earnings are determined by how many points you accumulate in that round, converted into dollars at a rate of 100 points per dollar. This means that more points always lead to higher dollar earnings at a consistent rate.

Your final payment from the experiment will be the sum of your show-up fee, your payment for correct quiz answers, and your earnings from one randomly selected auction round.

On the next page, you will find a few examples to help you better understand the rules. Please go through them at your own pace. After you have reviewed the examples, click Next again to begin the quiz.

Next

Figure 8: Instructions - Baseline Treatment

Instructions

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

AFTER THESE INSTRUCTIONS THERE WILL BE A SHORT QUIZ ABOUT THE MATERIAL. YOU WILL RECEIVE $1 FOR EACH QUESTION YOU ANSWER CORRECTLY.

All participants will receive a show-up fee of $20, regardless of what happens during the study.

In this study, you will participate in 30 rounds of decision-making. Each round begins with the computer randomly pairing you with two other participants. The players you are paired with in one round are selected independently of the players you are paired with in any other round. You will not know who the other players are.

In each round, you will participate in a special type of auction. The value of winning the auction is random and will change from round to round. While no player will know the actual value of winning, each player will receive a private signal about the value. Each signal is drawn independently and has an equal chance of taking any value between 0 and 1000 points (in 20 point increments). The value of winning the auction is the **SUM** of all three players' signals.

All players will be given a budget of 3000 points from which to make bids. If you are the highest bidder (with ties broken randomly), you will win the auction. You will receive your budget and the value of winning the auction, but must **pay your bid** <u>and</u> **a percentage of the value** of winning the auction. This percentage payment will vary from round to round and will range between 0% and 60%. You will be informed of the percentage before making your bid. If you do not win the auction, you will keep your budget.

In each round, your earnings are determined by how many points you accumulate in that round and how these points are converted into dollars. The conversion follows a two-part structure with a threshold at 3000 points. For the first 3000 points, your earnings are converted at a rate of 100 points per dollar. Any points you earn beyond 3000 are converted at a rate of 250 points per dollar. This means that while earning more points always increases your total payment, additional points beyond the threshold contribute less to your earnings.

Your final payment from the experiment will be the sum of your show-up fee, your payment for correct quiz answers, and your earnings from one randomly selected auction round.

On the next page, you will find a few examples to help you better understand the rules. Please go through them at your own pace. After you have reviewed the examples, click Next again to begin the quiz.

Next

Figure 9: Instructions - Risk-Aversion Treatment

Examples

PLEASE READ THE EXAMPLES CAREFULLY AND CLICK NEXT WHEN YOU ARE READY TO BEGIN THE QUIZ.

Example 1: The **percentage payment** in this round is **20%**.

Player	Signal	Bid	Point Earnings	Dollar Earnings
A	840	900	3000	$30.00
B	380	440	3000	$30.00
C	700	1100	3436	$34.36

In this example, the value of winning the auction is: 840 + 380 + 700 = 1920 points.

Because Player C has the highest bid, they win the auction. Their earnings from the round are their budget (3000), plus the value of winning the auction (1920), minus their bid (1100), minus the percentage payment (0.2 × 1920 = 384), for a total of 3436 points. This corresponds to $34.36.

Players A and B did not win the auction, so their earnings for the round are 3000 points each. This corresponds to $30.00.

Example 2: The **percentage payment** in this round is **60%**.

Player	Signal	Bid	Point Earnings	Dollar Earnings
A	480	620	3000	$30.00
B	120	900	2548	$25.48
C	520	900	3000	$30.00

In this example, the value of winning the auction is: 480 + 120 + 520 = 1120 points.

Players B and C are tied for the highest bid, and Player B is randomly chosen as the winner. Player B's earnings from the round are their budget (3000), plus the value of winning the auction (1120), minus their bid (900), minus the percentage payment (0.6 × 1120 = 672), for a total of 2548 points. This corresponds to $25.48.

Players A and C did not win the auction, so their earnings for the round are 3000 points each. This corresponds to $30.00.

Example 3: The **percentage payment** in this round is **0%**.

Player	Signal	Bid	Point Earnings	Dollar Earnings
A	740	1440	3820	$38.20
B	600	800	3000	$30.00
C	920	1100	3000	$30.00

In this example, the value of winning the auction is: 740 + 600 + 920 = 2260 points.

Because Player A has the highest bid, they win the auction. Their earnings from the round are their budget (3000), plus the value of winning the auction (2260), minus their bid (1440), minus the percentage payment (0 × 2260 = 0), for a total of 3820 points. This corresponds to $38.20.

Players B and C did not win the auction, so their earnings for the round are 3000 points each. This corresponds to $30.00.

When you are ready, click Next again to begin the quiz.

Next

Figure 10: Examples - Baseline Treatment

Examples

PLEASE READ THE EXAMPLES CAREFULLY AND CLICK NEXT WHEN YOU ARE READY TO BEGIN THE QUIZ.

Example 1: The **percentage payment** in this round is **20%**.

Player	Signal	Bid	Point Earnings	Dollar Earnings
A	840	900	3000	$30.00
B	380	440	3000	$30.00
C	700	1100	3436	$31.74

In this example, the value of winning the auction is: 840 + 380 + 700 = 1920 points.

Because Player C has the highest bid, they win the auction. Their earnings from the round are their budget (3000), plus the value of winning the auction (1920), minus their bid (1100), minus the percentage payment (0.2 × 1920 = 384), for a total of 3436 points. This corresponds to $31.74.

Players A and B did not win the auction, so their earnings for the round are 3000 points each. This corresponds to $30.00.

Example 2: The **percentage payment** in this round is **60%**.

Player	Signal	Bid	Point Earnings	Dollar Earnings
A	480	620	3000	$30.00
B	120	900	2548	$25.48
C	520	900	3000	$30.00

In this example, the value of winning the auction is: 480 + 120 + 520 = 1120 points.

Players B and C are tied for the highest bid, and Player B is randomly chosen as the winner. Player B's earnings from the round are their budget (3000), plus the value of winning the auction (1120), minus their bid (900), minus the percentage payment (0.6 × 1120 = 672), for a total of 2548 points. This corresponds to $25.48.

Players A and C did not win the auction, so their earnings for the round are 3000 points each. This corresponds to $30.00.

Example 3: The **percentage payment** in this round is **0%**.

Player	Signal	Bid	Point Earnings	Dollar Earnings
A	740	1440	3820	$33.28
B	600	800	3000	$30.00
C	920	1100	3000	$30.00

In this example, the value of winning the auction is: 740 + 600 + 920 = 2260 points.

Because Player A has the highest bid, they win the auction. Their earnings from the round are their budget (3000), plus the value of winning the auction (2260), minus their bid (1440), minus the percentage payment (0 × 2260 = 0), for a total of 3820 points. This corresponds to $33.28.

Players B and C did not win the auction, so their earnings for the round are 3000 points each. This corresponds to $30.00.

When you are ready, click Next again to begin the quiz.

Next

Figure 11: Examples - Risk-Aversion Treatment

Quiz

You will now be given a series of questions to check your understanding of the instructions and examples. You will be paid $1 for each answer you get correct.

Suppose that your signal is 320 and the other two signals are 180 and 200. What is the value of winning the auction?

- ○ 320
- ○ 500
- ○ 700
- ○ 920

What is true about a bidder who submits a bid of 3000 when the percentage payment is 20%?

- ○ He/She will always lose the auction.
- ○ He/She will always win the auction.
- ○ His/Her payoff from winning will be lower than that of losing.
- ○ All losers in the auction will receive lower payoffs than the winner.

Suppose that you bid 1420 and the other bids are 1360 and 420. Which one of the following statements are true.

- ○ The bidder that bids 1360 wins.
- ○ You win the auction.
- ○ The winner is chosen randomly from all bidders.
- ○ All bidders win the auction.

Suppose the value of winning the auction is 2000, the winning bid is 600, and the percentage payment is 40%. What is the payoff of the winning bidder after paying her bid and the percentage payment?

- ○ 0.6 × (3000 + 2000 - 600) = 2640.
- ○ 3000
- ○ 3000 + 2000 - 600 - (0.6 × 2000) = 3200
- ○ 3000 + 2000 - 600 - (0.4 × 2000) = 3600

Suppose the value of winning is 1000 and the winning bid is 520 when the percentage payment is 60%. What of the following statements is true?

- ○ The winning bidder receives their budget of 3000 and the value of the prize of 1000 but must pay their bid of 520 and the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000 points.
- ○ All bidders receive 3000 points.
- ○ The winning bidder receives the value of the prize of 1000, but must pay their bid of 520 and the percentage payment of (0.6 × 1000) = 600. The losing bidders receive 3000, but must pay the percentage payment of (0.6 × 1000) = 600.
- ○ The winning bidder receives their budget of 3000 and the value of the prize of 1000, but must pay the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000, but must pay the highest bid of 520.

Suppose you earned 3400 points in one round. Considering only payments from the auction, what would be your total payment in dollars?

- ○ $28
- ○ $30
- ○ $34
- ○ $35

When you believe you have answered all questions correctly, press Next to check your answers.

Next

Figure 12: Quiz - Baseline Treatment

Quiz

You will now be given a series of questions to check your understanding of the instructions and examples. You will be paid $1 for each answer you get correct.

Suppose that your signal is 320 and the other two signals are 180 and 200. What is the value of winning the auction?

- ◯ 320
- ◯ 500
- ◯ 700
- ◯ 920

What is true about a bidder who submits a bid of 3000 when the percentage payment is 20%?

- ◯ He/She will always lose the auction.
- ◯ He/She will always win the auction.
- ◯ His/Her payoff from winning will be lower than that of losing.
- ◯ All losers in the auction will receive lower payoffs than the winner.

Suppose that you bid 1420 and the other bids are 1360 and 420. Which one of the following statements are true.

- ◯ The bidder that bids 1360 wins.
- ◯ You win the auction.
- ◯ The winner is chosen randomly from all bidders.
- ◯ All bidders win the auction.

Suppose the value of winning the auction is 2000, the winning bid is 600, and the percentage payment is 40%. What is the payoff of the winning bidder after paying her bid and the percentage payment?

- ◯ 0.6 × (3000 + 2000 - 600) = 2640.
- ◯ 3000
- ◯ 3000 + 2000 - 600 - (0.6 × 2000) = 3200
- ◯ 3000 + 2000 - 600 - (0.4 × 2000) = 3600

Suppose the value of winning is 1000 and the winning bid is 520 when the percentage payment is 60%. What of the following statements is true?

- ◯ The winning bidder receives their budget of 3000 and the value of the prize of 1000 but must pay their bid of 520 and the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000 points.
- ◯ All bidders receive 3000 points.
- ◯ The winning bidder receives the value of the prize of 1000, but must pay their bid of 520 and the percentage payment of (0.6 × 1000) = 600. The losing bidders receive 3000, but must pay the percentage payment of (0.6 × 1000) = 600.
- ◯ The winning bidder receives their budget of 3000 and the value of the prize of 1000, but must pay the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000, but must pay the highest bid of 520.

Suppose you earned 3400 points in one round. Considering only payments from the auction, what would be your total payment in dollars?

- ◯ $28
- ◯ $30
- ◯ $31.60
- ◯ $35

When you believe you have answered all questions correctly, press Next to check your answers.

Next

Figure 13: Quiz - Risk-Aversion Treatment

Quiz Answers

The answers for the quiz are given below. Please review the answers and note any mistakes you have made.

Question 1: Suppose that your signal is 320 and the other two signals are 180 and 200. What is the value of winning the auction?
Correct Answer: 700
Your Answer: 700

Question 2: What is true about a bidder who submits a bid of 3000 when the percentage payment is 20%?
Correct Answer: His/Her payoff from winning will be lower than that of losing.
Your Answer: His/Her payoff from winning will be lower than that of losing.

Question 3: Suppose that you bid 1420 and the other bids are 1360 and 420. Which one of the following statements are true.
Correct Answer: You win the auction.
Your Answer: The winner is chosen randomly from all bidders.

Question 4: Suppose the value of winning the auction is 2000, the winning bid is 600, and the percentage payment is 40%. What is the payoff of the winning bidder after paying her bid and the percentage payment?
Correct Answer: 3000 + 2000 - 600 - (0.4 × 2000) = 3600
Your Answer: 3000 + 2000 - 600 - (0.4 × 2000) = 3600

Question 5: Suppose the value of winning is 1000 and the winning bid is 520 when the percentage payment is 60%. What of the following statements is true?
Correct Answer: The winning bidder receives their budget of 3000 and the value of the prize of 1000 but must pay their bid of 520 and the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000 points.
Your Answer: The winning bidder receives their budget of 3000 and the value of the prize of 1000, but must pay the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000, but must pay the highest bid of 520.

Question 6: Suppose you earned 3400 points in one round. Considering only payments from the auction, what would be your total payment in dollars?
Correct Answer: $34
Your Answer: $34

You earned $4.0 from your correct answers. Please review any questions you answered incorrectly. When you are ready to begin the first round, click the next button.

Next

Figure 14: Quiz Answers - Baseline Treatment

Quiz Answers

The answers for the quiz are given below. Please review the answers and note any mistakes you have made.

Question 1: Suppose that your signal is 320 and the other two signals are 180 and 200. What is the value of winning the auction?
Correct Answer: 700
Your Answer: 920

Question 2: What is true about a bidder who submits a bid of 3000 when the percentage payment is 20%?
Correct Answer: His/Her payoff from winning will be lower than that of losing.
Your Answer: His/Her payoff from winning will be lower than that of losing.

Question 3: Suppose that you bid 1420 and the other bids are 1360 and 420. Which one of the following statements are true.
Correct Answer: You win the auction.
Your Answer: The winner is chosen randomly from all bidders.

Question 4: Suppose the value of winning the auction is 2000, the winning bid is 600, and the percentage payment is 40%. What is the payoff of the winning bidder after paying her bid and the percentage payment?
Correct Answer: 3000 + 2000 - 600 - (0.4 × 2000) = 3600
Your Answer: 3000 + 2000 - 600 - (0.4 × 2000) = 3600

Question 5: Suppose the value of winning is 1000 and the winning bid is 520 when the percentage payment is 60%. What of the following statements is true?
Correct Answer: The winning bidder receives their budget of 3000 and the value of the prize of 1000 but must pay their bid of 520 and the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000 points.
Your Answer: The winning bidder receives their budget of 3000 and the value of the prize of 1000, but must pay the percentage payment of (0.6 × 1000) = 600. The losing bidders receive their budgets of 3000, but must pay the highest bid of 520.

Question 6: Suppose you earned 3400 points in one round. Considering only payments from the auction, what would be your total payment in dollars?
Correct Answer: $31.60
Your Answer: $31.60

You earned $3.0 from your correct answers. Please review any questions you answered incorrectly. When you are ready to begin the first round, click the next button.

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Figure 15: Quiz Answers - Risk-Aversion Treatment

Round 2: Auction

Remember that the value of the prize is the **SUM** of all 3 players' signals. Each signal is drawn independently and has an equal chance of taking each value between 0 points and 1000 points (in 20 point increments).

In this round, your signal is 760 points. That means that the value of the prize is somewhere between 760 points and 2760 points.

The **percentage payment** in this round is **60%**.

What will you bid in the auction?

0		3000

Bid: **900**

Next

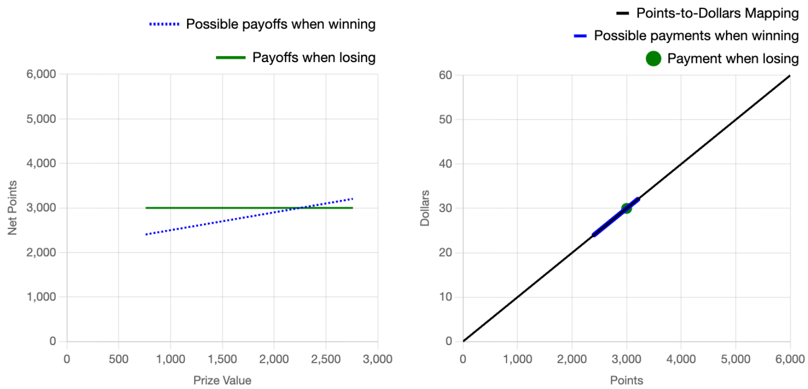

Figure 16: Bidding Page - Baseline Treatment

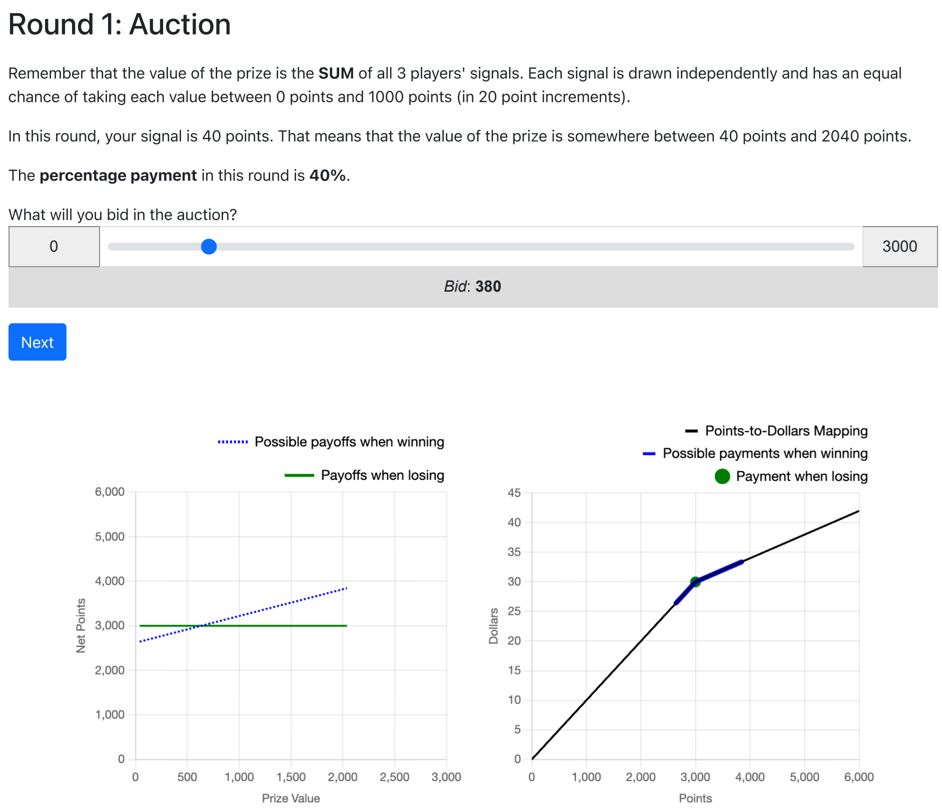

Figure 17: Bidding Page - Risk-Aversion Treatment

Figure 18: Winner's Results - Baseline Treatment

Round 1: Results

We can now inform you that the value of the prize was 1060. You were the winner. Your bid of 600 was the highest.

The percentage payment in this round is 40%, so your payoff from the auction is 3000 + 1060 - 600 - (0.40 × 1060) = 3036. This corresponds to $30.14. Those that did not win the auction will receive $30.

Overall, if this round is chosen to be the one that counts, you will receive $30.14.

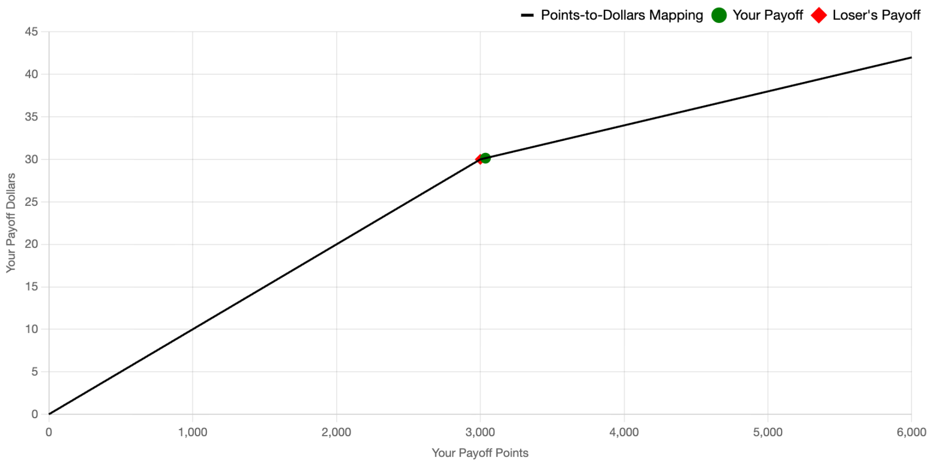

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Figure 19: Winner's Results - Risk-Aversion Treatment

Round 1: Results

We can now inform you that the value of the prize was 2100. You were not the winner. Your bid was 780 and the highest bid was 1100.

Your payoff from the auction is 3000. This corresponds to \$30. The percentage payment in this round was 20%, so the winner of the auction will receive 3000 + 2100 - 1100 - (0.20 × 2100) = 3580. This corresponds to \$35.8.

Overall, if this round is chosen to be the one that counts, you will receive \$30.

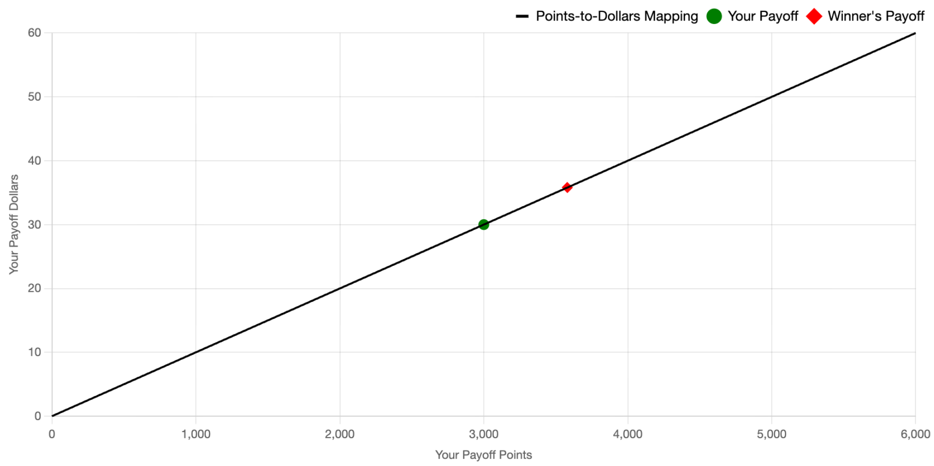

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Figure 20: Loser's Results - Baseline Treatment

Round 1: Results

We can now inform you that the value of the prize was 1060. You were not the winner. Your bid was 340 and the highest bid was 600.

Your payoff from the auction is 3000. This corresponds to $30. The percentage payment in this round was 40%, so the winner of the auction will receive 3000 + 1060 - 600 - (0.40 × 1060) = 3036. This corresponds to $30.14.

Overall, if this round is chosen to be the one that counts, you will receive $30.

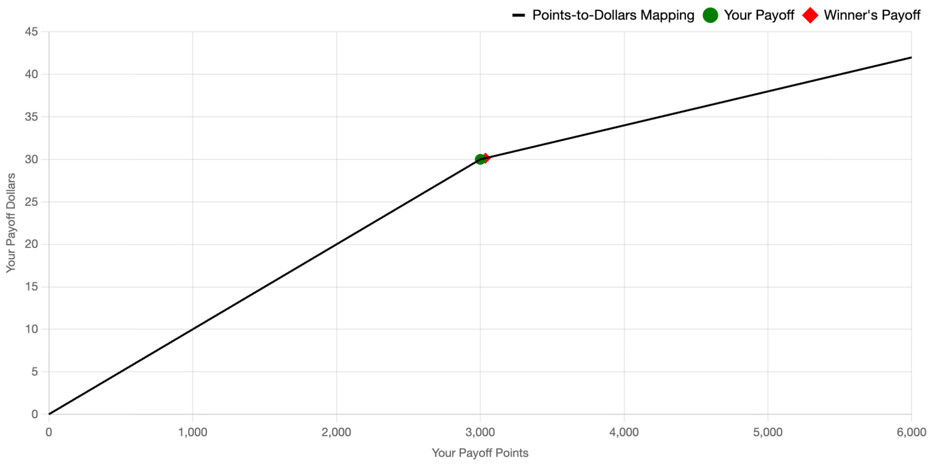

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Figure 21: Loser's Results - Risk-Aversion Treatment