PREFERENCE REVERSALS BETWEEN ONE-SHOT AND REPEATED DECISIONS: THE CASE OF REGRET

ALEX IMAS, DIEGO LAMÉ, AND ALISTAIR J. WILSON

ABSTRACT. Under regret theory, decision-makers derive utility both from the outcome of their chosen action and the counterfactual. Evidence for anticipatory regret aversion has been found in one-shot settings, with "regret lotteries" that provide counterfactual information being valued higher than more-standard lotteries. These one-shot findings have motivated a literature that advocates the use of regret as a policy tool to boost incentives for behaviors such as exercise and drug adherence, often as recurrent decisions. However, differences in learning opportunities and the interaction between anticipated and realized regret make the consequences of regret in repeated settings far from clear. Through a series of controlled experiments, we replicate the one-shot result that regret lotteries have higher valuations than standard lotteries. In contrast, for sequential repeated decisions, the pattern *reverses*. For repeated decisions, regret lotteries are valued significantly less than standard lotteries, from the very first decision and onwards. Our results serve to highlight the issues that can arise when extrapolating behavioral effects from one-shot to repeated settings.

Regret theory (Bell, 1982; Loomes and Sugden, 1982) proposes a simple modification to expected-utility theory through which individuals derive utility not only directly from choice outcomes, but also indirectly through knowledge of the outcomes from counterfactual choices. Specifically, the decision-maker factors in each possible realization from her chosen action, weighted by its likelihood just as in expected utility theory (EUT), and she also derives utility from counterfactual outcomes. Regret theory makes two assumptions: (a) people experience feelings of regret (rejoicing) when the outcome of her choice does worse (better) than counterfactual choices; and (b) these feelings are anticipated ex-ante. The theoretical consequence for decision-making is that individuals may opt away from EUT choices and instead select options that minimize their regrets.

A recent body of work has sought to utilize regret as a non-pecuniary boost to incentives through the use of *regret lotteries* (Zeelenberg and Pieters, 2007; Volpp et al., 2008b). Regret lotteries differ from standard lotteries by ensuring that the decision-maker is aware of realizations regardless of her decision to comply with the incentivized activity. In a typical regret lottery set-up, an entire population of possible entrants are first assigned winning states (an employee number, a zip code,

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Imas: Carnegie Mellon University, Social and Decision Sciences, 5000 Forbes Street, Pittsburgh, PA; aimas@andrew.cmu.edu. *Lamé*: University of Pittsburgh, Department of Economics, 230 Bouquet Street, Pittsburgh, PA; djw63@pitt.edu. *Wilson*: University of Pittsburgh, Department of Economics, 230 Bouquet Street, Pittsburgh, PA; alistair@pitt.edu. Our thanks to the following for their feedback: Linda Babcock, Julie Downs, Uri Gneezy, Judd Kessler, PJ Healy, David Huffman, George Loewenstein, Graham Loomes, Lise Vesterlund and Stephanie Wang.

etc.). They then make choices on whether to enter the lottery or not through compliance with the incentivized activity (for example, exercising, taking a prescribed drug). Regardless of their decisions, the lottery state is drawn and the entire population is informed of the realization. If the realized state matches an individual's *and* she was compliant then a corresponding prize is awarded. If either she did not embrace the incentivized choice or her particular winning state was not drawn, then no prize is awarded. Such lotteries seek to exploit regret aversion through the provision of counterfactual feedback regardless of the entry decision. A regret-averse decision-maker, knowing that feedback will be provided regardless of the entry choice, acts as if the lottery incentive has a larger prize. The anticipated regret from not entering and missing out on the prize can push those on the margins to comply with the incentivized activity where they otherwise would not.

A prominent example from the field is the Dutch postcode lottery, designed to incentivize the collection of public revenues. To realize the lottery outcome, a winning postcode is drawn from the entire population of Dutch postcodes. Each individual living within the drawn postal region that bought a ticket wins a large cash prize. Those in the winning neighborhood that did not buy tickets do not get prizes but do observe that their postcode was chosen and their neighbors who did purchase a ticket have won. Zeelenberg and Pieters (2004) argue that regret aversion should make this lottery program more successful than a national lottery in which the counterfactual (for example, an assigned winning state) is not publicly announced to those not buying tickets.

The argument for the increased incentive power of regret lotteries is based on a theoretical and empirical literature on anticipated regret, which focuses on one-shot decision making. However, both the anticipated and realized aspects of regret change qualitatively in repeated settings; in turn, the predictions for its efficacy as a behavioral boost to incentives become less clear. Unlike with standard lotteries that provide no counterfactual information, individuals facing a sequence of regret lotteries can learn about offered incentives without having to enter the lottery. This difference in anticipated learning can lead to *less* people entering regret lotteries than standard ones. Additionally, in contrast to one-shot choices, sequential decisions are subject to both anticipated and realized regret. Does the regret from entering the lottery and losing build up over time? Can this agglomeration be anticipated?

Given these differences it is critical to examine the extent to which behavioral effects like regret aversion extend from one-shot to repeated settings. In this paper, we directly study the differential effects of counterfactual information through a series of controlled laboratory experiments that compare subjects' valuations for identical lotteries with and without counterfactual feedback. While our results do corroborate the higher valuations of regret lotteries in one-shot settings, when we examine the valuations for sequences of statistically independent decisions the regret comparative statics are entirely *reversed*. Our results imply that regret lotteries may be inferior to standard lotteries for incentivizing repeated decision making.[1]

Our paper adds a new facet to the emerging economics literature focusing on the potential for regret as an incentive tool for policy (Madrian, 2014), improving health outcomes (Kessler and Zhang, 2014), increasing worker motivation (Babcock et al., 2012), and as a tool in development programs (Datta and Mullainathan, 2014). In much of this discussion, regret lotteries are advocated as a tool for incentivizing recurrent, ongoing choices. However, the evidence supporting regret lotteries as a superior policy tool relative to standard lotteries (or to fixed payments) comes primarily from experiments examining one-shot decisions (Loomes and Sugden, 1987; see Zeelenberg, 1999 for a review). While some studies do examine repeated settings, they typically compare regret lotteries to the absence of an extrinsic incentive (Volpp et al., 2008a) or to fixed payments that are below the lottery's expected value (Volpp et al., 2008b). For example, Volpp et al. (2008a) examine the effectiveness of regret lotteries in incentivizing adherence to a prescription-drug regimen, where the authors report greater adherence in the lottery treatment than in the no-incentive control (see Volpp et al., 2008b; Kimmel et al., 2012; Haisley et al., 2012, for applications to other settings). While our results do not dispute that regret lotteries offer a positive inducement across environments, they imply that regret lotteries may be an inferior incentive device in repeated settings. Policy-makers with a fixed incentive budget have better available options for incentivizing sequential decisions. Additionally, our findings speak to a more general point of caution in extrapolating behavioral results from one-shot to repeated settings. Beyond just an attenuation of an effect size, our paper instead shows that the direction of the behavioral comparative static can be entirely reversed for repeated decision-making.

Why would the effects of regret reverse for repeated decisions? The one-shot aspects of regret aversion that motivate the provision of counterfactual information focuses entirely on the impact of *anticipated* regret, which is entirely appropriate for a one-shot decision. However, there has been substantially less focus on how counterfactual information affects decision-making through the interaction with actual realizations and differential opportunities for learning.[2] While realized regret or rejoicing will not be an issue when the goal is to incentivize a one-time decision—such as opt-ins or initial allocation decisions for a portfolio—it will be when incentivizing recurrent decisions such as exercise or refraining from smoking.

[1]Where our paper examines decision-making in *repeated* but statistically independent decision making, Strack and Viefers (2015) examine a dynamicdecision to divest from a risky asset with a persistent state. Inthis setting they find that counterfactual information helps, through a correction for excessive risk aversion.

[2]In contrast, the focus within the learning literature on regret does not consider anticipatory effects and is backward looking (see for instance Erev and Barron, 2005).

With the large-prize–low-probability gambles that are typically implemented in regret lotteries, the large majority of participants will lose, and those that chose to comply with the incentivized activity will experience realized regret.[3] Of particular interest are the effects of regret on the margins, focusing on participants where counterfactual information produces a change in their behavior. Over time, successive losses can build to induce a switch away from the incentivized activity. Additionally, unlike with standard lotteries, the availability of counterfactual feedback in regret lotteries can reinforce the decisions of marginal participants who chose not to comply with the incentive. Most participants receiving the counterfactual information will receive frequent feedback reinforcing their decision.[4] Importantly, in a repeated setting even the anticipatory effects become a double-edge sword — here through the learning opportunities provided by counterfactual information. Participants can adopt a wait-and-see approach if they are uncertain about the value of the offered lotteries, anticipating an opportunity to learn about it without actually having to enter. Anticipation of learning in a repeated setting with counterfactual information can therefore serve to reduce engagement even before the first outcome is realized. Indeed, we find evidence suggesting anticipated learning does indeed lead to lower engagement in our repeated environment. Subjects are less willing to enter the regret lotteries than the standard lotteries from the very first decision, before any realizations have occured. This suggests that in contrast to one-shot settings, even anticipatory factors can *decrease* the appeal of regret lotteries.

The paper's aim is to be a concise summary of the core empirical result, and is organized as follows: Section 2 outlines the experimental design; Section 3 presents the results from the one-shot and repeated settings; Section 4 concludes.

2. Experimental design

Our experiment consists of a 2×2 between-subject design examining valuations across:

- **(I)** The type of lottery:
  - (*a*) *Regret lotteries* where counterfactual information is available if the lottery is not entered.
  - (*b*) *Standard lotteries* without counterfactual information for those choosing not to enter.
- **(II)** The repetition and feedback of the decision:
  - (*a*) A *simultaneous* one-shot decision that binds for thirty independent, identically distributed (*iid*) lotteries carried out after the decision.

[3]Feelings of regret specifically have been shown to cause individuals to move away from the actions that produced it (Ku, 2008), while positive emotions such as rejoicing at having made the ex-post optimal choice tend to reinforce that same action in subsequent decisions (Keltner and Lerner, 2010). See Marchiori and Warglien (2008) and Hart (2005) for the use of regret as a process to predict subsequent choices.

[4]In addition, other behavioral dynamic forces may serve to attenuate the effects which push in the other direction. For example, a gambler's fallacy may mitigate the discouraging effects of realized regret on the choice not to enter, see Imas et al. (in preparation) for a demonstration in a similar context to this paper.

(*b*) Thirty *sequential* decisions for thirty *iid* lotteries, with feedback on the realizations after every choice.

Our lotteries in all treatments are implemented through an assigned ticket: three distinct numbers $\{A, B, C\}$ between 1 and 50. Lottery realizations are determined by publically drawing three numbered balls $\{a, b, c\}$ without replacement from a physical bingo cage at the from the room, which contains fifty balls numbered from 1 to 50. Prizes for the lottery are determined by the number of matches on the assigned ticket—the cardinality of $\{A, B, C\} \cap \{a, b, c\}$. Matching one ball number wins a prize of $\$2.50$, matching two yields a prize of $\$25$, while matching all three numbers yields a prize of $\$250$.

Given 50 balls in the bingo cage there are 19,600 possible outcomes. Examining all possible draws the expected value (EV) of the lottery is calculated as:

$$EV = \frac{3,243}{19,600} \cdot \$2.50 + \frac{141}{19,600} \cdot \$25.00 + \frac{1}{19,600} \cdot \$250.00.$$

Our decision task elicits participant's lottery valuations by asking for the maximum amount of money the participant would turn down to enter the lottery. Truthful reporting is incentivized through a Becker-DeGroot-Marschak (BDM) procedure with a uniform draw of an offer amount. If the offer amount is at or below the elicited value the participant enters the lottery; if the offered amount is greater the participant gives up the lottery and takes the offer.[5]

The design over the two treatment dimensions is summarized in Table 1.[6] For the lottery-feedback dimension (**I**) we vary whether participants receive their lottery entry tickets before the decision to enter (printed out on their desks as they are seated) or only after choosing to enter (a randomized ticket assigned by the computer). The former therefore implements a *regret lottery*, the latter a *standard lottery*. Participants in the regret-lottery condition know that they will observe the public lottery draw and realized outcome regardless of the decision to enter the lottery. In contrast, participants in the standard-lottery treatment only find out an assigned ticket conditional on entry—so those who accept the offer cannot know whether their ticket would have won or not. For the feedback dimension (**II**) we vary whether participants make a single one-time valuation decision that binds for all thirty lotteries (our *Simultaneous* treatment) or whether they make repeated decisions over the 30 rounds with lottery realizations after each decision (our *Sequential* treatment).

The literature on regret aversion makes a clear prediction in the one-shot simultaneous treatment: The standard lottery has the same prize structure as the regret lottery but removes the possibility of

[5]We also conduct an alternative simultaneous standard/regret treatment pair where we elicit values over a single lottery (rather than thirty *iid* draws), where the prize amounts are multiplied by 4 to increase the stakes. Results from these treatments are qualitatively the same as in our main treatments, and are reported in the Appendix.

[6]The Appendix provides a more-detailed discussion of the precise experimental details, as well as providing representative instructions.

	Standard	Regret
Simultaneous	• Random ticket on entry • Single Decision • 30 Subjects	• Fixed, printed ticket • Single Decision • 30 Subjects
Sequential	• Random ticket on entry • Thirty sequential decisions • 30 Subjects	• Fixed, printed ticket • Thirty sequential decisions • 30 Subjects

TABLE 1. Core Design

anticipated regret from not entering. A regret-averse agent can take the offered amount knowing they will not be confronted with a counterfactual realization. In contrast, regret aversion provides a motive for subjects to enter the lottery at greater rates. Subjects can anticipate the regret they may feel if they do not enter but would have won a large prize (a maximum of $7,500 across the thirty decisions). Regret aversion therefore predicts that participants in the simultaneous treatments will on average give up larger offers to enter the regret lottery than the standard version.

However, as discussed in the introduction the predictions of regret theory are far from clear once anticipation and realization interact. It is possible that anticipated regret outweighs the effect of ex-post realizations, and the regret lottery will continue to have greater value than the standard lottery in the sequential decisions. Conceptually, though intuitively unlikely, it is possible that anticipation and realization ramp up the effects of regret, increasing the level effect of regret. However, if realization effects are dominant—or indeed the anticipation of learning the realizations without entering—the higher valuation of regret lotteries can be reduced. Moreover, if these effects are large enough, the valuations of regret lotteries can actually be lower than those of standard lotteries.[7] The main motivation of our experiment is to understand and document the comparative statics associated with moving from a one-shot decision to a repeated setting.

3. RESULTS

Figure 1 illustrates the aggregate results from each treatment, where the figure provides the averages for subject's valuations V_t^i (for each subject i in each round t), which we express relative to the expected value as a percentage.[8] For statistical inference to complement the figure we use Table 2, which regresses subject-level averages on two treatment-dummies reflecting the regret effects, as well as three level controls. The two main regret effects are captured by the *Regret* coefficient,

[7] We should note here that our priors going into this project were that ex-post realizations and the high probability of not winning any prize in the lottery (82.7 percent) would retard the efficacy of regret as an incentive over time. We did not *anticipate* that the downward pressure of anticipatory learning would be the dominant force here.

[8] That is for each treatment we provide the rescaled relative valuation $\hat{V}_t^i = \frac{V_t^i}{EV}$.

FIGURE 1. Average Valuations Relative to Actuarial Value

while the interaction *Seq*$\times$ *Regret* provides the estimated difference-in-difference across regret and timing.

In the simultaneous treatments, our experiments indicate that subjects in the standard lottery value it at approximately half its expected value (52.5 percent). However, in the same simultaneous choice environment subjects price up the regret lottery to 64 percent of its expected value. Matching the prior regret literature, the data indicates that when making a one-time decision participants' anticipated of regret drives up their lottery valuations. The positive effect from regret in the one-shot setting is marginally significant with a two-sided test.[9] The one-shot regret effect is estimated at 13.0 percentage points (of the expected value), reflecting a pricing increase of 23.8 percent over the standard lottery for the average subject. The conclusion for the one-shot treatments is summarized as follows:

Result 1 (One-Shot)**.** *Regret lotteries are effective in motivating entry in one-shot decision settings relative to standard lotteries.*[10]

In contrast to the finding for the one-shot environment, when looking at subjects' average valuations across the 30 sequential decisions, regret effects are entirely *reversed*. While standard lotteries are valued at 85 percent of the expected value, average valuations for the regret lottery is 15 percentage points lower.[11]

[9] We additionally ran one-shot sessions where subjects provided valuations for a single lottery (rather than a sequence of thirty), where we multiplied all prize amounts by 4 ($10/$100/$1,000). The regression indicates a marginally significant regret effect of 14.2 percentage points—measured relative to the quadrupled expected value of $2.43. The relative regret effects are therefore remarkably similar for one-shot decisions, both for a simultaneous decision over 30 realizations and for a single realization. Pooling the two one-shot decision environments, the positive effect for regret is significant ($p = 0.024$), where we report these results in Tables A1 and A2 in the appendix.

[10] Another finding, though one our design did not explicitly set out to address, is that the lotteries are priced *lower* than the expected value. From the point of view of its use as an incentive device with a fixed budget, the lottery is inferior to paying the expected value with certainty. This is true for men (total effect in a one-shot regret lottery of 76.7 percent the expected value, different from 100 percent with $p = 0.000$), but particularly so for women (total effect of 58.0 percent combined with regret, $p = 0.000$).

[11] In the appendix we provide details on the dynamics across the sequence of decisions, where we repeat the average-value regressions in Table 2 for the values from the first and last rounds (Tables A3 and A4, respectively). The main

Var.	Coeff.	Std. Err	p-Value
Regret Effects:			
Regret	0.130	0.075	0.084
Seq×Regret	-0.322	0.106	0.005
Level Controls:			
Sequential	0.350	0.085	0.002
Female	-0.188	0.056	0.001
Constant	0.638	0.062	0.000
N	120		

TABLE 2. Regression results

The regressions for subject-level average valuations in Table 2 indicates a large and substantial difference-in-difference across our the two treatment pairs, -32.2 percentage points. Factoring in the positive estimated effect for regret in the simultaneous treatment, the net regret effect in the sequential treatments is -17.3 percent (significantly different from zero with $p = 0.023$). Where regret boosts the standard lottery's incentive power in the simultaneous setting by about a quarter, in the sequential environment it decreases the incentive power by a fifth.[12] The conclusion for risk in sequential decision making is therefore:

Result 2 (Sequential Implementation)**.** *Regret lotteries induce less entry than standard lotteries in the repeated environment.*

Though regret lotteries can be an effective incentive boost for one-time decisions, our data indicates they *reduce* the incentive efficacy in repeated settings.[13]

In Imas et al. (in preparation) we further examine within-subject learning across time in our sequential valuation environment, and similar environments where we vary the dynamic feedback. Though in that analysis we show that the previous round's *realizations* do have strong effects on the subject's round-to-round valuations, from the aggregate point of view taken here there is little effect on the overall conclusions. The negative effect of regret for repeated decisions emerges from the very first choice, and persists across the decision sequence.

The more-involved task of identifying and pulling apart the factors driving differential regret effects in one-shot and repeated settings is beyond the scope of this short paper, and is left for

finding there is that the net regret effect for sequential decisions is significantly negative from the very first valuation, and remains so over the course of the entire experiment.

[12]The overall level effects for valuations indicate that subjects are substantial more favorable towards the lottery in the sequential treatments. As our experimental design is constructed around differences we focus on these effects rather than the levels. However, we do plan to examine the level effects in future work. In particular, the risk aversion demonstrated in the simultaneous treatment valuations is strange, where repetition for thirty rounds should *decrease* the effective risks.

[13]Moreover, in both cases lotteries are inefficient relative to offering the expected value of the lottery with certainty.

future research. Instead, our paper focuses on demonstrating the possibility for reversals over the behavioral comparative statics when moving from one setting to the other. In turn, some note of caution is warranted in generalizing behavioral effects from one-shot to repeated settings.

4. Discussion and Conclusion

Our results replicate the finding that anticipated regret can increase the efficacy of a lottery incentive in one-shot settings. However, when we move to a repeated setting the result is entirely reversed, with the prospect of counterfactual information driving down the lottery valuation.

In providing guidance to policy and incentive design, our results suggest that paying a constant non-stochastic payment may be preferable to a lottery incentive in many situations. However, where lotteries have other potential benefits, our results suggest two options. First, when repeated incentives have to be applied our results imply standard lotteries may be the superior tool. Second, rather than a repeated implementation for the same decision-maker, it may be more effective to instead design an incentive scheme closer to a one-shot setting. For example, a regret lottery paid one time at the end of a prolonged time range—with required engagement levels across the entire period—may be more effective.

Lastly, our findings caution against the untested extension of behavioral decision-making phenomena from one-shot to repeated contexts. Learning, risk aversion over final wealth, and realized emotions can all contribute towards making a sequence of decisions non-separable, even when statistically independent. In some settings this non-separability might exacerbate behavioral effects, in others it may attenuate them. Our paper provides a clear empirical example of a worst case from the point of view of policy, where the direction of the intended effects are entirely reversed with repetition.

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APPENDIX A. ADDITIONAL RESULTS AND FIGURES

A.1. **Single Lottery Treatment.**

Var.	**Coeff.**	**Std. Err**	p**-Value**
Regret Effects:			
Regret	0.142	0.083	0.089
Seq×Regret	-0.322	0.118	0.007
Level Controls:			
Sequential	-.272	0.085	0.002
Female	-.242	0.061	0.000
Constant	0.660	0.060	0.000
N	120		

TABLE A1. Regression Results (Averages) replacing Simultaneous with One-Shot

Var.	**Coeff.**	**Std. Err**	p**-Value**
Regret Effects:			
Regret	0.137	0.060	0.024
Seq×Regret	-0.314	0.104	0.003
Level Controls:			
Sequential	.358	0.080	0.000
One-Shot	0.636	0.060	0.000
Female	-0.228	0.051	0.000
Constant	0.660	0.060	0.000
N	180		

TABLE A2. Regression Results Pooling Simultaneous and One-Shot

Var.	**Coeff.**	**Std. Err**	p**-Value**
Regret Effects:			
Regret	0.129	0.080	0.110
Seq×Regret	-0.376	0.114	0.001
Level Controls:			
Sequential	0.461	0.080	0.000
Female	-0.178	0.060	0.004
Constant	0.632	0.069	0.000
N	120		

TABLE A3. Regression Results (First Round)

Var.	Coeff.	Std. Err	p-Value
Regret Effects:			
Regret	0.135	0.100	0.178
Seq×Regret	-0.431	0.141	0.003
Level Controls:			
Sequential	0.596	0.100	0.000
Female	-0.270	0.074	0.004
Constant	0.687	0.084	0.000
Subjects	120		

TABLE A4. Regression Results (Last Round)

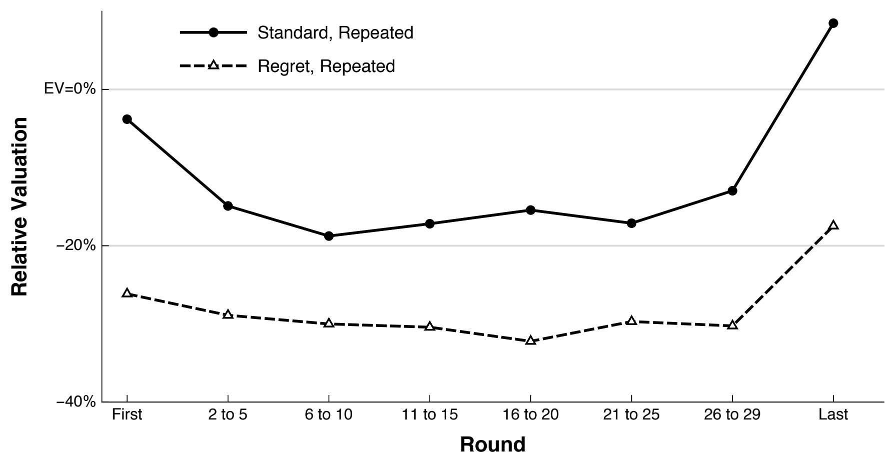

FIGURE A1. Average sequential valuations across time

A.2. **Experimental Details.** Our experiments were conducted at the Pittsburgh Experimental Economics Laboratory between March and December 2015, with subjects recruited from the general undergraduate population of the University of Pittsburgh. We report here the main results from 12 sessions in our 2×2 design, where each session has 10 participants, where no subject participated in more than one session. In addition, in the appendix we provide additional results from a one-shot control where subjects provide valuations for a single lottery realization (3 regret sessions, 3 standard sessions)

In all treatments subjects received a $5 fixed fee for their participation, plus their earnings from the decisions in the experiment. Common to all experiments, the first part of the instructions outlined a multiple price-list where subjects make 20 decisions between a 50-50 gamble over $10 and nothing.[14] The fixed task in the price list was the lottery, and in each of the twenty-one

[14]This was framed with the bingo cage at the front of the room, where we allowed them to choose 'Odd' or 'Even'. At the end of the session, after the main data collection, we chose one of the twenty-one price-list tasks for one of the ten subjects (uniformly for both), determining the outcome by drawing a ball from the cage.

questions the other option was a fixed certain amount increasing from \$0.00 to \$10.00, in \$0.50 increments.

While the initial task elicits a risk and consistency measure, the main purpose of this first task was to familiarize subjects with the valuation method for a lottery. After participants completed the price-list, we used the price-list to motivate the BDM procedure elicitation in the main experimental treatments.[15]

In all treatments, the instructions carefully outline the prize lottery and how realization of the outcome is determined. In explaining how an entry ticket translates into the three different prizes, we explicitly provide the odds of each winning event.[16]

For the main 30-round treatments, subjects are told there will be a sequence of 30 rounds, where in every round prizes of \$2.50, \$25 and \$250 are possible ($P = \$2.50$).[17] The maximum offer they would turn down to enter the lottery was elicited in every round with a BDM over the \$0.00 to \$1.00 interval. At the end of each round, the bingo cage was spun several times by the experimenter and three balls were drawn in turn. The numbers on the three balls were then publicly announced and entered into the monitor computer. Subjects' screens informed them of their current earnings for the round.

The lottery-type treatments were implemented through the manner in which tickets were issued. In the regret treatments, subjects' entry tickets were pre-assigned—printed on a piece of paper and placed on their desks as they arrived.[18] The assigned entry tickets were held constant across the entire session. Since the bingo cage drawing was public for each round, subjects in the regret-lottery treatments always learned the outcome of the lottery—whether they would have won or lost—even if their decision meant they did not enter the lottery, i.e. the counterfactual.

In the standard-lottery treatments, subjects were instead told they would only be assigned a ticket if they entered the lottery. After indicating their valuation, a random ticket was generated (a uniform draw across all possible tickets) and displayed on subjects' screens during the lottery draw only if they had entered. Those subjects that did not enter had no way to know whether they would have won or not.[19]

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[15]We thank P.J. Healy for this suggestion in implementing instructions for the BDM.

[16]Representative instructions and screenshots are included as a supplement to this paper.

[17]We chose a different prize amounts for the one-shot treatment to make sure the lottery was well incentivized, as our focus is the standard/regret comparison in each feedback environment. In those treatments subjects are informed there will be a single drawing with possible prizes of \$10, \$100 and \$1,000 ($P = \$10$). Subjects then indicated the valuations through a BDM over the \$0.00 to \$5.00 interval.

[18]Subjects were randomly assigned to desks as they came in to the session through a draw from the bingo cage (ten balls, one for each desk). The pre-assigned entry tickets were uniform random draws from the set of all possible tickets.

[19]The sequence of uniform draws that determined the BDM's constant offers in each round were pre-drawn at the session level, and so across the standard and regret treatments we can match subjects with the same series of constant offers.