Anticipation and Risk-Taking: Disentangling the Effects of Delayed Information and Payment

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Abstract

This study examines the impact of delayed payments and delayed outcome information on individuals' risk-taking behavior. Using an online experiment with investment decisions, we isolate the effects of delayed monetary rewards and delayed risk resolution. Our findings indicate that delaying information about outcomes significantly increases risk-taking, while delaying payments alone has no statistically significant effect. This behavior is particularly pronounced in high-risk, high-reward scenarios, suggesting that anticipation plays a crucial role in decision-making under uncertainty. Our results challenge standard economic models of expected utility and discounting, highlighting the need for incorporating anticipation-based preferences into risk models. These insights have implications for financial decision-making, policy design, and gambling regulation.

Keywords: Risk-Taking, Anticipation, Behavioral Economics

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1 Introduction

Risk-taking is a fundamental aspect of decision-making, influencing behaviour across various domains such as finance, entrepreneurship, and personal development. Most of the literature regarding decision-making under risk assumes immediate consequences: after making a choice, the decision maker observes risk resolution, learns the outcome of the decision, and receives the reward without any delay. However, real-life risky situations rarely correspond to this setting. Instead, a delay often separates the moment when the decision is made from the moment when consequences materialise. This delay may play a crucial role in shaping risk preference, affecting decisions in a range of domains, including health, politics, law, work, and consumption. For instance, voters experience the consequences of political decisions long after elections, law offenders may perceive sanctions differently when imposed with a delay, and individuals may discount the risks associated with delayed health consequences. Similarly, educational and career choices, as well as financial investments, frequently involve delayed payoffs. These examples illustrate that risk and time are inherently intertwined, yet economic models have mainly treated them as separate dimensions of decision-making (for example, Andreoni and Sprenger, 2012).

Only recently has research begun to systematically explore the interaction between risk and time. A growing body of literature has investigated the effect of delayed realization on risky choices, where delays involve *both* the postponement of outcome revelation *and* the deferral of payment (see, for example, Weber and Chapman, 2005; Coble and Lusk, 2010; Kocher et al., 2014; Abdellaoui et al., 2022; Özgümüs et al., 2024). These studies consistently find that delaying realization increases risk tolerance. This effect has been attributed to mechanisms such as changes in probability weighting (Abdellaoui et al., 2011; Kemel and Paraschiv, 2023), and shifts in cognitive evaluation (Özgümüs et al., 2024).

The study most closely related to ours is Kemel and Paraschiv (2023), who compare lottery choices across two timing conditions: an immediate condition in which both outcome and payment occur without delay, and a delayed-payment condition in which the outcome is revealed immediately but payment is postponed. They find that participants display greater risk tolerance when payment is delayed, and they interpret this pattern as reflecting increased optimism in probability weighting rather than a change in utility curvature. However, because their design varies the timing of payment while holding the timing of outcome information fixed, it cannot speak to whether the behavioral shift in settings with delayed realization is driven by delayed liquidity or by the timing of uncertainty resolution itself. Our study addresses this identification gap by adding a treatment in which outcome information is explicitly withheld, allowing us to separately estimate the effects of delayed information and delayed payment.[1]

Despite these insights, a key question remains unresolved: does the increase in risk-taking stem primarily from a delay in learning the outcome or from a delay in receiving the associated payoff? We start by showing, according to a standard theoretical model, that the delay of payment should not affect investment. In addition, we show that again in a standard theoretical model, a delay in information should, if anything, lower the amount invested. However, our experimental results contradict these theoretical predictions.

Since the standard models fail, understanding the driving force behind this phenomenon is crucial for refining theoretical models of decision-making under uncertainty and improving policy recommendations. If delayed payment is the dominant factor, it implies that either (i) the assessment of the probabilities of a gamble á la Kahneman and Tversky model would vary when payment occurs or (ii) the utility function would become less risk-averse in the future. Neither is very palatable. If delayed information is the primary driver, it suggests that there is some benefit to not knowing the information. This is unusual in an individual choice problem. Hence, a new behavior model of decision-making is necessary, one that incorporates information directly into utility. Distinguishing between these mechanisms is essential for understanding behavior in financial markets, policy-making, and health-related decisions, where individuals frequently face risks with delayed consequences and information.

To fill this gap, we design an experiment that isolates the effects of delayed information from those of delayed monetary rewards. Our experiment consists of four investment decisions per participant, conducted online using a subject pool from Prolific. Participants were randomly assigned to one of three treatment conditions: (i) an immediate information and immediate payment condition (Now), (ii) an immediate information but delayed payment condition (Delay P), and (iii) a delayed information about the outcome and delayed payment condition (Delay OP).[2]

Our findings indicate that delaying information significantly increases risk-taking, whereas

[1]Our design also differs in two methodological respects. First, we implement a between-subjects design as opposed to a within-subject design. Second, our study utilizes a larger, fully incentivized sample ($N = 558$), which increases statistical power for detecting heterogeneous treatment effects and reduces concerns about hypothetical bias and carryover across conditions.

[2]It is not feasible to have delayed information but an immediate payment.

delaying payment alone does not produce a statistically significant effect. This latter result contrasts with Kemel and Paraschiv (2023) and suggests that the "future optimism" on payment alone documented in prior work may depend on the time horizon of the delay and/or the elicitation and incentive procedures used to measure risk preferences. Interestingly, the increase in risk-taking under delayed information is particularly evident in long-shot scenarios, where potential rewards are large but highly improbable. These results challenge the predictions of standard expected utility theory. They suggest that individuals may derive utility from the anticipation of positive outcomes. This anticipation, in turn, influences their willingness to take risks. To explore this mechanism, we further develop and estimate a formal model of anticipation. We find that the anticipation model aligns more closely with our experimental data.

The remainder of the paper is organized as follows: Section 2 discusses the theory model. Our experimental design and procedures are discussed in Section 3. Main results are reported in Section 4. We present and estimate a model of anticipation utility in Section 5. Finally, we conclude in Section 6.

2 Theoretical Predictions

2.1 Standard Theory: Delay and Information

In standard theory, utility is additively separable in time, and the future is discounted. For instance, with two time periods, we have $u(c_1, c_2) = u_1(c_1) + \beta u_2(c_2)$. There is a risky gamble which for investment x_r pays with probability p an amount $\alpha \cdot x_r$ where $\alpha > 1$. We compare conditions about the timing of the gamble, the timing of the payment and cost, and the timing of the information about the outcome of the gamble.

2.1.1 Delay: No intertemporal transfers

Assuming no intertemporal transfers, willingness to gamble should *not* vary based upon whether the gamble is now or later; it would only depend upon the utility and income of that time period. In particular, the discount β would not affect the decision. To illustrate this independence, let us have $u_1(c) = u_2(c) = u(c)$, which, among other things, keeps risk aversion consistent between time periods.

If the gamble happens today, the consumer's problem is:

$$\max_{x_r \geq 0, x_r \leq c_1} (1-p)u(c_1 - x_r) + p \cdot u(c_1 + \alpha \cdot x_r) + \beta u(c_2)$$

where c_i is the consumption good endowed in time i. The gambled amount x_r occurs in time 1, so is limited to be less than or equal to c_1. If the gamble happens tomorrow, the consumer's problem is:

$$\max_{0 \leq x_r \leq c_2} u(c_1) + \beta[(1-p)u(c_2 - x_r) + pu(c_2 + \alpha \cdot x_r)].$$

Now the gambled amount x_r occurs in time 2, so it is limited to be less than or equal to c_2.

Assume that u guarantees a unique interior solution to the problem. The first-order conditions of the two problems are $p \cdot \alpha \cdot u'(c_1 + \alpha x_r) = (1-p)u'(c_1 - x_r)$ and $p \cdot \alpha \cdot u'(c_2 + \alpha x_r) = (1-p)u'(c_2 - x_r)$, respectively. Note that neither choice depends upon the discount β. If $c_1 = c_2$ (income is the same in each period), we would have the same choice of x_r for either problem. If the utility is CRRA, then the corresponding choices of x_r will be proportional to c_t. For instance, if $\alpha = 3$ and utility is log, then $x_r = \frac{c_t}{3}(4p-1)$.

2.1.2 Delay: Intertemporal transfers

On the other hand, if there ARE intertemporal transfers and we assume that all results are determined in period 1 before the consumption decisions, then the gamble only affects the intertemporal budget constraint (and timing doesn't matter).

For period 1 gambles, if one wins (w) the gamble, then the budget constraint is

$$q_1 \cdot c_{1w} + q_2 \cdot c_{2w} \leq m + \alpha \cdot x_r^1,$$

where q_t are the prices of the consumption good in period t, c_{tw} is the consumption in period t when one wins, x_r^1 is the amount invested for a period 1 gamble, and m is the overall income.

If one loses (ℓ) the gamble, then the budget constraint is

$$q_1 \cdot c_{1\ell} + q_2 \cdot c_{2\ell} \leq m - x_r^1,$$

where $c_{t\ell}$ is the consumption in period t when one loses, For period 2 gambles, if one wins (w) the gamble, then the budget constraint is

$$q_1 c_{1w} + q_2 c_{2w} \leq m + \alpha x_r^2/(1+r),$$

where x_r^2 is the amount invested for a period 2 gamble, If one loses (ℓ) the gamble, then the budget constraint is

$$q_1 c_{1\ell)} + q_2 c_{2\ell} \leq m - x_r^2/(1+r).$$

These two sets of budget constraints are equivalent since one can set $x_r^1 = x_r^2/(1+r)$.

This leads us to our first proposition, which captures the standard results in Kreps and Porteus (1978).[3]

Proposition 1. *With no intertemporal transfers, the amount invested only depends on each period's utility function and endowment, independent of the other period. With intertemporal transfers, $x_r^1 = x_r^2/(1+r)$, that is, the amount invested in the gamble is the same discounted amount whether the transaction from the gamble occurs today or tomorrow.*

2.1.3 Information

We now ask the second question. Does information matter? For instance, if one is receiving an uncertain payment tomorrow. Does it matter when one learns the exact payment (outcome)? The simple answer is that knowing the outcome today will be helpful in determining how much to spend today, while knowing the outcome only tomorrow may cause individuals to save more in case of a bad outcome.

We see this formally with the following example: Individuals can choose to save in one of two ways: (A) A safe asset pays 1 unit tomorrow for each unit invested today. (B) Risky asset pays α tomorrow with probability p and 0 with probability $1-p$ for each unit invested today.

There are two possible information conditions: (i) Individuals only learn the outcome of the risky asset tomorrow, (ii) An individual can learn the outcome of the risky asset today before deciding how much to invest in the safe asset. We denote these contingent investments x_{sg} and x_{sb} for the good and bad outcomes of the risky investment and the non-contingent investment

[3]This doesn't necessarily hold for non-vNM models, for instance, in recursive non-vNM specifications such as Epstein-Zin preferences (Epstein and Zin, 1989), the timing of the resolution of uncertainty does matter for investment-savings decisions as it changes the certainty equivalence of future consumption. However, the standard prediction is that later resolution of uncertainty tends to reduce investment.

as x_s.

An individual, who knows only tomorrow, maximizes

$$\max_{x_s, x_r \geq 0} u(1 - x_s - x_r) + \beta(p \cdot u(x_s + \alpha x_r) + (1-p)u(x_s))$$

An individual, who knows today, maximizes

$$\max_{x_{sg}, x_{sb}, x_r \geq 0} p[u(1 - x_{sg} - x_r) + \beta u(x_{sg} + \alpha \cdot x_r)] + (1-p)[u(1 - x_{sb} - x_r) + \beta u(x_{sb})]$$

The second problem with the constraint that $x_{sg} = x_{sb}$ is equivalent to the first problem. Hence, the optimal value in the unconstrained problem is potentially higher than in the constrained problem.

If we denote the unconstrained investment by $\tilde{x}_r$ and the constrained as x_r. The two FOCs of the unconstrained problem with respect to x_{sg} and x_{sb} are

$$u'(1 - x_{sg} - \tilde{x}_r) = \beta u'(x_{sg} + \alpha \cdot \tilde{x}_r), \tag{1}$$

$$u'(1 - x_{sb} - \tilde{x}_r) = \beta u'(x_{sb}). \tag{2}$$

We see that $x_{sb} > x_{sg}$. If not, the LHS of (1) would be larger than the LHS of (2), but also the RHS of (1) will be smaller than the RHS of (2), which is a contradiction.

The FOC with respect to x_s of the constrained problem is

$$u'(1 - x_s - x_r) = (1-p) \cdot \beta \cdot u'(x_s) + p \cdot \beta \cdot u'(x_s + \alpha x_r). \tag{3}$$

The FOCs with respect to $\tilde{x}_r$ and x_r and yield

$$(\alpha - 1)p \cdot u'(x_{sg} + \alpha \tilde{x}_r) = (1-p)u'(x_{sb}), \tag{4}$$

$$(\alpha - 1)p \cdot u'(x_s + \alpha x_r) = (1-p)u'(x_s). \tag{5}$$

If $x_s > x_{sb}$ and $x_r \geq \tilde{x}_r$, then the RHS of (3) is strictly smaller than the p-weighted average of the RHS of (1) and (2). However, the LHS of (3) is strictly larger than the p-weighted average of the LHS of (1) and (2), which is a contradiction. So when $x_s > x_{sb}$, we must have $\tilde{x}_r > x_r$.

If $x_{sg} < x_s \leq x_{sb}$, then $u'(x_{sb}) \leq u'(x_s)$. By (4) and (5), $u(x_{sg} + \alpha\tilde{x}_r) \leq u(x_s + \alpha x_r)$. This implies $x_{sg} + \alpha\tilde{x}_r \geq x_s + \alpha x_r$. Since $x_s > x_{sg}$, we must have $\tilde{x}_r > x_r$.

The only remaining possibility for $\tilde{x}_r \leq x_r$ is if $x_s \leq x_{sg}$. If this is the case, the RHS of (4) must be strictly smaller than the RHS of (5). Since the LHS equals the RHS in both equations, it also implies the LHS of (4) is strictly smaller than the LHS of (5). Hence, the RHS of (3) must be strictly larger than the p-weighted average of the RHS of (1) and (2) (since $u'(x_s) \geq u'(x_{sg})$ and $u'(x_s + \alpha x_r) \geq u'(x_{sg} + \alpha\tilde{x}_r)$). Again, since the LHS equals the RHS of the equations, this follows for the LHS as well. However, since $x_s \leq x_{sg} < x_{sb}$, from the LHS inequalities, we must have $1 - x_{sg} - \tilde{x}_r > 1 - x_s - x_r$ or $x_r - \tilde{x}_r > x_{sg} - x_s$. Also, from (4) and (5), we must have $x_s + \alpha x_r < x_{sg} + \alpha\tilde{x}_r$ or $\alpha(x_r - \tilde{x}_r) < x_{sg} - x_s$. This is a contradiction since $\alpha > 1$, so $x_s > x_{sg}$.

Overall, we see that the added flexibility leads to a higher investment. This leads to our next proposition.

Proposition 2. *Delaying information leads to a reduction of investment, that is, $x_r < \tilde{x}_r$.*

In the following section, we outline our experimental design and procedures, and formally state the hypotheses we aim to test.

3 Experimental Design and Procedure

3.1 Experimental design

The baseline game consists of four rounds of investment decisions (we call them scenarios thereafter). At the start of each scenario, subjects were given 100p and asked to decide how much to invest (denoted by $x \in [0, 100]$) in the lottery and how much to invest in the safe investment. Each scenario varies in the payoffs as well as the associated probabilities. Table 1 details the payoffs for each scenario. The amount put in the safe investment $(100 - x)$ has a rate of return of 1.

Table 1: Experimental Scenarios

Scenario	Winning probability	Payoff if win	Payoff if lose
A	1/6 (16%)	$7x$	0
B	1/6 (16%)	$10x$	0
C	5/6 (84%)	$2x$	0
D	5/6 (84%)	$1.4x$	0

The scenarios were presented to the subjects in random order, with one scenario randomly selected for payment. The experiment consisted of three treatment conditions: Now (our control condition), Delayed Payment (Delay P), and Delayed Outcome and Payment (Delayed OP). These conditions differ along two key dimensions: the availability of the investment outcome (immediate or delayed) and the timing of the payment (immediate or delayed) as outlined in Table 2.

In the Now condition, participants were informed of their investment outcomes immediately after each round and received their payment at the conclusion of the session. In the Delay P condition, participants were also informed of their investment outcomes immediately after each round, but payment was delayed by ten days after the session. In the Delay OP condition, both the investment outcomes and the payments were delayed: participants received feedback on their investment decisions and their payment ten days after the session ended.

We selected a ten-day delay to ensure that the postponement of payment was long enough to be perceived as meaningful by participants, while still complying with Prolific's payment policy, which requires payments to be issued within 22 days.[4] Although Prolific does not publish official data on typical payment timing, most studies on the platform tend to issue payment within 2 - 3 days of completion.[5] Given these norms, a ten-day delay is likely to have been perceived by participants as a substantial and salient deviation from their usual expectations.

Information regarding the timing of both outcomes and payments was clearly communicated to participants in the instructions and reiterated on the decision-making page during the experiment. Refer to Appendix B.1 and Appendix B.3 for more details.

Table 2: Treatment Conditions

	Immediate Payment	Delayed Payment
Immediate Outcome	Now	Delayed Payment (Delay P)
Delayed Outcome	X	Delayed Outcome and Payment (Delay OP)

[4]See Prolific policy.

[5]Based on the author's experience as a Prolific participant in over 112 studies, the vast majority issued payment within three days.

3.2 Procedure

The experiment was implemented using oTree (Chen et al., 2016) and was conducted on Prolific between June and July in 2021, over a period of three weeks.[6]

Upon accepting the study invitation on Prolific, participants were presented with an informed consent form, which outlines the purpose of the research and the estimated duration of participation. Participants who consented were directed to a page with the experimental instructions specific to their randomly assigned condition (see Appendix B.1 for screenshots). Following the instructions, participants completed a comprehension test to ensure they fully understood the decisions they were required to make and were attentive during the session.

Participants who successfully passed the comprehension check proceeded to engage in four rounds of investment decision-making tasks. Depending on the condition, participants were provided with end-of-round feedback (see Appendix B.3). After the task, participants answered a set of questions regarding their demographic information, risk preferences, and attitudes toward gambling (detailed questions are provided in Appendix C). The entire study took approximately 10 minutes to complete. The average payment was £3.05 or £18.3/hr. At the time of the experimental session, the typical hourly rate for a Prolific study was £5.

3.3 Hypotheses

Based on our experimental design and theoretical predictions, we have the following hypotheses:

Hypothesis 1. *A delay in* **payment** *will not affect the amount invested.*

If there are intertemporal transfers, then the delay in payment would make no difference on an individual level (from Proposition 1) since the discount rate is negligible. If there are no intertemporal transfers, then it is possible that investments may increase or decrease on an individual level, but this would be uncorrelated with time. Overall, we expect the average amount invested to remain unchanged regardless of any delay in payment.

Hypothesis 2. *A delay in* **information** *will lead to a decrease in the amount invested. The reduction occurs in both long-shot scenarios and favorite bets.*

[6]Prolific is an online research platform that provides access to a diverse pool of participants from varying demographic backgrounds. Previous studies have demonstrated that data collected through Prolific tends to be more reliable than other online platforms (see, e.g., Goodman et al., 2023; Peeters et al., 2023; Peer et al., 2017).

This comes from Proposition 2, which shows that a delay in information will reduce flexibility and thereby hurt investment on an individual level. The intuition is as follows: if one loses, one can consume less today to make up for the deficit tomorrow. If one wins, one can spend some of the winnings today (consumption smoothing). Importantly, our prediction holds regardless of the probability or payoff associated with the investment scenario. Consequently, we expect the investment to decrease in both long-shot and favorite-bet scenarios when information is delayed.

In the next section, we discuss the experimental data and our main results.

4 Results

4.1 Data summary

We collected data on 558 participants using the Prolific platform. Table 3 reports the summary statistics of the demographic information collected. The participants in our sample have a mean age of 32 and are equally split by gender. Roughly half of them are educated up to college level or more, with 59% being currently employed. 42% of the participants' household income is below the UK median household income. We also elicited participants' time preference and risk attitudes (on a scale of 0 to 10).[7] Moreover, we created a problem gambling index (PGI) using questions from the Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-5) criteria for gambling disorder (ranging from 1-10 where a higher number implies greater severity). We only have 25 problem gamblers in our sample (PGI ≥ 3). We also collected information on the participants' recent gambling activities. Interestingly, 40% of those who played the lottery did not think they recently gambled.

4.2 Main results

Figure 1 shows the average level of risky investment across four scenarios.[8] In the full sample, there is no statistically significant difference in risky investments between the Now and Delay P treatments (p-value = 0.3694). This suggests that delaying payment does not increase risk-taking.

[7] For both time and risk preference elicitation, we used questions from a validated preference survey module (Falk et al. (2018, 2023)). Please refer to Section C for more details.

[8] For further details, please refer to Table D.1.

Table 3: Summary statistics for the participants

	N	Mean	Std Err	Min	Max
Age	558	32.29	0.50	18	72
Female	558	0.50	0.02	0	1
Married	558	0.30	0.02	0	1
Employed	558	0.59	0.02	0	1
College educated	558	0.51	0.02	0	1
Below Median Income	558	0.42	0.02	0	1
Time preference	558	6.68	0.09	0	10
Risk–attitude	558	5.06	0.09	0	10
Problem Gambling Index	558	1.18	0.03	1	8
Recent Gambling	558	0.405	0.02	0	1
Travel to gamble	558	0.077	0.01	0	1
Lottery	558	0.419	0.02	0	1

In contrast, participants in the Delay OP treatment invest significantly more in the risky asset than those in the Delay P treatment (p-value = 0.0039). This finding suggests that delaying information about the outcome may encourage greater risk-taking. The difference between Delay OP and the other two treatments seems to be driven mostly by Scenarios A and B. The effect is less pronounced in Scenarios C and D. [9]

To better isolate the differential effects of delayed monetary payment and delayed information on risk-taking behaviour, we estimated a series of regressions on the amount invested in the risky asset. Table 4 presents the results of these regressions, where each observation corresponds to a participant-scenario pair. Specification (1) includes no control variables. Specifications (2) through (5) sequentially introduce additional controls to account for potential confounding factors.[10]

The variable *Delay Payment* is a binary indicator equal to 1 if the monetary payment for a given investment scenario is delayed, and 0 otherwise. Similarly, *Delay Information* is a dummy variable equal to 1 if the outcome information for the scenario is delayed. By examining the coefficients on these two variables, we are able to disentangle the separate effects of delayed payment and delayed information on risky investment behavior.

Result 1. *Delaying payment has no significant effect on the risky investment.*

This result is consistent with Hypothesis 1. We focus on the coefficient for *Delay Payment*.

[9] Regression results reported in Table 5 discuss this further.

[10] The number of observations in specifications (3) through (5) is reduced because 45 out of 558 participants did not provide their income group.

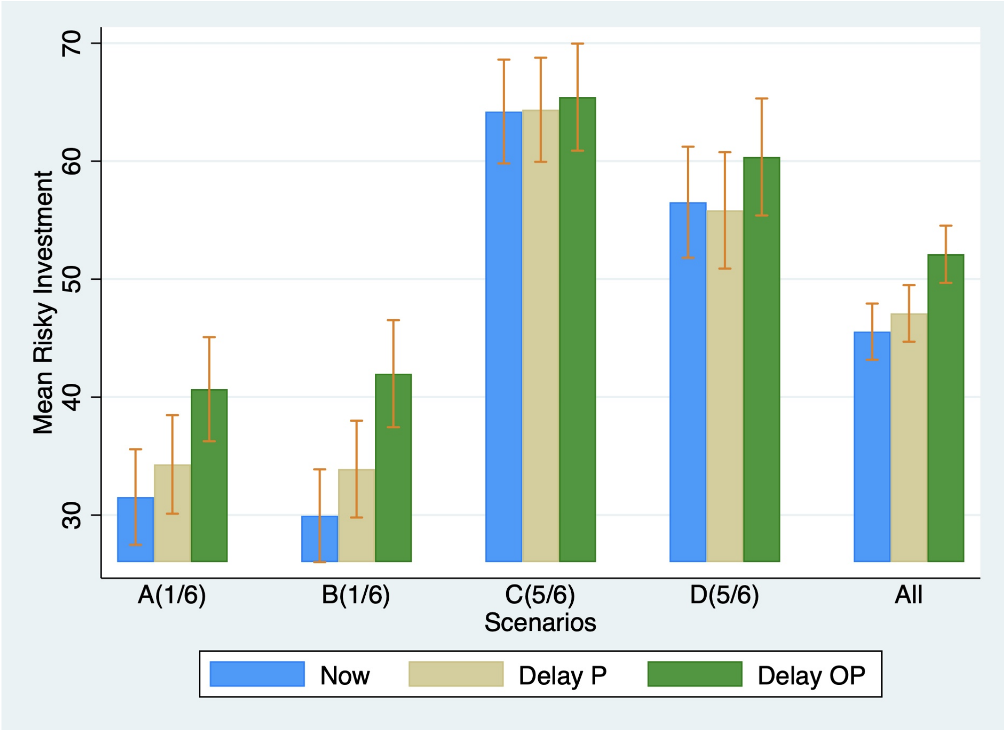


Figure 1: Average risky investment by treatment for all the scenarios. The error bars represent 95% confidence interval.

Across all specifications, the coefficient remains statistically insignificant (p-value = 0.89 in the most general specification (5)).

Result 2. *Delaying information leads to a significant increase in risky investments.*

This result rejects Hypothesis 2. It indicates that delaying outcome information increases participants' investment in the risky asset by approximately 5% per round - or between 4.96p and 5.50p from a 100p endowment (p-value < 0.01 in Specification (5)). Moreover, Self-reported risk attitude and recent lottery purchases are positively correlated with risky investment. In contrast, we did not find any significant association with the self-reported time preference, the recent gambling dummy, or the travel to gamble dummy.

Result 3. *Delaying information leads to increased risky investment in long-shot scenarios only.*

We further explore the heterogeneous effects of delayed information by estimating Specification (5) separately for each of the four scenarios. The results, reported in Table 5, show that the coefficient on *Delay Information* is statistically significant only for Scenarios A and B (p-value < 0.01). This suggests that the effect of delayed information is driven primarily by the long-shot scenarios, possibly due to a greater fantasizing potential. These findings provide further evidence against Hypothesis 2.

Table 4: Regression results for investment in the risky asset

	(1)	(2)	(3)	(4)	(5)
Delay Payment	1.546	1.546	0.694	-0.178	-0.290
	(1.938)	(1.939)	(2.064)	(2.081)	(2.104)
Delay Information	5.016**	5.016**	4.958**	5.211**	5.497***
	(2.091)	(2.092)	(2.122)	(2.056)	(2.070)
Time Preference				0.778	0.764
				(0.478)	(0.487)
Risk Attitude				1.334***	1.291***
				(0.404)	(0.426)
Recent Gambling					-1.144
					(2.021)
Lottery					3.369*
					(1.917)
Travel to gamble					1.043
					(3.321)
Constant	45.55***	32.78***	31.44***	17.99***	18.12***
	(1.393)	(1.656)	(3.601)	(6.060)	(6.048)
Demographic Controls	No	No	Yes	Yes	Yes
Scenarios	No	Yes	Yes	Yes	Yes
Control Illusion	No	No	No	Yes	Yes
PG Index	No	No	No	No	Yes
Observations	2,232	2,232	2,052	2,052	2,052
R-squared	0.007	0.161	0.175	0.189	0.192

Notes: Demographic Controls include age, gender, education level, income, marital status, and employment status. Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Regression results for investment in the risky asset by different scenarios.

Scenario	A	B	C	D
Delay Payment	-1.271	2.740	-1.834	-0.793
	(3.170)	(3.121)	(3.296)	(3.792)
Delay Information	9.167***	9.102***	-0.117	3.836
	(3.231)	(3.199)	(3.367)	(3.791)
All controls	Yes	Yes	Yes	Yes
Observations	513	513	513	513
R-squared	0.099	0.127	0.097	0.062

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.3 Delayed-information effect and the role of feedback

Participants in the Now and Delay P treatments receive end-of-round feedback on each outcome, whereas those in Delay OP do not. This design choice was so because we wanted the Now/DelayP treatments to observe the outcome as soon as possible so there is no cause for any anticipation. However, a realized outcome in one round could, in principle, change investment in subsequent rounds, so part of the Delay OP versus (Now and Delay P) gap might reflect the absence of a feedback channel in Delay OP rather than the anticipation mechanism. This subsection isolates that channel and shows that it does not drive our results.

The feedback response is weak. We first measure the feedback channel directly, regressing risky investment on the lagged own outcome (*Lag Win* $= 1$ if the previous round's risky asset paid out) within the feedback-receiving treatments in rounds 2–4. The estimated response is small and statistically insignificant ($\hat{\beta} = -2.29$, $p = 0.20$; cluster-bootstrap $p = 0.22$ with $n = 2000$). There is, accordingly, little contamination to remove and any reasonable correction can move the treatment estimate only modestly.

As a placebo test, interacting the lagged outcome with *Delay Information* indicator recovers a statistically insignificant term for both scenarios types ($p = 0.13$ for A–B and $p = 0.20$ for C–D). The placebo null is expected as the Delay OP treatment cannot respond to feedback it never observed, so its implied feedback slope is close to zero.

Surprise does not change the effect. The feedback channel can be most active if the realised outcome is less likely. Because the long-shot leads to most surprise, we measure feedback as whether the previous round resolved in its less-likely event (*Lag Surprise*: a long-shot win in A–B or a favorite loss in C–D). We then interact this indicator with *Delay Information* and test whether the treatment effect differs after surprising versus expected feedback. It does not: the interaction is economically and statistically negligible (-0.81, $p = 0.85$), while the main effect is still significant (6.66, $p = 0.01$). Splitting the interaction by scenario type leaves both components statistically indistinguishable from zero ($p = 0.16$ for A–B and $p = 0.19$ for C–D). This check simply compares the treatment effect across feedback histories and it cleanly attributes the Delay OP gap to anticipation rather than to the feedback, while not relying on any assumptions about the counterfactual no-feedback baseline.

Purging the feedback channel. As an additional check, we remove the estimated feedback response out of the Now/Delay P investment and ask whether the treatment effect survives. The procedure has two steps. First, using only the feedback-receiving treatments in rounds 2–4, we estimate how investment responds to the previous round's outcome, obtaining the slope $\hat{\beta}$ described above. Second, for each Now/Delay P observation we subtract the portion of investment that this slope attributes to the realized feedback, $\hat{\beta} \cdot \textit{Lag Win}$, leaving a "purged" measure of what the participant would have invested had the feedback channel been switched off. We then re-estimate the treatment regression on this purged outcome. Because Delay OP never received feedback, its investment is left unaltered, so the *Delay Information* coefficient now compares Delay OP against a base group (Now/Delay P) from which the feedback component has been removed.

The one judgment this requires is what "feedback switched off" should mean. In rounds 2–4 every base group participant has already seen an outcome, so the genuine no-feedback state (the state of the Delay OP treatment) is never observed and must be imputed. The choice amounts to picking the value of *Lag Win* at which the purge leaves investment untouched, that anchor point is the no-feedback baseline the estimate is built on. We report two transparent choices that bound the plausible range. The first, a loss baseline, leaves investment untouched at $\textit{Lag Win} = 0$, i.e. it treats a participant who just lost as behaving like one who did not receive any feedback. The second, an average baseline, centers the lag at its sample mean and so leaves untouched a participant at the average feedback state, i.e. it assumes that the feedback effect cancels out and does not contaminate, on an average. The two purges differ only by the constant $\hat{\beta} \cdot \mathbb{E}[\textit{Lag Win}]$, so this quantity measures how far the treatment estimate moves when the no-feedback baseline is changed from the loss to the average baseline. Comparing the two therefore reports the estimate's sensitivity to that choice. It turns out that there is little effect of this identifying assumption.

The *Delay Information* effect is significant under both baselines and sits in a tight band of 4.63 (loss baseline) to 5.48 (average baseline), shown in Table 6. Standard errors are cluster-bootstrapped over the full two-step procedure, so that inference accounts for the first-stage estimation of $\hat{\beta}$ rather than treating it as known.[11]

[11] The correction turns out to be negligible. Since the feedback channel itself is small, first-stage uncertainty barely propagates, and analytic and bootstrap standard errors essentially coincide.

Table 6: Robustness of the delayed-information effect to the feedback channel

	Delay Information	SE	p	N
Round 1 only (feedback-free)	3.20	3.23	0.32	513
Purge, loss baseline (non-centered)	4.63	2.21	0.04	2,052
Purge, average baseline (centered)	5.48	2.13	0.01	2,052
After more-likely event	6.38	2.53	0.01	1,277
After less-likely event (surprise)	8.24	4.62	0.08	262
Surprise × *Delay Information interaction*				
Interaction term	−0.81	4.28	0.85	1,539
Main effect	6.66	2.46	0.01	1,539

Notes. Dependent variable is risky investment (out of 100p). *Delay Information* is the *Delay OP* indicator; *Delay Payment* (*Delay P*) is insignificant in all specifications and is omitted from the table. All regressions include scenario fixed effects and the full control set of Table 4, with standard errors clustered at the subject level. Purge rows subtract the estimated lagged-outcome response ($\hat{\beta} = -2.29$, $p = 0.20$) from base-arm investment in rounds 2–4. Their standard errors are cluster-bootstrapped (2,000 replications) over the full two-step procedure. The interaction block reports the test of whether the treatment effect differs by feedback type.

A feedback-free subsample. Finally, in round 1 no participant in any treatment has yet received feedback, so the channel is mechanically absent. Restricting to round 1, the *Delay Information* coefficient is positive and of comparable magnitude (3.20) but imprecise ($p = 0.32$), as expected when three-quarters of the data are set aside. We interpret it as directionally consistent rather than as independent confirmation.

Overall, the delayed-information effect is stable whether we condition on feedback type, purge the feedback channel under either baseline, or restrict to the feedback-free first round. The underlying feedback response is itself weak and insignificant. We therefore conclude that the higher risk-taking under Delay OP reflects the delayed resolution of uncertainty and not the end-of-round feedback that the Now and Delay P treatments receive and Delay OP does not.

5 Anticipation Utility: Theory, Identification, and Structural Estimation

The reduced-form results reject both standard predictions: delayed payment is irrelevant (consistent with Proposition 1) while delayed information *raises* risky investment, concentrated in long shots (rejecting Proposition 2). This section develops a model in which decision makers derive utility from anticipating an unresolved favorable outcome, in the spirit of Loewenstein

(1987)and Kőszegi (2010). We (i) state the model's primitives and derive three testable predictions; (ii) characterize exactly which features of the anticipation function the experimental design identifies, its values at the two design probabilities (no more), and show how the treatment variation separates anticipation from probability weighting, with which it is observationally equivalent within any single arm; and (iii) estimate the model by maximum likelihood on the full sample, treating behavioral noise and preference heterogeneity inside the likelihood rather than by sample trimming (removing inconsistent players).

5.1 Primitives

There are two periods, $t \in \{1, 2\}$. The decision maker (DM) has consumption utility $u(\cdot)$, strictly increasing and concave, and discount factor $\beta \in (0, 1]$. In period 1 the DM allocates an endowment between a safe asset and a risky asset that succeeds with probability p, exactly as in the experiment.

In addition to consumption utility, the DM derives *anticipation utility* in period 1 whenever the period-2 outcome is uncertain at the time of anticipation. Let $\bar{r}_2$ denote the best attainable period-2 reward and p its probability. Anticipation utility is

$$A(p, \bar{r}_2) \;=\; \varphi(p)\, u(\bar{r}_2), \tag{6}$$

so that total ex-ante utility under *unresolved* uncertainty is:

$$U^{\text{unres}} \;=\; u(c_1) \;+\; \varphi(p)\, u(\bar{r}_2) \;+\; \beta\, \mathbb{E}[u(c_2)], \tag{7}$$

while under *resolved* uncertainty the anticipation term is replaced by its degenerate counterpart evaluated at the realized reward.

Assumptions for the anticipation function

(A1) **No hope, no savoring:** $\varphi(0) = 0$.

(A2) **Monotonicity:** Probably true. Not sure?

(A3) **Subproportionality:** $\varphi(p)/p$ is strictly decreasing in p on $(0, 1]$.

(A4) **Information dependence:** anticipation accrues only over outcomes unresolved in period 1, and is independent of the timing of *payment*.

No parametric commitment. We deliberately do *not* commit to a parametric family for φ such as $\varphi(p) = \gamma_0 p^\theta$. We show below that our design identifies φ only at the two probabilities it employs, so any two-parameter family fits those points exactly and its parameters are not separately identified. All predictions and tests are stated in terms of the identified quantities $\varphi(1/6)$ and $\varphi(5/6)$.

5.2 Predictions

Proposition 3 (Payment delay is irrelevant)**.**

Proposition 4 (Delayed information raises investment)**.**

Proposition 5 (Long-shot concentration)**.** *Under (A3), the per-unit-probability anticipation wedge $\varphi(p)/p$ is larger at $p_{lo} = 1/6$ than at $p_{hi} = 5/6$; holding the expected gross return fixed, the treatment effect of delayed information on investment is strictly larger in the long-shot scenarios.*

Propositions 3–5 map one-to-one to Results 1–3, and each maps to a single test statistic in Table 7: the Now/DP pooling test, the RDU likelihood-ratio test, and the subproportionality test, respectively.

5.3 Identification

This section sets out what the experiment can and cannot identify. We make three points. First, the design identifies the anticipation function only at the two probabilities it uses. Second, within any single treatment arm anticipation and probability weighting are observationally equivalent. Third, the variation across treatment arms identifies anticipation as the part of the decision weight that responds to the timing of information.

5.3.1 What the design identifies

Each decision environment, that is each scenario within each arm, is a binary-branch allocation problem. Let preferences over the invested amount z be represented by

$$V(z) = W\, u\big(200 + (\alpha - 1)z\big) + L\, u(200 - z),$$

with $W, L > 0$. The first-order condition $V'(z) = 0$ depends on W and L only through the ratio W/L. Choices in one environment therefore identify that ratio and not the separate levels. We normalize $L = 1-p$ without loss and parameterize the winning-branch weight at each probability and treatment arm as

$$W(p, T) = p\, e^{g(p,T)}, \tag{8}$$

so that $g = 0$ returns expected utility, $g > 0$ overweights the winning branch, and $g < 0$ underweights it.

From the anticipation primitive to the decision weight. Anticipation enters investment through the best attainable reward. When the decision maker invests more in the risky asset, the best period-2 reward $\bar{r}_2$ rises with that amount. Under Delay OP, the anticipation term $\varphi(p)\, u(\bar{r}_2)$ in (7) is active, so a larger investment raises anticipation utility. This adds to the marginal value of the risky asset and pushes investment up. Under Now and Delay P, the outcome resolves in period 1, the anticipation term collapses to its realized value, and it drops out of the first-order condition. The reduced effect is an upward shift in the weight the decision maker places on the winning branch whenever uncertainty stays unresolved. We combine the standard probability p and this anticipation shift into the single weight in (8). The map from the primitive φ in (6) to the reduced weight in (8) is monotone. A larger $\varphi(p)$ raises $g(p, \text{Delay OP})$ and therefore $W(p, \text{Delay OP})$, and it leaves the Now and Delay P weights unchanged. Assumption (A1) fixes the anchor, since $\varphi(0) = 0$ means anticipation adds nothing when winning is impossible.

Two probabilities, two weight numbers. The design uses two probabilities, 1/6 and 5/6, so the data support two weight numbers per arm, $W(1/6, T)$ and $W(5/6, T)$, and not a smooth curve through them. Curvature is identified by variation in stakes at a fixed probability. Scenarios A and B both set $p = 1/6$ and therefore share the weight $W(1/6, T)$, but they differ in the payoff multiplier α, which equals 7 in A and 10 in B. With the weight held fixed across the two scenarios, the investment change due to the change in α pins down the curvature r. Once r is known, the level of investment identifies the weight, and hence $g(1/6, T)$. Scenarios C and D do the same at $p = 5/6$. In short, stake variation at a fixed probability identifies r, and the investment level then identifies the weight.

Why we do not impose a parametric anticipation function? The design identifies φ at $p = 1/6$ and $5/6$ and nowhere else. Two points place no restriction on the shape of φ between or beyond them. Any two-parameter family that passes through the two identified values fits the choices equally well, so the functional form has no testable content, and fitted parameters would report the family we assumed rather than a feature of the data. A specification such as $\varphi(p) = \gamma_0 p^\theta$ illustrates the point. The two identified values pin down γ_0 and θ by simple algebra, but they do so for any other two-parameter family just as well, so the fitted parameters describe the family we imposed rather than a feature of the choices. For this reason we do not commit to a parametric family. We report the identified values $\varphi(1/6)$ and $\varphi(5/6)$ directly and state every prediction in terms of them.

5.3.2 Anticipation versus probability weighting

Within a single treatment arm the model in (7) is observationally equivalent to rank-dependent utility. Both deliver a pair of decision weights, $W(1/6)$ and $W(5/6)$, and no choice data inside one arm can tell them apart. The two accounts differ in what moves the weights across arms, and the design exploits that difference. The separation rests on one assumption, which we state directly.

Assumption (Timing-invariant risk preferences). Consumption utility u, the curvature r, and any probability weighting are properties of risk preferences. They do not depend on the timing of outcome information or on the timing of payment.

Under this assumption the only object that can respond to information timing is anticipation, which by (A4) switches on when resolution is delayed and stays off when the outcome resolves at once. Anticipation also does not respond to payment timing, again by (A4). Two implications follow, and the data can test both.

First, moving payment later while holding information fixed leaves every weight unchanged, so the Now and Delay P arms should share the same weights. We test this restriction.

Second, delaying information raises the winning-branch weight through anticipation. We define the anticipation increment as the gap between the Delay OP weight and the pooled base weight,

$$\Delta(p) \;=\; W(p, \text{Delay OP}) - W(p, \text{base}) \;=\; p\left[e^{g(p,\text{Delay OP})} - e^{g(p,\text{base})}\right], \tag{9}$$

where the base group pools Now and Delay P. The model places two restrictions on Δ. Under rank-dependent utility with timing-invariant weights, $\Delta(p) = 0$ at both probabilities. Under anticipation with (A1) , Δ is positive at the long-shot probability,

$$\Delta(\tfrac{1}{6}) > 0. \tag{10}$$

The rank-dependent null is nested in the anticipation model through the two equality restrictions, which yields a likelihood-ratio test.

We interpret Δ as anticipation, but also want to note that what the design identifies across treatment arms is a component of the decision weights that depends on the timing of information. One could relabel this component as information-dependent probability weighting, and the choice data would not object. The label does not change our test. What the data rule out is the standard account in which probability weighting is a fixed feature of risk preferences and does not move with the timing of information. Standard probability weighting cannot produce a weight that switches on only when the outcome is unresolved, and that switch is exactly what (9) measures.

5.4 Econometric Specification

This section takes the identified objects from Section 5.3 to the data and outlines the econometric model used for estimation.

5.4.1 The choice model

Subject i in treatment arm T_i faces scenarios $s \in \{A, B, C, D\}$ with parameters (p_s, α_s) and chooses $z_{is} \in \{0, 1, \ldots, 100\}$. Given curvature r and winning-branch weight W, the model predicts one target investment. The first-order condition solves in closed form:

$$k = \left[\frac{W(\alpha - 1)}{1 - p}\right]^{1/r}, \qquad z^*(r, W; \alpha, p) = 200\,\frac{k - 1}{k + \alpha - 1}. \tag{11}$$

The weight W enters through (8), so each treatment arm and each probability contributes its own target through its own $g(p, T)$. The target moves smoothly in r and in W. When z^* falls outside $[0, 100]$, the observation model assigns the mass to the nearer corner as discussed below.

5.4.2 The observation model

The slider records integers, not a continuous quantity, so we model the recorded choice as a rounded draw around the target. Let the latent choice, a perturbation to z^*, be $\tilde{z} = z^* + \varepsilon$ with $\varepsilon \sim N(0, \sigma^2)$. The slider records whatever integer $\tilde{z}$ rounds to, so a draw in the interval $(z - \frac{1}{2}, z + \frac{1}{2})$ is recorded as z. Standardizing by σ, the recorded integer z has probability

$$\Pr(z_{is} = z) = \Phi\left(\frac{z + \frac{1}{2} - z^*}{\sigma}\right) - \Phi\left(\frac{z - \frac{1}{2} - z^*}{\sigma}\right). \tag{12}$$

We lump the tails into the corner cells $z = 0$ and $z = 100$, so corner choices need no separate correction. We prefer this interval-censored normal to a tobit for two reasons. The target z^* is a nonlinear function of the structural parameters rather than a linear index. The choice is also bounded at both ends and carries mass at each corner, while the tobit handles one-sided censoring around a linear index.

5.4.3 Free parameters and tests

Section 5.3 pools Now and Delay P into a single base group once the pooling test passes, and we write "base" for that pooled group throughout. In the representative-agent anticipation model, the free parameters are the curvature r, the base weights $g(1/6, \text{base})$ and $g(5/6, \text{base})$, the Delay OP weights $g(1/6, \text{Delay OP})$ and $g(5/6, \text{Delay OP})$, and the error scale σ.

The three propositions map to three tests, and each test can be interpreted directly from Table 7. Proposition 3 predicts that payment timing does not move the weights. We estimate a specification that gives Now and Delay P their own weights and test equality. Proposition 4 predicts that delayed information raises the weight. The rank-dependent null sets $\Delta \equiv 0$, which nests the anticipation model through two equality restrictions. The likelihood-ratio test compares the "Invariant" and "By arm" columns. Proposition 5 predicts that the per-unit-probability increment is larger at the long shot. We do a one-sided test based on the inequality (10).

5.4.4 Heterogeneity

A single representative agent can hide variation across subjects, so we allow K latent types and estimate a finite mixture by maximum likelihood. The log-likelihood is

$$\mathcal{L} = \sum_{i=1}^{558} \log \sum_{k=1}^{K} \pi_k \prod_s \Pr(z_{is} \mid \psi_k, T_i)\,. \tag{13}$$

We report three cases. With $K = 1$ we recover the representative agent. With $K = 2$ we add an expected-utility type that fixes $g \equiv 0$ and carries its own curvature and error scale, alongside a behavioral type with arm-varying weights. With $K = 3$ we add a pure-noise type that chooses investment uniformly on the choice grid. All types are discrete-grid probability mass functions. We cluster standard errors at the subject level.

5.4.5 Sample and inconsistent players

A natural consistency check asks whether a subject invests more when the return rises at fixed odds, that is $z_A \leq z_B$ and $z_D \leq z_C$. In our data 247 of 558 subjects violate it. Dropping them is tempting but wrong, for two reasons.

First, investment need not rise in the return. Under CRRA expected utility with the experimental budget,

$$\frac{\partial z^*}{\partial \alpha} < 0 \quad \Longleftrightarrow \quad z^* > \frac{200}{(\alpha-1)(r-1)} \quad \Longleftrightarrow \quad r > 1 + \frac{200}{(\alpha-1)\,z^*}. \tag{14}$$

Take $r = 3.5$ and $\alpha = 7$ in Scenario A, which implies $z^* > 13.3$. A utility maximizer this risk-averse, invests less in Scenario B, which pays 10×, than in Scenario A, which pays 7×. A higher α makes the winning state wealthier, and a risk-averse subject spends that extra effective wealth on downside protection rather than on more of the risky asset. The income effect dominates the substitution effect. Many subjects flagged as inconsistent therefore obey the model at the sample's own estimates, and excluding them selects on r.

Also, the mixture already handles residual reversals. The error term and the noise type absorb them inside (13). We use the full sample throughout.

Table 7: Structural estimates. Decision weights and anticipation increments

	(1)	(2)	(3)	(4)
	Invariant	By arm	K=2 mixture	K=3 mixture
Panel A. Behavioral type				
r (CRRA)	3.516 (0.246)	3.516 (0.246)	4.661 (0.335)	4.646 (0.371)
W_{lo} (base)	3.599 (0.937)	2.730 (0.694)	8.570 (2.965)	5.562 (2.143)
W_{hi} (base)	2.133 (0.309)	2.041 (0.300)	2.422 (0.422)	2.662 (0.758)
W_{lo} (Delay OP)	—	6.168 (2.048)	22.77 (10.77)	15.75 (8.71)
W_{hi} (Delay OP)	—	2.334 (0.401)	2.766 (0.607)	3.690 (1.415)
Δ_{lo}	—	3.438 (1.637)	14.20 (8.63)	10.19 (7.45)
Δ_{hi}	—	0.293 (0.276)	0.344 (0.435)	1.028 (1.303)
σ (error SD)	38.89 (1.18)	38.69 (1.17)	25.79 (0.94)	21.21 (1.43)
Panel B. Other types				
r (EU type)	—	—	0.994 (0.172)	1.129 (0.134)
Share, EU type	—	—	0.326	0.357
Share, behavioral type	—	—	0.674	0.431
Share, noise type	—	—	—	0.211
Panel C. Fit and inference				
p: $\Delta_{\text{lo}} > 0$ (one-sided)	—	0.018	0.050	0.086
p: $\Delta_{\text{hi}} = 0$ (two-sided)	—	0.289	0.430	0.430
Log-likelihood	−9189.9	−9180.0	−8973.4	−8938.5
BIC	18405.1	18398.0	18003.6	17940.3

Notes. Maximum likelihood estimates of the structural model on the full sample of $N = 558$ subjects. Cluster-robust standard errors at the subject level are in parentheses. Column (1) restricts the winning-branch weights to be equal across arms, which is the rank-dependent utility null with no anticipation. Column (2) lets the weights differ between the base arm and Delay OP. Columns (3) and (4) add latent types through a finite mixture, an expected-utility type with $g \equiv 0$ and, in column (4), a noise type uniform on the choice grid.
W_{lo} and W_{hi} are the winning-branch decision weights at the long-shot probability $p_{\text{lo}} = 1/6$ (Scenarios A and B) and the favorite probability $p_{\text{hi}} = 5/6$ (Scenarios C and D). The base arm pools Now and Delay P. The anticipation increment is $\Delta = W(\text{Delay OP}) - W(\text{base})$ at each probability.
Specification tests. The likelihood-ratio test of the rank-dependent restriction $\Delta \equiv 0$, comparing columns (1) and (2), gives 19.74 on two degrees of freedom with $p = 0.0001$. The Wald test of weight equality across Now and Delay P gives 1.43 on two degrees of freedom with $p = 0.488$.

5.5 Estimation Results

This section reports the results from the three tests listed in the previous section. We discuss the results in the order of Propositions 3 to 5 and then map the structural estimates back onto the reduced-form results.

5.5.1 The estimated model

Table 7 reports estimation results. The "Invariant" column reports the restricted model which sets the Delay OP weights equal to the base weights. We lead with the anticipation model in the "By arm" column, which is the transparent baseline for inference, and we treat the finite mixtures as robustness.

The estimated risk aversion is $r = 3.516$ with a standard error of 0.246. Section 5.3 identifies r from the stake variation within each probability, so Scenarios A and B pin it down at the long shot and Scenarios C and D pin it down at the favorite. A curvature near 3.5 describes a strongly risk-averse decision maker. The same value appears in the Invariant column, which fits the model without anticipation, so curvature does not depend on how the weights are allowed to vary.

The base weights already depart from expected utility. Under expected utility, the winning branch would carry weight equal to its probability, so W would equal $1/6$ at the long shot and $5/6$ at the favorite. The estimates are $W_{\text{lo}}(\text{base}) = 2.730$ and $W_{\text{hi}}(\text{base}) = 2.041$. Both weights sit far above their probabilities, so the base arm overweights the winning branch even when information resolves at once. The overweighting is larger at the long shot, which reverses the ordering that expected utility implies. This is the familiar overweighting of small probabilities, and it is present in the data before delayed information does anything. Anticipation then enters as an arm-specific increment on top of this baseline.[12]

The error scale is large at $\sigma = 38.69$. A single representative agent absorbs a great deal of behavioral noise, which motivates the mixture models.

5.5.2 Payment timing does not move the weights (Proposition 3)

We test whether payment timing shifts the weights by giving Now and Delay P their own weights and testing equality. The Wald statistic is 1.43 on two degrees of freedom with a p-value of 0.49. We do not reject, so we pool Now and Delay P into the base group. This confirms Proposition 3 and matches Result 1 from the reduced form.

5.5.3 Delayed information raises the weight (Proposition 4)

Delayed information moves the winning-branch weight, and the movement is large at the long shot. The weight rises from $W_{\text{lo}}(\text{base}) = 2.730$ to $W_{\text{lo}}(\text{Delay OP}) = 6.168$, so the long-shot

[12] The free two-point weights are not an overfit. We compare the free weights against a one-parameter Prelec weighting function, which forces a single parameter to describe both probabilities. The likelihood-ratio test rejects the Prelec restriction decisively, with a statistic of 514.2 on one degree of freedom and a p-value below 0.0001. The data prefers free weights at the two design probabilities. This validates the decision in Section 5.3 not to impose a parametric anticipation function.

increment is $\Delta_{\text{lo}} = 3.438$ with a standard error of 1.637. The favorite weight barely moves, from 2.041 to 2.334, so $\Delta_{\text{hi}} = 0.293$ and we cannot distinguish it from zero, with a two-sided p-value of 0.289.

The formal test compares the anticipation model against the rank-dependent null that sets $\Delta \equiv 0$. This null is the Invariant column, which forces the Delay OP weights to equal the base weights. The likelihood-ratio test rejects it, with a statistic of 19.74 on two degrees of freedom and a p-value of 0.0001. Standard theory predicts that delayed information lowers investment, which is Proposition 2. The estimates reject that prediction and confirm Result 2. Delayed information raises the weight the decision maker places on winning.

5.5.4 The effect concentrates at the long shot (Proposition 5)

To Do.

5.5.5 Heterogeneity and model selection

The representative agent may hide variation across subjects, so we turn to the finite mixtures. BIC falls monotonically as we add types, from 18405.1 for the Invariant model to 18398.0 for By arm, then to 18003.6 at $K = 2$ and 17940.3 at $K = 3$. By BIC the three-type mixture fits best. We report this honestly even though it is not our main specification for inference.

The mixtures separate a behavioral type from an expected-utility type and a noise type. At $K = 2$ the expected-utility type holds a share of 0.326 and carries a curvature near one, while the behavioral type holds 0.674 and carries the anticipation weights. At $K = 3$ a noise type appears with a share of 0.211, and the two structural shares become 0.357 and 0.431. As the noise type absorbs grid-uniform choices, the error scale of the structural type falls, from 38.69 in the representative agent to 25.79 and then 21.21, and the risk aversion rises toward 4.6.

The anticipation effect is robust in sign and in location across all of these specifications. The long-shot increment stays positive and grows, from $\Delta_{\text{lo}} = 3.438$ in the representative agent to 14.20 at $K = 2$ and 10.19 at $K = 3$. The favorite increment stays near zero throughout. Splitting the sample into types costs power, which widens the standard errors on the structural type. We therefore read the mixtures as confirming the sign and magnitude of anticipation, and we treat the representative By-arm agent as the specification that delivers the sharpest inference.

Table 8: Model-implied delayed-information effect against the reduced form

Scenario	Model-implied effect (By arm)		Reduced form
	Latent z^* gap	Censored gap	Table 5 coef.
A ($7\times$, $p = 1/6$)	11.44	8.92	9.17***
B ($10\times$, $p = 1/6$)	9.56	7.25	9.10***
C ($2\times$, $p = 5/6$)	3.35	2.49	-0.12
D ($1.4\times$, $p = 5/6$)	4.27	3.37	3.84
Long shots (A, B)	10.50	8.09	9.13
Favorites (C, D)	3.81	2.93	1.86
All scenarios	7.15	5.51	5.50

Notes: The model-implied effect passes the By-arm weights from Table 7 through the first-order condition in (11). The latent gap differences the target investment z* between Delay OP and the pooled base arm (Now and Delay P). The censored gap differences the model-implied censored mean E[max(0,min(100,z*+e))] at $\sigma = 38.69$. The reduced-form column reports the Delay Information coefficient from Table 5 by scenario. The long-shot and favorite rows average those coefficients. The All scenarios reduced-form entry is the Delay Information coefficient from Specification (5) of Table 4. *** p<0.01.

5.5.6 Validation of structural estimates

We now translate the estimated decision weights back into the investment data. We take the By-arm weights from Table 7 and pass them through the first-order condition in Equation (11). This gives a target investment for each scenario under the base arm and under Delay OP. The difference between the two targets is the model's prediction for the delayed-information effect, measured on the same 0 to 100 scale as the raw choices.

The target is a latent quantity, but the recorded choice is not. Choices are censored at 0 and 100, and the estimated error scale is large at $\sigma \approx 38.7$, so the observed effect runs smaller than the latent effect. To compare like with like, we map each target to its model-implied censored mean, $E[\max(0, \min(100, z^* + \varepsilon))]$, and difference these across arms. Table 8 reports the latent gap and the censored gap next to the reduced-form estimate from Table 5.

Two facts stand out. First, the aggregate match is close to exact. Averaged over the four scenarios, the model-implied censored gap is 5.51p, and the reduced-form coefficient from Specification (5) of Table 4 is 5.50p. The structural model uses only the shape of the choice distribution through the likelihood. It nonetheless reproduces the primary reduced-form magnitude almost precisely. Second, the model reproduces the location of the effect. The censored gap is 8.09p in the long shots against a reduced-form average of 9.13p, and 2.93p in the favorites against 1.86p.

Anticipation appears in long-shots as reported in Result 3.

It is worth noting that censoring does real work here. The latent gaps are at 10.50p in the long shots and 3.81p in the favorites. Censoring at the two corners compresses them toward the observed effects. A reader who saw the latent gaps alone would judge the model to overestimate the effect. The censored means are the right object for the comparison, and they line up with the data.

There is one mismatch. In Scenario C, the model implies a censored gap near 2.5p, while the reduced-form coefficient is essentially zero. The small positive favorite increment in the weights, $\Delta_{\text{hi}} = 0.293$, is already insignificant so the model does not claim a favourite effect. The a few pence that appear in Scenario C are what the first-order condition produces mechanically from that small point estimate at $p = 5/6$. Also, Scenario D matches closely at 3.37p against 3.84p, so C is an isolated miss and not a pattern.

The broader point is what makes the exercise worth running. The reduced form and the structural model reach the same place by different routes. One regresses investment on treatment indicators. The other estimates decision weights inside a censored likelihood and computes them back through the first-order condition. The two agree on the aggregate effect to within 0.01p and agree on the long-shot concentration. An account that simply relabeled the effect as information-dependent probability weighting would not independently regenerate these magnitudes. The agreement is therefore evidence for the anticipation account rather than a restatement of it.

6 Conclusion

This study investigated how delays in outcome information and payment affect risk-taking behavior, employing an online experimental design. Our findings indicate that postponing outcome information significantly increases risk-taking, particularly in long-shot scenarios characterized by low probabilities of large payoffs. In contrast, delaying payment alone does not exert a comparable effect. These results suggest that the utility derived from anticipation - beyond mere temporal discounting - plays a critical role in decision-making under uncertainty.

Our empirical evidence challenges conventional expected utility frameworks by demonstrating that individuals may gain positive utility from the anticipation of uncertain rewards. This observation extends current theoretical models in behavioral economics and risk analysis, which have traditionally treated risk and time preferences as separate constructs. The pronounced effect of delayed outcome information underscores the need to incorporate anticipation-based mechanisms into models of decision-making under risk.

A potential policy implication of our findings relates to financial investment regulations. For example, in retirement savings programs, delaying the disclosure of portfolio performance might encourage higher-risk investments due to the anticipation of positive outcomes. However, delaying the actual receipt of funds upon retirement is less impactful on risk-taking behavior, highlighting the importance of designing policies that consider how the timing of information affects decision-making. Also, myopic loss aversion explains the equity premium puzzle and predicts that more frequent disclosure of portfolio performance would lead to a preference for safer, low-return assets like bonds. Our results hint toward another avenue where disclosures of returns will affect the portfolio of savers. Namely, the anticipation of the chance of a large nest egg will increase investment in stocks. Another crucial insight emerges in the context of problem gambling: when the outcome of a gamble is delayed, it can exacerbate gambling behavior as individuals continue betting in anticipation of an uncertain but potentially large reward. This effect is particularly strong in long-shot bets with low probability of high payoffs. In contrast, delaying the payout of winnings does not significantly influence gambling behavior. These findings suggest that gambling regulations should focus on limiting delays in outcome resolution rather than merely postponing payouts, as the former may drive excessive gambling due to the heightened utility derived from anticipation.

Further research is needed to explore the interplay between anticipation and other behavioral biases, such as regret and loss aversion. In particular, examining how these biases interact among populations more prone to risky behavior could yield valuable insights and inform policy interventions.

A Instructions

Welcome to our study on decision-making. In the study, you will have the opportunity to earn additional money. This is in addition to your £xx completion payment.

Now, you receive an additional 100p in your account. This is now your money, which you can use to participate in the study.

The study consists of 4 successive rounds of investment decisions. In each round, you must decide the amount that you would like to invest in the risky investment and how much to invest in the safe investment. These amounts must add up to 100p.

The safe investment will return an additional amount equal to the amount invested.

If successful, the risky investment will return an additional amount equal to several times the amount invested. If unsuccessful, the risky investment will not have a return (i.e., you get the same amount back).

Only one of these 4 rounds will be randomly selected, and the investments in that round will determine your bonus payment.

How do we determine the success or failure of your risky investment?

In each round, you will be assigned a success number(s) between 1 and 6. It is displayed on your computer screen. The computer will roll a six-sided die. If the rolled number is your success number or is one of your success numbers, the risky investment will be successful in that round. If the rolled number is NOT your success number or is not included in your success numbers, the risky investment will be unsuccessful. This round will ONLY count if the round is selected.

Each round, you get a new success number and make a similar decision.

Now condition only – immediate realization and pay-out

The outcome of the investments is reported after each round. At the end of the four rounds, one round will be randomly selected, your bonus payment will be your total earnings from the investments you make in that round. We will inform you which round is selected at the end of the study.

Important note: you will receive your bonus payment right after the completion of the study today.

Delayed payment condition only

The outcome of the investments is reported after each round. At the end of the four rounds, one round will be randomly selected, your bonus payment will be your total earnings from the investments you make in that round. We will inform you which round is selected at the end of the study.

Important note: you will receive your bonus payment 10 days from today.

Delayed realization and pay-out condition only

In 10 days from today, the outcome of the investments for each round will be determined. In addition, one round will be randomly selected, your bonus payment will be the total earnings from the investments you make in that round.

Important note: We will inform you of the outcomes and you will receive your total bonus payment 10 days from today.

Decisions Page

Please decide how much of 100p you would like to invest in the following lottery:

Situation 1:

The safe investment will return an additional amount equal to the amount invested.

With a probability of 1/6 (16%), the risky investment will be successful and return an additional amount equal 7 times the amount invested.

With a probability of 5/6 (84%), the risky investment will be unsuccessful and will not have a return.

Situation 2:

The safe investment will return an additional amount equal to the amount invested.

With a probability of 1/6 (16%), the risky investment will be successful and return an additional amount equal 10 times the amount invested.

With a probability of 5/6 (84%), the risky investment will be unsuccessful and will not have a return.

Situation 3:

The safe investment will return an additional amount equal to the amount invested.

With a probability of 5/6 (84%), the risky investment will be successful and return an additional amount equal two times the amount invested.

With a probability of 1/6 (16%), the risky investment will be unsuccessful and will not have a return.

Situation 4:

The safe investment will return an additional amount equal to the amount invested.

With a probability of 5/6 (84%), the risky investment will be successful and return an additional amount equal 1.4 times the amount invested.

With a probability of 1/6 (16%), the risky investment will be unsuccessful and will not have a return.

Your success number for this round is x or (5 numbers if the winning probability is 5/6). If your success number is the same as or include the number rolled by the computer, the risky investment will be successful, otherwise the risky investment will be unsuccessful.

You can invest between 0 and 100p inclusive.

Now – immediate realization and pay-out condition only

Note: The outcome of the investments is reported each round. You will receive your bonus payment right after the completion of the study today.

Delayed payment condition only

Note: The outcome of the investments is reported each round. You will receive your bonus payment 10 days from today.

Delayed realization and pay-out condition only

Note: The outcome of the investments will be revealed to you in 10 days from today. You will also receive your total bonus payment for all rounds in 10 days from today.

B Screenshots

B.1 Instructions

The screenshots for different treatment conditions are shown in this section. Figure B.1, B.2, B.3 present the screenshot for Now, Delay P, and Delay OP conditions respectively.

Instructions

Welcome to our study on decision making. In the study, you will have the opportunity to earn additional money. This is in addition to your **£0.85** completion payment.

Now you receive an additional **100p** in your account. This is now **your money** which you can use to participate in the study.

The study consists of **4** successive rounds of investment decisions. Each round you must decide how much you would like to invest in the **risky investment** and how much to invest in the **safe investment**. These amounts must add up to 100p.

- *The safe investment:* the safe investment will return an **additional** amount equal to the amount invested.
- *The risky investment:* if successful, the risky investment will return an **additional** amount equal to several times the amount invested. If unsuccessful, the risky investment will not have a return (i.e., you get the same amount back).

Only one of these 4 rounds will be randomly selected and the investments in that round will determine your bonus payment.

How we determine the success or failure of your risky investment?

In each round, you will be assigned success number(s) between 1 and 6. It is displayed on your computer screen.

The computer will roll a six-sided die. If the rolled number is your success number or is one of your success numbers, the risky investment will be successful in that round. If the rolled number is NOT your success number or is not included in your success numbers, the risky investment will be unsuccessful. This round will ONLY count if the round is selected.

Each round, you get new success number(s) and make a similar decision.

The outcome of the investments is reported after each round. At the end of the four rounds, one round will be randomly selected, your bonus payment will be your total earnings from the investments you make in that round. We will inform you which round is selected at the end of the study.

Important note: you will receive your bonus payment **right after the completion of the study today**.

Next, you will answer a few comprehension questions to ensure that you understand the decisions you are about to make.

Go to the comprehension questions

Figure B.1: Now Condition

Instructions

Welcome to our study on decision making. In the study, you will have the opportunity to earn additional money. This is in addition to your **£0.85** completion payment.

Now you receive an additional **100p** in your account. This is now **your money** which you can use to participate in the study.

The study consists of **4** successive rounds of investment decisions. Each round you must decide how much you would like to invest in the **risky investment** and how much to invest in the **safe investment**. These amounts must add up to 100p.

- *The safe investment:* the safe investment will return an **additional** amount equal to the amount invested.
- *The risky investment:* if successful, the risky investment will return an **additional** amount equal to several times the amount invested. If unsuccessful, the risky investment will not have a return (i.e., you get the same amount back).

Only one of these 4 rounds will be randomly selected and the investments in that round will determine your bonus payment.

How we determine the success or failure of your risky investment?

In each round, you will be assigned success number(s) between 1 and 6. It is displayed on your computer screen.

The computer will roll a six-sided die. If the rolled number is your success number or is one of your success numbers, the risky investment will be successful in that round. If the rolled number is NOT your success number or is not included in your success numbers, the risky investment will be unsuccessful. This round will ONLY count if the round is selected.

Each round, you get new success number(s) and make a similar decision.

The outcome of the investments is reported after each round. At the end of the four rounds, one round will be randomly selected, your bonus payment will be your total earnings from the investments you make in that round. We will inform you which round is selected at the end of the study.

Important note: you will receive your total bonus payment **10 days from today**.

Next, you will answer a few comprehension questions to ensure that you understand the decisions you are about to make.

Go to the comprehension questions

Figure B.2: Delay P Condition

Instructions

Welcome to our study on decision making. In the study, you will have the opportunity to earn additional money. This is in addition to your **£0.85** completion payment.

Now you receive an additional **100p** in your account. This is now **your money** which you can use to participate in the study.

The study consists of **4** successive rounds of investment decisions. Each round you must decide how much you would like to invest in the **risky investment** and how much to invest in the **safe investment**. These amounts must add up to 100p.

- *The safe investment:* the safe investment will return an **additional** amount equal to the amount invested.
- *The risky investment:* if successful, the risky investment will return an **additional** amount equal to several times the amount invested. If unsuccessful, the risky investment will not have a return (i.e., you get the same amount back).

Only one of these 4 rounds will be randomly selected and the investments in that round will determine your bonus payment.

How we determine the success or failure of your risky investment?

In each round, you will be assigned success number(s) between 1 and 6. It is displayed on your computer screen.

The computer will roll a six-sided die. If the rolled number is your success number or is one of your success numbers, the risky investment will be successful in that round. If the rolled number is NOT your success number or is not included in your success numbers, the risky investment will be unsuccessful. This round will ONLY count if the round is selected.

Each round, you get new success number(s) and make a similar decision.

In **10 days from today**, the outcome of the investments for each round will be determined. In addition, one round will be randomly selected, your bonus payment will be the total earnings from the investments you make in that round.

Important note: We will also inform you of the outcomes and you will receive your total bonus payment **10 days from today**.

Next, you will answer a few comprehension questions to ensure that you understand the decisions you are about to make.

Go to the comprehension questions

Figure B.3: Delay OP Condition

B.2 Comprehension Questions

Comprehension Questions

Please answer the comprehension questions using the example scenario below:

Example Scenario

The safe investment

- The safe investment will return **an additional amount equal to the amount invested**.

The risky investment

- With a probability of 1/2 (50%), the risky investment will be successful and return **an additional amount equal <u>3 times</u>** the amount invested.
- With a probability of 1/2 (50%), the risky investment will be unsuccessful and will **not have a return** (i.e., you get the same amount back and no additional return).

Suppose that you decide to invest all your 100p in the safe investment, what is your total payment?

- ◯ 0p
- ◯ 100p
- ◯ 200p
- ◯ 150p
- ◯ 400p

Suppose that instead you decide to invest all your 100p in the risky investment and the risky investment is successful, what is your total payment?

- ◯ 0p
- ◯ 100p
- ◯ 200p
- ◯ 400p
- ◯ 600p

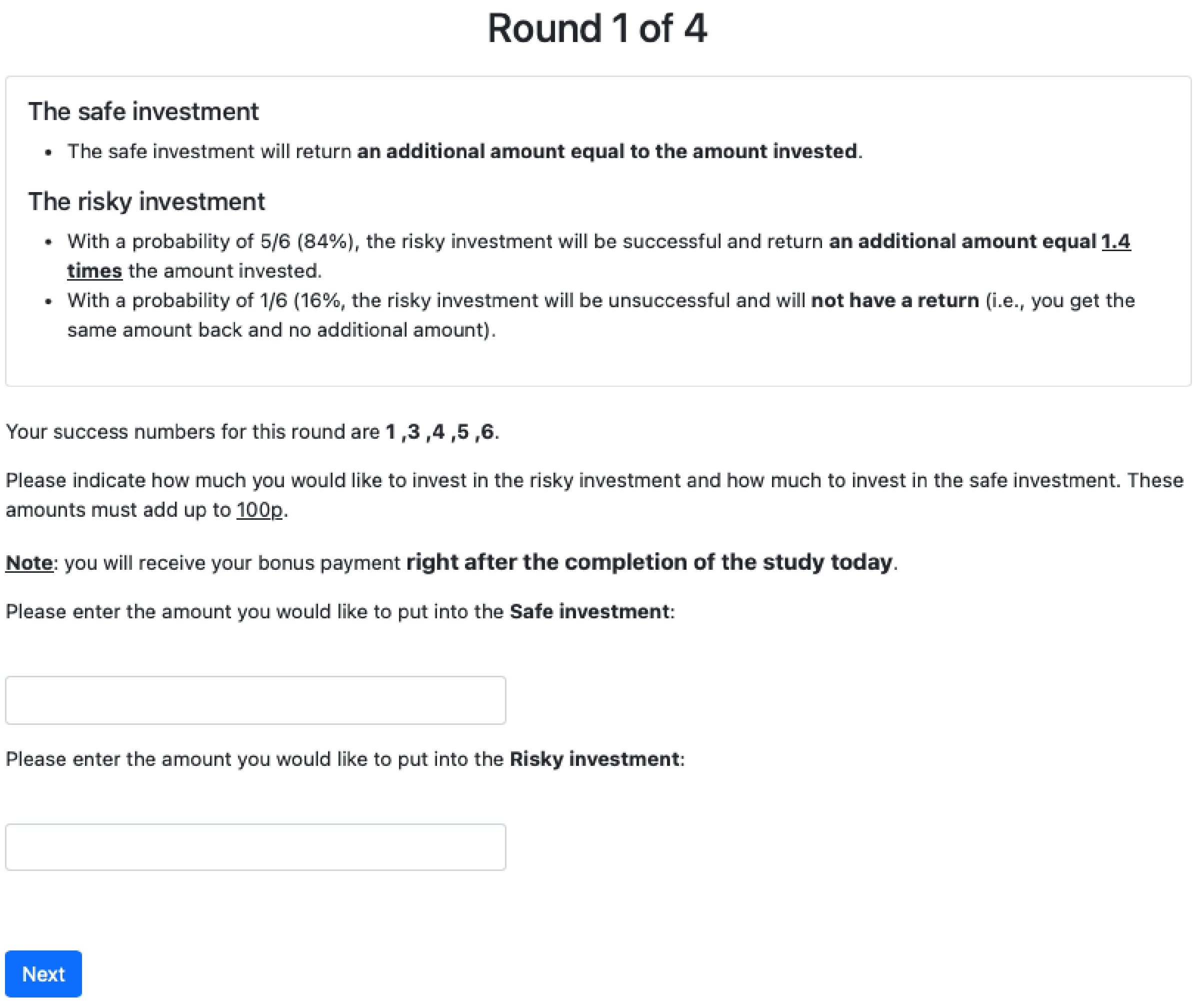
Suppose that instead you decide to invest all your 100p in the risky investment and the risky investment is unsuccessful, what is your total payment?

- ◯ 0p
- ◯ 100p
- ◯ 300p
- ◯ 400p
- ◯ 500p

Submit

Show instructions

B.3 Decision Page



Round 1 of 4

The safe investment

- The safe investment will return **an additional amount equal to the amount invested**.

The risky investment

- With a probability of 5/6 (84%), the risky investment will be successful and return **an additional amount equal 1.4 times** the amount invested.
- With a probability of 1/6 (16%, the risky investment will be unsuccessful and will **not have a return** (i.e., you get the same amount back and no additional amount).

Your success numbers for this round are **1 ,3 ,4 ,5 ,6**.

Please indicate how much you would like to invest in the risky investment and how much to invest in the safe investment. These amounts must add up to 100p.

Note: you will receive your bonus payment **right after the completion of the study today**.

Please enter the amount you would like to put into the **Safe investment**:

Please enter the amount you would like to put into the **Risky investment**:

Next

Figure B.4: Now Condition

Round 1 of 4

The safe investment

- The safe investment will return **an additional amount equal to the amount invested**.

The risky investment

- With a probability of 5/6 (84%), the risky investment will be successful and return **an additional amount equal <u>1.4 times</u>** the amount invested.
- With a probability of 1/6 (16%, the risky investment will be unsuccessful and will **not have a return** (i.e., you get the same amount back and no additional amount).

Your success numbers for this round are **1 ,2 ,4 ,5 ,6**.

Please indicate how much you would like to invest in the risky investment and how much to invest in the safe investment. These amounts must add up to 100p.

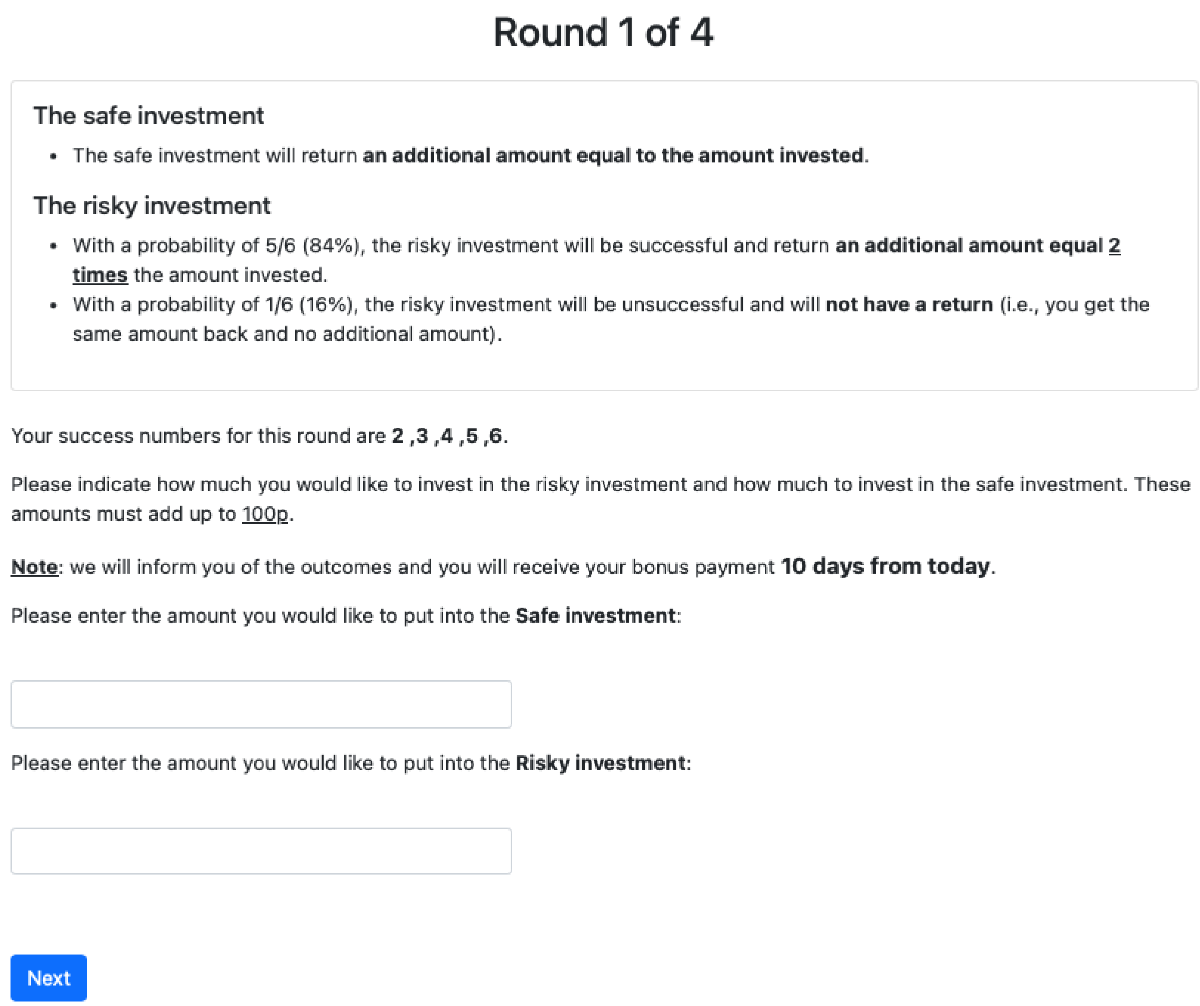
Note: you will receive your bonus payment **10 days from today**.

Please enter the amount you would like to put into the **Safe investment**:

Please enter the amount you would like to put into the **Risky investment**:

Next

Figure B.5: Delay P Condition



Round 1 of 4

The safe investment

- The safe investment will return **an additional amount equal to the amount invested**.

The risky investment

- With a probability of 5/6 (84%), the risky investment will be successful and return **an additional amount equal 2 times** the amount invested.
- With a probability of 1/6 (16%), the risky investment will be unsuccessful and will **not have a return** (i.e., you get the same amount back and no additional amount).

Your success numbers for this round are **2 ,3 ,4 ,5 ,6**.

Please indicate how much you would like to invest in the risky investment and how much to invest in the safe investment. These amounts must add up to 100p.

Note: we will inform you of the outcomes and you will receive your bonus payment **10 days from today**.

Please enter the amount you would like to put into the **Safe investment**:

Please enter the amount you would like to put into the **Risky investment**:

Next

Figure B.6: Delay OP Condition

B.4 End of the Round Feedback

An example screenshot for end of the round feedback is provided below. Note that only participants in Now and Delay P condition received the feedback. Participants assigned to Delay OP did NOT receive any feedback on their investment decisions.

Round 1 Result

	Safe Investment	Risky Investment	
Amount Invested	40p	60p	
		Your success number(s)	**Number rolled by computer**
		1 ,2 ,4 ,5 ,6	1
		Your investment outcome	
		Success	
Investment payment	80p	144p	
Total payment	**224p**		

Next

C Post-experimental Questionnaire

Questionnaire

Have you gambled online in past 12 months?

- ○ Yes
- ○ No

What amount have you gambled in the past 12 months (approximately)?

- ○ Less than £50
- ○ £51 - £200
- ○ £201 - £500
- ○ £501 - £1000
- ○ £1001 - £5000
- ○ £5000 or more

How frequently do you gamble?

- ○ Few times a week
- ○ Few times a month
- ○ Few times a year
- ○ Once in a few years
- ○ Never

Have you ever traveled specifically to engage in gambling activities?

- ○ Yes
- ○ No

Have you bought a lottery ticket in past 12 months?

- ○ Yes
- ○ No

What is the maximum amount in £ you have lost in a single day?

What are the different gambling machines/activities you have ever participated in? Separate each response by a comma.

Next

Questionnaire (Cont')

In comparison to others, are you a person who is generally willing to give up something today in order to benefit from that in the future or are you not willing to do so? Please use a scale from 0 to 10, where 0 means you are "completely unwilling to give up something today" and 10 means "you are very willing to give up something today". You can also use the values in-between to indicate where you are on the scale.

○ 0 ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10

How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please use a scale from 0 to 10 for your assessment. 0 means not at all willing to take risks and 10 means very willing to take risks.

○ 0 ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10

Next

Questionnaire (Cont')

Please read each of the following statements carefully. Rate to what extent you agree or disagree with each statement.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
There are secrets to successful casino gambling that can be learned.	○	○	○	○	○
It is a good advice to stay with the same pair of dice on a winning streak.	○	○	○	○	○
One should pay attention to lottery numbers that often win.	○	○	○	○	○
If a coin is tossed and comes up heads ten times in a row, the next toss is more likely to be tails.	○	○	○	○	○
The longer I have been losing, the more likely I am to win.	○	○	○	○	○

Next

Questionnaire (Cont')

Please select all the options that apply to you.

- ☐ Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
- ☐ Is restless or irritable when attempting to cut down or stop gambling.
- ☐ Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
- ☐ Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
- ☐ Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).
- ☐ After losing money gambling, often returns another day to get even ("chasing" one's losses).
- ☐ Lies to conceal the extent of involvement with gambling.
- ☐ Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
- ☐ Relies on others to provide money to relieve desperate financial situations caused by gambling.
- ☐ None of the options above apply to me.

Next

Questionnaire (Cont')

Please tell us how old you are (in years):

Which gender do you identify with?

- Male
- Female

Which country are you from?

What is your current marital status?

- Married
- Widowed
- Divorced
- Separated
- Never married

What is your current employment status?

- Employed full time
- Employed part time
- Unemployed looking for work
- Unemployed not looking for work
- Retired
- Student
- Disabled

What is highest degree or level of school you have completed?

- Primary school
- GCSEs or equivalent
- A - Levels or equivalent
- University undergraduate programme
- University post - graduate programme
- Doctoral degree

What is highest degree or level of school you have completed?

- Primary school
- GCSEs or equivalent
- A - Levels or equivalent
- University undergraduate programme
- University post - graduate programme
- Doctoral degree

What is your annual household income?

- Less than £10,000
- £10,000 - £19,999
- £20,000 - £29,999
- £30,000 - £39,999
- £40,000 - £49,999
- £50,000 - £59,999
- £60,000 - £69,999
- £70,000 - £79,999
- £80,000 - £89,999
- £90,000 - £99,999
- £100,000 - £149,999
- More than £150, 000
- Prefer not to say

Next

D Remaining tables

Table D.1: Average risky investments by treatment and scenario

Treatment	**Scenario**	**N**	**Mean**	**Low CI**	**High CI**
	A	190	31.5263	27.47193	35.5807
	B	190	29.9421	26.01199	33.87222
Now	C	190	64.2053	59.80305	68.60748
	D	190	56.5158	51.80543	61.22615
	All	760	45.5474	43.1637	47.93103
	A	185	34.2919	30.11409	38.4697
	B	185	33.8973	29.79204	38.00255
Delay P	C	185	64.3568	59.94543	68.76808
	D	185	55.827	50.89488	60.75917
	All	740	47.0932	44.69705	49.48944
	A	183	40.6721	36.25946	45.0848
	B	183	41.9836	37.44727	46.51995
Delay OP	C	183	65.4262	60.88767	69.96479
	D	183	60.3552	55.39741	65.31297
	All	732	52.1093	49.68382	54.53476

Table D.2: Utility parameters for the anticipation model

Scenarios		Delay Payment			Delay Information		
		Yes	No	Diff	Yes	No	Diff
	N	940	424		480	884	
	r	1.5991	1.6334	-.03433 (p=0.7581)	1.5548	1.6396	-0.0848 (p=0.4330)
A, B	N	470	212		240	442	
	γ_{p12}	0.4209	0.3360	0.085** (p=0.0384)	0.4606	0.3586	0.1020** (p=0.0103)
C, D	N	506	268		254	520	
	γ_{p34}	6.22×10^{24}	1.68×10^{21}	6.22×10^{24} (p=0.3035)	1.24×10^{25}	8.68×10^{20}	1.24×10^{25}** (p=0.0428)

*** p<0.01, ** p<0.05, * p<0.1

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