I Want to Know it Now: Measuring Preferences Over the Temporal Resolution of Consumption Uncertainty*

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PRELIMINARY VERSION

Comments welcome.

Abstract

We design an experiment to elicit preferences over the temporal resolution of *consumption* uncertainty as axiomatized in Kreps and Porteus (1978) and Epstein and Zin (1989). Subjects consume in the lab by surfing YouTube which is contrasted by a real effort task. Lotteries over consumption at different points in time introduce actual consumption uncertainty – as opposed to income uncertainty. Assessing a series of choices, we find that on average, subjects are willing to forgo about 4% of their total consumption in order to expedite the resolution of consumption uncertainty. A structural estimation suggests that subjects on average indeed prefer an early resolution consumption uncertainty. This, however, is mainly driven by a minority of subjects with a strong preference for early resolution.

Keywords Recursive Utility · Timing of Resolution of Uncertainty · Preference Elicitation

JEL Classification C90 · D80 · D90 ·

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1 Introduction

Imagine your life time consumption path was fully predetermined but unknown to you. Would you be willing to pay in order to learn about your life time consumption now? If so, how much?

This question is at the core of recursive utility (henceforth, RU) models as in Kreps and Porteus (1978) and Epstein and Zin (1989). RU models build on the idea that agents have intrinsic preferences towards the resolution of *consumption uncertainty* over time. In general, there are many reasons why individuals may prefer uncertainty to resolve early. For example, individuals may favor an early resolution of the uncertainty regarding their future income in order to optimally choose between spending and saving. In RU models, however, an early resolution of uncertainty may be preferred even if this information has no instrumental value. By assuming a nonindifference towards the timing of the resolution of consumption uncertainty, RU decouples attitudes towards risk from the elasticity of intertemporal substitution (EIS), i.e. the willingness to shift consumption over time.[1] This additional flexibility has proven very useful in a host of studies in finance and macroeconomics. A prime example is the seminal work of Bansal and Yaron (2004). Utilizing preferences for an early resolution of uncertainty, their long-run risk model offers a unified explanation of several empirical asset pricing puzzles.[2] Despite the recent success of RU, the question whether individuals actually exhibit a preference for the temporal resolution of *consumption uncertainty* remains unclear.

Recently, Epstein et al. (2014) argue that the macro-financial literature has ignored the full implications of assuming a preference for the temporal resolution of uncertainty. They show how common parameter specifications lead to implausibly high timing premia, i.e. the amount of consumption one would be willing to forgo in exchange for consumption uncertainty to be resolved early.[3] In the end, the question whether individual preferences

[1] In the expected utility framework, the coefficient for relative risk aversion is always the reciprocal of the EIS. Note the separation of these parameters under RU is only possible *via* the notion of timing of the resolution of uncertainty.

[2] See their conclusion (Bansal and Yaron, 2004, p. 1502): “The model is capable of justifying the observed magnitudes of the equity premium, the risk-free rate, and the volatility of the market return, dividend-yield, and the risk-free rate. Further, it captures the volatility feedback effect, that is, the negative correlation between return news and return volatility news. As in the data, dividend yields predict future returns and the volatility of returns is time-varying.”

[3] In the same paper, the authors highlight the need for empirical studies, measuring potential timing premia and thus giving empirical guidance to theoretical studies. So far only purely theoretical results are available. Agents in Bansal and Yaron (2004) would give up a debatable fraction of 31% of their life time consumption to have all uncertainty resolved early (Epstein et al. (2014)). Petrosky-Nadeau et al. (2015) calculate timing premia arising in an economy with endogenous disasters via Monte Carlo simulations. They report a timing premium of 17%. However, there is no empirical counterpart available to evaluate these results.

exhibit such timing premia, and what magnitude they have, is an empirical one. In this paper, we aim to answer this question by running a laboratory experiment. Subjects in our experiment complete three incentivized multiple price lists (henceforth MPLs, see Coller and Williams (1999), Holt and Laury (2002)) that assess preferences over time, risk and the temporal resolution of uncertainty, respectively. Instead of choosing over lotteries that yield monetary rewards, however, subjects in our experiment choose over real consumption, represented by a real effort task and YouTube surfing time. Accordingly, we are able to directly measure how much consumption (surfing time) subjects are willing to forgo in order to have all risk resolved early and learn the precise amount of future work and consumption.

This is one key contribution of our work: Unlike all existing studies that we are aware of, we test intertemporal attitudes towards *consumption* uncertainty - and *not* uncertainty about income. Even under standard (non-recursive) preferences, early resolution of income uncertainty should be preferred because information about future income can be used to improve consumption decisions. With respect to consumption uncertainty, no such planning advantage exists, because at the time all uncertainty is resolved (i.e. future consumption is known for certain) future consumption cannot be changed. RU models imply that agents nevertheless may be non-indifferent towards the timing of the resolution of consumption uncertainty.

Monetary rewards as experimental incentives should be internalized as income and not consumption by subjects. They allow to test if subjects correctly anticipate the planning advantage associated with knowing income early, but not whether subjects have a preference for the temporal resolution of consumption uncertainty in the way described by RU models. Hence, estimating preference parameters that are defined over the domain of consumption using monetary payments potentially leads to biased results. Moreover, observing that subjects in the laboratory prefer early resolution with respect to monetary payments is not sufficient to infer that subjects also prefer early resolution with respect to consumption uncertainty.

Additional confounds exist when using choices over monetary rewards instead of choices over consumption, in order to identify time and risk preferences. Among these are subjective assessments of the experimenter's payment reliability as well as arbitrage options with the outside world (see Augenblick et al. (2013)).

A number of previous efforts exist on identifying preferences over the temporal resolution of risk.[4] Closest to our study are Von Gaudecker et al. (2011) and Brown and Kim (2013). Von Gaudecker et al. (2011) use MPLs to estimate preferences with respect to

[4]See, e.g., Chew and Ho (1994), Ahlbrecht and Weber (1997), Brown and Kim (2013), Erev and Haruvy (2010), Abdellaoui et al. (2011), Von Gaudecker et al. (2011), Van Winden et al. (2011) and Miao and Zhong (2015).

risk, loss aversion and timing of risk resolution. They find preferences for the resolution of uncertainty to be the least important factor in determining subjects choices. In another study based on MPLs, Brown and Kim (2013) find that most subjects prefer an early resolution of uncertainty. Miao and Zhong (2015) provide empirical support for the RU model using a convex time budget setup. However, all of these studies use monetary rewards as incentives, and therefore fall prey to the above mentioned confounds. Moreover, Epstein et al. (2014) point out that these studies focus on identifying whether subjects prefer early or late resolution but not on assessing the strength of these preferences. In contrast to existing studies, our approach allows to directly identify the magnitude of timing premia as well as estimating all necessary parameters of standard RU specifications.

We find that subjects on average prefer an early resolution of consumption uncertainty. Subjects are willing to forgo about 4.4% of their consumption in order to expedite the resolution of consumption uncertainty by five weeks. A joint estimation of the parameters of Epstein-Zin utility implies a separation of risk preferences and preferences for intertemporal substitution, confirming that subjects on average prefer an early resolution of consumption uncertainty. However, there appears to be a large heterogeneity with respect to the preference for early resolution at the individual level: most subjects appear to be indifferent to the temporal resolution of uncertainty, while a significant minority of subjects appears to have a strong preference for the early resolution of uncertainty. No subject has a strong preference for the late resolution of uncertainty.

The remainder of this paper is organized as follows. Sections 2 and 3 describe our theoretical and experimental framework. Section 4 discusses our results and Section 5 concludes.

2 Theoretical Framework

This section illustrates the theoretical background that guides our experimental design. A recursive utility function can be written as follows:

$$U_t(C) = W\left(C_t, \mathcal{R}_t\left(U_{t+1}(C)\right)\right), \tag{1}$$

where U_t represents utility at time t. $W(\cdot,\cdot)$ is a time aggregator function that summarizes how consumption is valued at different points in time (intertemporal substitution). It is defined on current consumption and the conditional certainty equivalent of future utility, $\mathcal{R}_t$, which captures attitudes towards uncertainty.

A popular choice for the specific functional forms introduced by Epstein and Zin (1989) is

$$W\left(C\right) = \left[C_t^{\rho} + \beta \mathcal{R}_t \left(U_{t+1}\left(C\right)\right)^{\rho}\right]^{1/\rho}, \tag{2}$$

with

$$\mathcal{R}_t \left(U_{t+1}\left(C\right)\right) = \Big(\mathbb{E}_t \left[U_{t+1}^{\alpha}\right]\Big)^{1/\alpha}, \tag{3}$$

where ρ determines the EIS, β is the time discount factor and α determines the agents relative risk aversion. With this specification RU can be written as:

$$U_t\left(C\right) = \left[C_t^{\rho} + \beta\Big(\mathbb{E}_t \left[U_{t+1}^{\alpha}\right]\Big)^{\rho/\alpha}\right]^{1/\rho}. \tag{4}$$

Note that recursive utility nests the expected utility as the special case of $\alpha = \rho$. Only under this constellation, agents are indifferent towards the timing of the resolution of uncertainty. For $\alpha < \rho$, agents prefer early resolution of consumption uncertainty and for $\alpha > \rho$, agents prefer late resolution of consumption uncertainty.

2.1 Preferences for the temporal resolution of uncertainty

Consider the following random consumption stream (for sake of exposition, we label the dates according to our experimental setup). An individual lives for three periods ($t = (1, 2, 3)$) and faces consumption at period 2 and period 3, denoted C_2 and C_3, respectively. Both are i.i.d. random variables. There exist two options: early draw and late draw. With an early draw (ED), both C_2 and C_3 get drawn at date 2. With a late draw (LD), C_2 gets drawn at $t = 2$ and C_3 gets drawn late, at $t = 3$.

In Appendix A, we show that with an ED the specification in (4) collapses to

$$U_1^{ED}(C) = \mathbb{E}_1\left[\Big(C_2^{\rho} + \beta C_3^{\rho}\Big)^{\alpha/\rho}\right]^{1/\alpha}. \tag{5}$$

In case of late draw, however, C_3 will only be drawn at date 3. The agent's consumption path remains uncertain until date 3 and

$$U_1^{LD}(C) = \mathbb{E}_1\left[\Big(C_2^{\rho} + \beta \mathbb{E}_2\left[C_3^{\alpha}\right]^{\rho/\alpha}\Big)^{\alpha/\rho}\right]^{1/\alpha}. \tag{6}$$

This simple example shows how the temporal resolution of uncertainty matters. Generally, unless in the special case of expected utility ($\alpha = \rho$):

$$U_1^{ED} \neq U_1^{LD}. \tag{7}$$

Equation (7) shows that in the RU setup, the two consumption streams – which differ only in the temporal aspect of the resolution of uncertainty – are ranked differently. At an axiomatic level, the timing of the resolution of uncertainty matters because RU abandons the reduction of compound lotteries axiom of expected utility (EU) theory.[5] Intuitively, temporal compound lotteries can no longer be reduced to simpler structures and therefore the time dimension of uncertainty resolution matters. We refer for further discussion of the theoretical foundations to, e.g., Kreps and Porteus (1978), Chew and Epstein (1989), Epstein and Zin (1989) and Weil (1990).

3 Experimental Design

We run a total of three experimental sessions at three different points in time, in order to introduce a real time dimension. We will refer to these three points in time as $t = 1$, 2 and 3 respectively. The first two sessions are one week apart and the second and third sessions are four weeks apart. The first session ($t = 1$) lasted 60 minutes, and the last two sessions ($t = 2, 3$) lasted 90 minutes. At $t = 1$ subjects are presented with three MPLs which specify timing and risk of units of effort that have to be exerted. The three lists elicit time preferences, risk preferences and preferences over the timing of consumption uncertainty resolution, respectively. The choices elicited in these MPLs are sufficient to estimate the three parameters α, β and ρ in the recursive utility model, jointly. To control for present bias, the price lists contain units of effort to be exerted in the future, i.e. in $t = 2$ and/or $t = 3$. All payments take place after date 3. Figure 1 contains a graphical representation of the time line of our experiment.

3.1 Real Effort Task

One key feature of this experiment is the use of consumption instead of monetary payments as an incentive for the choices subjects face. Subjects spend a fixed amount of time in the lab and earn a lump-sum payment.[6] They consume in the lab by watching YouTube

[5] In this broad sense, our approach can be seen as part of a more general branch of behavioral economics that is motivated by the empirical evidence against the EU framework such as the Allais paradox and the Ellsberg paradox.

[6] Subjects receive a completion bonus conditional on completing all real effort tasks. See Section 3.3 for details.

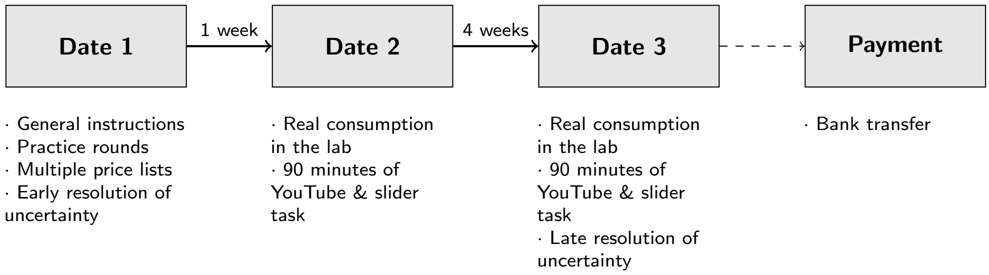

Figure 1: Time Line of Experimental Design

which is contrasted by a real work task similar to Augenblick et al. (2013) and Pagel and Zeppenfeld (2013).[7] This allows us to introduce actual consumption risk – as opposed to income risk – in our setting.

The real effort task is a modified version of the "slider task" in Gill and Prowse (2011) and was programmed and implemented in Z-tree (Fischbacher (2007)). One work unit (WU) consists of four "sliders" which subjects have to move to the value 50 within an allotted time frame of 30 seconds.[8] We choose the task to be purposefully monotone and annoying – an unpleasant experience. It contrasts the surfing time and makes it a far more pleasurable activity. It also ensures that participants take their choices seriously. A post-experimental questionnaire confirmed that subjects indeed perceived the task as boring, effortful and less pleasurable than surfing YouTube.

Importantly, each work unit lasts 30 seconds, even if subjects finish the task earlier. This way, work units, as well as consumption can be measured in units of 30 seconds of time. Since subjects spend 90 minutes in the lab, a total of 180 of these units can be divided between work and consumption time: $180 = WU + C$, where C denotes 30 second units of consumption (time spent surfing YouTube).

3.2 Preference Elicitation

In our experimental setup, subjects are presented with a total of 60 binary choices between two Options, A and B. Subjects complete all 60 choices which are grouped into three parts,

[7] Pagel and Zeppenfeld (2013) as well as Houser et al. (2010) proxy real consumption by internet surfing time vs. a boring monotone task such as clicking on pop-up windows. Pagel and Zeppenfeld (2013) further disentangle consumption from monetary payoffs by using a closed life-cycle design. Surfing the internet or YouTube is particularly attractive because subjects are familiar with this activity (see also Aperjis et al. (2014) who use surfing time on YouTube as a desirable activity). More importantly, we believe that restricting the subjects "leisure" in the lab to YouTube decouples choices in the lab from outside consumption. We see this is a prerequisite to study timing premia. Theoretically, if subjects were allowed to surf the internet freely, they could use this time to plan and engage in tasks relevant to choices outside of the lab. This would constitute an instrumental planning advantage independent of preferences towards the timing of the resolution of uncertainty.

[8] See Appendix C for a screenshot of the slider task.

	Option A		Option B		monthly	β intervals	
	$t = 2$		$t = 3$		interest rate	if subject switches to	
row	WU	C	WU	C	(in percent)	Option B and $\alpha = \rho = 1$)	
1	80	100	90	90	-10	1.11,	∞
2	80	100	87	93	-7	1.08,	1,11
3	80	100	85	95	-5	1.05,	1.08
4	80	100	83	97	-3	1.03,	1.05
5	80	100	82	98	-2	1.02,	1.03
6	80	100	81	99	-1	1.01,	1.02
7	80	100	80	100	0	1,	1.01
8	80	100	79	101	1	0.99,	1
9	80	100	78	102	2	0.98,	0.99
10	80	100	77	103	3	0.97,	0.98
11	80	100	75	105	5	0.95,	0.97
12	80	100	73	107	7	0.93,	0.95
13	80	100	71	109	9	0.92,	0.93
14	80	100	69	111	11	0.9,	0.92
15	80	100	67	113	13	0.88,	0.9
16	80	100	64	116	16	0.86,	0.88
17	80	100	60	120	20	0.83,	0.86
18	80	100	56	124	24	0.81,	0.83
19	80	100	52	128	28	0.78,	0.81
20	80	100	40	140	40	0.71,	0.78

Notes: Only the second and fourth column specifying the WU were shown to the subjects. Consumption and WU are measured in units of 30 seconds. Subjects spend a total of 90 minutes in the lab. The column β represents implied discount rates that are consistent to switching to Option B for the first time in the respective row, assuming $\alpha = \rho = 1$.

Table 1: Price List for Time Preferences

with 20 decisions each. After the experiment one of the 60 choices is selected randomly to determine the timing and amount of work units that have to be completed.[9]

The subjects first play a time-dated intertemporal price list (Part I) (Coller and Williams (1999)). Table 1 describes this price list. Subjects make a total of 20 choices between two Options, A and B, which specify amounts of work units that have to be completed at $t = 2$ and $t = 3$ respectively. Option A specifies a fixed amount of 80 WU for all 20 rows. Under Option B the amount of work units starts out at 90 units and then decreases as one moves down the list. For convenience, Table 1 also shows consumption $C = 180 - WU$, as well as implied monthly interest rates and β intervals consistent with

[9] Laury (2006) finds no significant difference when subjects are paid for all decisions instead of getting paid for only one.

	Option A				Option B						α intervals
	heads		*tails*		*heads*		*tails*				if subject
row	WU	C	WU	C	WU	C	WU	C	$E[C_A]$	$E[C_B]$	switches to B
1	70	110	90	90	20	160	178	2	100	81	1.48, ∞
2	70	110	90	90	20	160	174	6	100	83	1.46, 1.48
3	70	110	90	90	20	160	170	10	100	85	1.44, 1.46
4	70	110	90	90	20	160	166	14	100	87	1.41, 1.44
5	70	110	90	90	20	160	162	18	100	89	1.38, 1.41
6	70	110	90	90	20	160	158	22	100	91	1.33, 1.38
7	70	110	90	90	20	160	154	26	100	93	1.28, 1.33
8	70	110	90	90	20	160	150	30	100	95	1.22, 1.28
9	70	110	90	90	20	160	146	34	100	97	1.14, 1.22
10	70	110	90	90	20	160	142	38	100	99	1.05, 1.14
11	70	110	90	90	20	160	138	42	100	101	0.94, 1.05
12	70	110	90	90	20	160	134	46	100	103	0.82, 0.94
13	70	110	90	90	20	160	130	50	100	105	0.67, 0.82
14	70	110	90	90	20	160	126	54	100	107	0.48, 0.67
15	70	110	90	90	20	160	122	58	100	109	0.26, 0.48
16	70	110	90	90	20	160	118	62	100	111	-0.01, 0.26
17	70	110	90	90	20	160	114	66	100	113	-0.35, -0.01
18	70	110	90	90	20	160	110	70	100	115	-0.78, -0.35
19	70	110	90	90	20	160	106	74	100	117	-1.35, -0.78
20	70	110	90	90	20	160	102	78	100	119	-2.14, -1.35

Notes: Only the columns specifying the WU were shown to the subjects. Consumption and WU are measured in units of 30 seconds. Subjects spend a total of 90 minutes in the lab. The last column α represents CRRA relative risk aversion parameter intervals that are consistent to switching to Option B for the first time in the respective row.

Table 2: Price List for Risk Preferences

switching to Option B in each row, assuming $\alpha = \rho = 1$. In the experiment, subjects were only shown the columns specifying work units.[10]

Second, subjects play a binary lottery choice list (Part II) (Holt and Laury (2002)), in order to assess risk aversion. Table 2 illustrates the second price list. In this list, Option A and B are lotteries. Option A yields either 70 or 90 WU, both with equal probability, implemented with a coin toss. Option B yields 20 WU if the coin toss yields *heads*. If the coin toss yields *tails*, the amount of work units to be completed starts out at 178 in the first row, and then gradually decreases to 102 in the last row.[11]

[10]See Appendix C for the multiple price lists as they were presented to subjects.

[11]Option A and B in this task always take place at the same date. The specific date at which the work units have to be completed is irrelevant for identifying risk aversion. Therefore, the dates were selected according to individual preferences and availability in the lab.

	Option A (early resolution)						Option B (late resolution)					
	$t=2$		$t=3$				$t=2$		$t=3$			
			heads		*tails*				*heads*		*tails*	
row	WU	C	WU	C	WU	C	WU	C	WU	C	WU	C
1	80	100	10	170	160	20	105	75	10	170	160	20
2	80	100	10	170	160	20	99	81	10	170	160	20
3	80	100	10	170	160	20	94	86	10	170	160	20
4	80	100	10	170	160	20	90	90	10	170	160	20
5	80	100	10	170	160	20	87	93	10	170	160	20
6	80	100	10	170	160	20	85	95	10	170	160	20
7	80	100	10	170	160	20	83	97	10	170	160	20
8	80	100	10	170	160	20	82	98	10	170	160	20
9	80	100	10	170	160	20	81	99	10	170	160	20
10	80	100	10	170	160	20	80	100	10	170	160	20
11	80	100	10	170	160	20	79	101	10	170	160	20
12	80	100	10	170	160	20	78	102	10	170	160	20
13	80	100	10	170	160	20	77	103	10	170	160	20
14	80	100	10	170	160	20	75	105	10	170	160	20
15	80	100	10	170	160	20	73	107	10	170	160	20
16	80	100	10	170	160	20	70	110	10	170	160	20
17	80	100	10	170	160	20	66	114	10	170	160	20
18	80	100	10	170	160	20	61	119	10	170	160	20
19	80	100	10	170	160	20	55	125	10	170	160	20
20	80	100	10	170	160	20	48	132	10	170	160	20

Notes: Only the columns specifying the WU were shown to the subjects. Consumption and WU are measured in units of 30 seconds. In Option A the uncertainty was resolved immediately and in Option B only right before engaging in the work task at date 3.

Table 3: Price List for Uncertainty Resolution

The third task (Part III) is used to pin down subjects' timing premia, the amount of consumption subjects are willing to forgo in order to resolve uncertainty early (Table 3). Here, Option A and Option B both contain a lottery over units of work that have to be exerted at $t = 3$ and a safe amount of work that has to be completed at $t = 2$. The lottery is the same for both options, except that the uncertainty is resolved at different points in time. Under Option A subjects toss a coin at the end of $t = 1$ and know their future consumption and work units early. Under Option B the coin is tossed at the start of $t = 3$. Accordingly, the uncertainty is resolved just before the work units for this date have to be completed. The certain amount of WU to be completed under Option B starts out at 105 in the first row and then gradually decreases to 48 in the last row, while under Option A the certain amount remains constant at 80 WU.

All subjects complete the three parts in this order. While a randomization of order seems preferable from a theoretical point of view, we believe that the degenerate lottery in our time preference elicitation list is a good way to familiarize subjects with the concept, and thus to minimize choice mistakes. In each part, subjects are allowed to switch freely between the two options. As such we allow subjects to make inconsistent choices by choosing "multiple switch points". Only 14.44% of the multiple price lists completed by our subjects exhibited multiple switch points. We interpret this as indicative that a vast majority of our subjects understood the procedure well.

3.3 Experimental Procedures

A total of 30 subjects participated in our experiment. Most of the subjects were undergraduate students from Berlin University of Technology with a variety of academic backgrounds. All sessions were run at the Experimental Economics Laboratory of Berlin University of Technology. To avoid systematic preferences for any of the dates, all session were run on same weekday and time of day. All subjects were recruited through ORSEE (Greiner (2015)).

Subjects first received a set of general instructions, describing the experiment. They then solved 10 practice work units to understand the nature of this task. After that, the three multiple price lists were handed out sequentially together with the instructions on sheets of paper.[12] Throughout the experiment, subjects were first given time to read the instructions, and then the instructions were read aloud by the experimenter. After the experiment, subjects were asked to complete a questionnaire about their behavior during the experiment.

Subjects received a fixed amount of 5 € for each session they showed up at the laboratory and a completion bonus of 35 €, that was only paid in full if they completed all assigned real effort work tasks. None of our subjects had difficulties fulfilling the task and all subjects completed all assigned work units.[13]

Subjects received on average 46.3 € for their participation. All subjects were paid after the third date via bank transfer. The high completion bonus of 35 € ensured that all subjects but two showed up to the following sessions.

[12] See the Appendix C for the instructions.

[13] On one hand, we require the task to be effortful enough to incentivize subjects' choices and render their time on YouTube more pleasurable. On the other hand, we have to ensure that the task is easy enough such that subjects do not face any risks regarding their payments. A post-experimental questionnaire confirms that this was indeed the case.

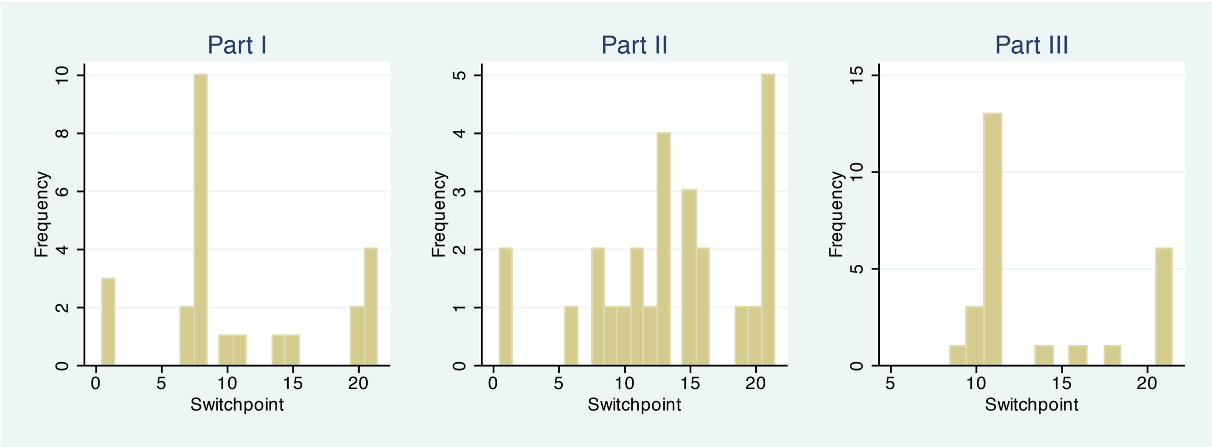

Figure 2: Switch Points

4 Results

In this Section, we first examine observed switch points in our MPLs, and then discuss our strategy to estimate the parameters of the RU model as in Epstein and Zin (1989). Finally, we define and discuss timing premia at the individual level.

4.1 Switch Points

A switch point is defined as the decision line in which a subject first starts to prefer Option B to Option A. Subjects who switch multiple times between Option A and Option B do not have a well defined switch point, and were therefore excluded from the switch point analysis. Subjects who always chose B were assigned a switch point of 1 and subjects who always choose A were assigned a switch point of 21. Figure 2 displays the distribution of switch points for the three multiple price lists.

The switch points can be interpreted as follows: in Part I, subjects who switch from Option A to Option B below decision line 7, have a discount factor β below 1 (assuming $\alpha = \rho = 1$). In Part II, a risk neutral subject would choose Option A until row 10 and then switch to Option B at row 11. Switch points above 11 indicate risk aversion ($\alpha < 1$) and subjects who switch below row 10 are risk loving ($\alpha > 1$). In Part III, subjects who are indifferent towards the temporal resolution of consumption uncertainty are indifferent between Option A and B in row 10 and strictly prefer Option B from row 11 onwards. Switch points above 11 indicate a preference for the early resolution of uncertainty and switch points below 10 indicate a preference for the late resolution of uncertainty.

The mean switch points in our sample are 10.84, 13.46 and 13.69 for Part I, II and III respectively. This implies that subjects on average have a discount factor below 1, are risk averse and prefer the early resolution of consumption uncertainty.

4.2 Maximum Likelihood Estimation

Table 4 reports maximum likelihood estimates of the model parameters that characterize all choices by all subjects. Our estimation strategy broadly follows Andersen et al. (2008) and Harrison and Rutström (2009). Intuitively, Part II identifies risk preferences (α). Part I and II, allow to identify time preferences (β). Finally, Part III together with I and II can be used to identify the EIS (determined by ρ). In the following, we lay out our strategy to estimate these parameters jointly. Let $C_{j,2}$ and $C_{k,3}$ denote each outcome in the lotteries at date 2 and 3, respectively. $j \in \{Heads, Tails\}$ (date 2) and $k \in \{Heads, Tails\}$ (date 3) specify all contingencies. The RU with an early resolution of uncertainty for each decision i is

$$RU_i^{ED} = \sum_{j=H,T} \sum_{k=H,T} \left(p_{j,2} \times p_{k,3} \times \left(C_{j,2}^{\rho} + \beta C_{k,3}^{\rho} \right)^{\alpha/\rho} \right), \tag{8}$$

where $p_{j,2}$ and $p_{k,3}$ denote the probabilities associated with the consumption levels at date 2 and 3. This corresponds to Equation (5).[14]

In Part III, the lottery outcome for Option B is resolved late (at date 3). In the RU framework, the conditional certainty equivalent contains future utility from consumption. We thus rewrite (8) according to the late draw specification in Equation (6). In the third MPL, the RU associated with a late resolution of uncertainty for each decision i is

$$RU_i^{LD} = \sum_{j=H,T} \left(p_{j,2} \times \left(C_{j,2}^{\rho} + \beta \mathcal{R}_i^{\rho} \right)^{\alpha/\rho} \right), \tag{9}$$

where the certainty equivalent is given by

$$\mathcal{R}_i = \sum_{k=H,T} \left(p_{k,3} \times \left(C_{k,3}^{\alpha} \right) \right)^{\frac{1}{\alpha}}. \tag{10}$$

The underlying structural model of the choices is a deterministic RU model as stated in equation 2 and 3. For our estimation, we allow for a stochastic element in the observed choices for Option A or B in the experimental data. In other words, we assume that subjects state their true preferences disturbed by some noise.[15] The difference in utilities for each choices is thus evaluated as

$$\nabla RU = \frac{RU_B - RU_A}{\exp(\mu)}, \tag{11}$$

[14]Subjects in the experiment made choices over work effort rather than consumption. However, for the estimation of preference parameters we make use of the identity $C = 180 - WU$.

[15]See for example Hey and Orme (1994). Decision-making errors may, for example, be caused by simple mistakes (trembles), a misunderstanding of experimental procedures or attention lapses etc.

Parameter	Point Estimate	Standard Error	P-value	95% Confidence Intervals	
α	0.775	0.109	0.039	0.562	0.989
β	0.914	0.036	0.017	0.844	0.985
ρ	1.274	0.250	0.273	0.784	1.762
μ	1.578	0.607	<0.001	0.388	2.766

Notes: This tables reports the maximum likelihood estimates using stochastic decision errors. $N = 1800$ as all choices (60) by all subjects (30) are included. Standard errors are clustered at the subject level. The log-likelihood is -998.7. P-values of the first three parameters estimated (α, β and ρ) refer to tests of the H_0 that the respective variable is equal to one. For the tremble parameter μ, the p-value refers to a test of the H_0 that the parameter is equal to 0 (utility maximization).

Table 4: Maximum Likelihood Estimates of Model Parameters

where μ is a simple structural "tremble" parameter.[16] For $\mu \to 0$, we find utility maximization as in the deterministic model. As μ goes up, the choices become increasingly random. For $\mu \to \infty$, the choice boils to down uniform randomization between Option A and B. The likelihood of the observed choices depends on all choices of all subjects and the three parameters governing time discounting preferences, RA and EIS.

Conditional on the recursive utility model being true, the log of the likelihood function is

$$\log L^{EZ}(\beta, \alpha, \rho, \mu; y) = \sum_i ((\log(-\nabla RU)|y_i = 1) + (\log(\nabla RU)|y_i = 0)), \qquad (12)$$

where $y_i = 1$ encodes the choice of Option B and $y_i = 0$ the choice of Option A in decision $i \in \{1, ..., 60\}$.

The point estimate for the risk-aversion parameter α equals 0.775 with a standard error of around 0.1. This indicates our subjects are on average risk-averse. The time discount factor β is 0.914 is also within a reasonable range. Importantly, these estimates for α and β are well in line with previous evidence. This confirms that our real consumption setup provides enough incentives for subjects to reveal their preferences.

Next, we turn to ρ, the parameter determining the EIS. The point estimate of 1.274 is higher than the risk-aversion parameter and not significantly different from 1. The 95% confidence interval for ρ is fairly large ranging from 0.784 up to 1.762. Note, however, that the point estimate for α lies outside of this confidence interval indicating a preference for an early resolution of consumption uncertainty. Additionally, we estimate a nested model where $\alpha = \rho$. A likelihood ratio test shows that the less restrictive model where α and ρ are separated fits the data significantly better ($p < 0.001$). Thus, the observed aggregate choice behavior supports a decoupling of risk preferences and intertemporal substitution

[16] A probabilistic choice specification with $\nabla RU = RU_B^{1/\mu}/(RU_B^{1/\mu} - RU_A^{1/\mu})$ as in Holt and Laury (2002) and Andersen et al. (2008) leads to similar results.

in the RU model. This is broadly in line with Miao and Zhong (2015) who find support for the parameter separation using monetary payments.

4.3 Timing Premia

One advantage of our third MPL (Part III) is that we can directly infer timing premia from the choices subjects make in this part. The timing premium in our framework is the percentage of expected consumption a subject is maximally willing to forgo over the course of the experiment in order to expedite the resolution of consumption uncertainty. For each row of Table 3, we can calculate the interval of potential timing premia that are consistent with choosing Option B for the first time in this line.[17] To approximate the premium, we use the mean of this interval to represent the timing premium. The premium defines the maximum amount of consumption (relative to their expected experimental "life time" consumption) that subjects are willing to forgo in order to have uncertainty resolved early. Accordingly, for subjects who do not always choose Option A or B,[18] the approximation of the timing premium, TP, can be written as

$$TP = \frac{\overline{C}_2^B - C_2^A}{C_2^A + E[C_3]}, \tag{13}$$

where $\overline{C}_2^B$ is the mean value of the two consumption levels specified for Option B at $t = 2$ in the rows in which a subject first switches to B and the row before. $C_2^A = 100$ is consumption at $t = 2$ for Option A and $E[C_3] = 95$ is expected consumption for Option A and B at $t = 3$.

A histogram of the timing premia for all subjects who have a single switch point in Part III is provided in Figure 3. While the mean timing premium is 4.4% it is apparent from the histogram that there is substantial heterogeneity in our sample with respect to timing premia. A majority of subjects (56.67%) have timing premia very close to 0. A significant minority of subjects, however appears to have rather large timing premia. Six subjects (20%) have a timing premium of 16.4% (or above), i.e. they are willing to forgo at least 16.4% of their overall consumption in order to expedite the resolution of consumption uncertainty. Another three subjects (10%) are in between the extremes,

[17] For an extended version of Table 3 including timing premia intervals, see Appendix B.

[18] For subjects who always choose Option A (Option B) this interval has no upper (lower) bound. In this case, we approximate the timing premium with the lower (upper) bound of this interval.

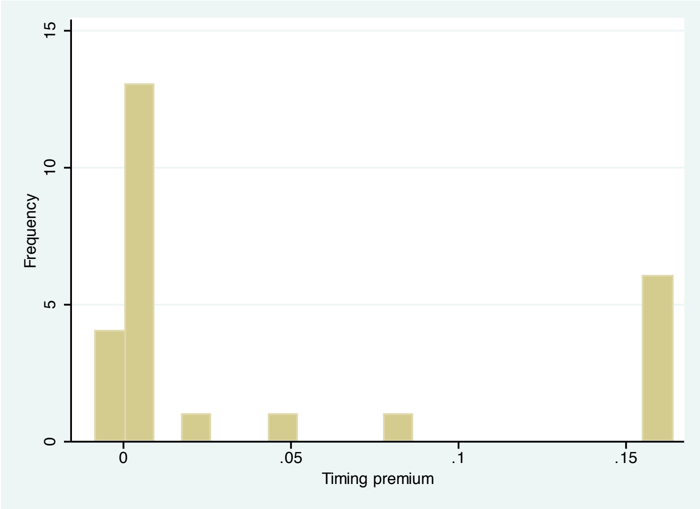

Figure 3: Timing Premia

exhibiting moderate levels of timing premia.[19] Notably, no subject has a strong preference for the late resolution of consumption uncertainty.[20]

Summing up, while it appears that subjects do have a preference for the early resolution of uncertainty on the aggregate, individual level analysis reveals a substantial heterogeneity in preferences. A majority of subjects appears to be indifferent towards the temporal resolution of uncertainty, and a minority appears to have a strong preference for early resolution of uncertainty.

5 Conclusion

The goal of our study is to test whether people have preferences for the temporal resolution of uncertainty as axiomatized in Kreps and Porteus (1978) and Epstein and Zin (1989). This class of preference has proven very successful in leading macro-financial studies and beyond. Importantly, RU models postulate attitudes towards *consumption* uncertainty - and *not* uncertainty about income. However, in the literature the question whether individuals actually prefer consumption uncertainty to resolve early is still largely unanswered. Controlled lab experiments offer valuable tools to illuminate the issue and test such behavioral hypotheses. In our experiment subjects consume in the lab by freely

[19] Three examples of post-experimental questionnaire, may further exemplify the observed behavior. Subject B14 states "I don't care whether I know already today or at date 3. It is therefore irrelevant for my decision." Subject B17 shows a mild preference for early resolution of uncertainty: "Actually, I don't care to know how much I have to work at date 3. However, with only 3 work units difference, it is nice to know what I should expect." Finally, subject B16 explains: "I want to know already today how many [work units] I have to complete at date 3."

[20] Four out of 30 subjects or 13.33% had multiple switch points in Part III. These subjects were excluded from the analysis of this subsection as their choices do not allow to calculate timing premia.

watching YouTube videos which is contrasted by a real work task. We use a multiple price list elicitation format where subjects choose over amounts of work units and surfing time on YouTube. This allows us to introduce actual consumption uncertainty – as opposed to income uncertainty – in our setting and therefore to measure preferences for the temporal resolution of consumption uncertainty.

With our setup, we can directly infer timing premia – the percentage of expected consumption a subject is willing to forgo over the course of the experiment in order to resolve consumption uncertainty at an early stage. We find that on average, subjects are willing to forgo about 4.4% of their consumption in order to expedite the resolution of consumption uncertainty. Moreover, estimating the parameters of Epstein-Zin utility, we find support for a separation of risk preferences and preference for intertemporal substitution, as well as a preference for the early resolution of uncertainty on the aggregate. Individual data analysis, however, reveals considerable heterogeneity in behavior. While most subjects are indifferent towards the temporal resolution of uncertainty, some subjects show a strong preference for early resolution.

Our results have direct implications for a wide range of studies applying preference specifications as in Kreps and Porteus (1978) and Epstein and Zin (1989). In particular, we believe that the apparent heterogeneity in our sample with respect to timing premia is an interesting area of future research. Moreover, we believe that our setup provides valuable new methodological tools. Combining MPL preference elicitation and real consumption in the lab, may prove useful for testing preferences over time and uncertainty.

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A Temporal Resolution of Uncertainty

This Appendix gives a simple example of two consumption lotteries with Epstein and Zin (1989) preferences that are in the future, i.e. that have not yet been drawn. As our subjects in the experiment, the decision maker faces consumption at two dates, a date 2 and date 3. We start with the standard formulation (as in 4):

$$U_t(C) = \left[C_t^{\rho} + \beta \Big(\mathbb{E}_t \left[U_{t+1}^{\alpha} \right] \Big)^{\rho/\alpha} \right]^{1/\rho}. \tag{A.1}$$

Raise both sides to the power of ρ and set $t = 1$

$$U_1(C)^{\rho} = C_1^{\rho} + \beta \Bigg(\mathbb{E}_1 \left[U_2^{\alpha} \right] \Bigg)^{\rho/\alpha}, \tag{A.2}$$

and iterating one step ahead in the recursion (use $U_2^{\alpha} = \Bigg(C_2^{\rho} + \beta \Big(\mathbb{E}_2 \left[U_3^{\alpha} \right] \Big)^{\rho/\alpha} \Bigg)^{\alpha/\rho}$) yields:

$$U_1(C)^{\rho} = C_1^{\rho} + \beta \left(\mathbb{E}_1 \left[\left(C_2^{\rho} + \beta \left(\mathbb{E}_2 \left[U_3^{\alpha} \right] \right)^{\rho/\alpha} \right)^{\alpha/\rho} \right] \right)^{\rho/\alpha} \tag{A.3}$$

W.l.o.g., assume that date 3 is the last period, normalize $C_1 = 0$ to focus on future (uncertain) lotteries and get rid of the scaling with β :

$$U_1(C) = \left(\mathbb{E}_1 \left[\left(C_2^{\rho} + \beta \left(\mathbb{E}_2 \left[C_3^{\alpha} \right] \right)^{\rho/\alpha} \right)^{\alpha/\rho} \right] \right)^{1/\alpha} \tag{A.4}$$

C_2 and C_3 are some i.i.d. random variables. There exist two options: early draw and late draw. With early draw (ED), both C_2 and C_3 get drawn at 2. With late draw (LD), C_2 gets drawn at date 2 and C_3 gets drawn at date 3. With an early draw, consumption at date 3 is known at the end of date 1. From the perspective of the decision maker, we drop the expectations operator in $t = 2$ and the problem simplifies to:

$$U_1^{ED}(C) = \mathbb{E}_1 \left[\left(C_2^{\rho} + \beta C_3^{\rho} \right)^{\alpha/\rho} \right]^{1/\alpha} \tag{A.5}$$

With a late draw, the future consumption (at date 3) remains uncertain until date 3 and is summarized by the certainty equivalent. Therefore,

$$U_1^{LD}(C) = \mathbb{E}_1\left[\left(C_2^{\rho} + \beta\Big(\mathbb{E}_2\left[C_3^{\alpha}\right]\Big)^{\rho/\alpha}\right)^{\alpha/\rho}\right]^{1/\alpha}. \tag{A.6}$$

Equations (A.5) and (A.6) correspond to (5) and (6) in the main text.

B Extended Table Part III

	Option A (early resolution)							Option B (late resolution)							timing premium		
	$t=2$		$t=3$					$t=2$		$t=3$							
			heads		*tails*					*heads*		*tails*					
row	WU	C	WU	C	WU	C		WU	C	WU	C	WU	C		intervals		TP
1	80	100	10	170	160	20		105	75	10	170	160	20		$-\infty$,	-0.128	-0.0128
2	80	100	10	170	160	20		99	81	10	170	160	20		-0.128,	-0.097	-0.0113
3	80	100	10	170	160	20		94	86	10	170	160	20		-0.097,	-0.072	-0.085
4	80	100	10	170	160	20		90	90	10	170	160	20		-0.072,	-0.051	-0.062
5	80	100	10	170	160	20		87	93	10	170	160	20		-0.051,	-0.036	-0.044
6	80	100	10	170	160	20		85	95	10	170	160	20		-0.036,	-0.03	-0.031
7	80	100	10	170	160	20		83	97	10	170	160	20		-0.03,	-0.015	-0.021
8	80	100	10	170	160	20		82	98	10	170	160	20		-0.015,	-0.01	-0.013
9	80	100	10	170	160	20		81	99	10	170	160	20		-0.01,	-0.005	-0.007
10	80	100	10	170	160	20		80	100	10	170	160	20		-0.005,	0	-0.002
11	80	100	10	170	160	20		79	101	10	170	160	20		0,	0.005	0.002
12	80	100	10	170	160	20		78	102	10	170	160	20		0.005,	0.01	0.007
13	80	100	10	170	160	20		77	103	10	170	160	20		0.01,	0.015	0.013
14	80	100	10	170	160	20		75	105	10	170	160	20		0.015,	0.03	0.021
15	80	100	10	170	160	20		73	107	10	170	160	20		0.03,	0.036	0.031
16	80	100	10	170	160	20		70	110	10	170	160	20		0.036,	0.051	0.044
17	80	100	10	170	160	20		66	114	10	170	160	20		0.051,	0.072	0.062
18	80	100	10	170	160	20		61	119	10	170	160	20		0.072,	0.097	0.085
19	80	100	10	170	160	20		55	125	10	170	160	20		0.097,	0.128	0.113
20	80	100	10	170	160	20		48	132	10	170	160	20		0.128,	0.164	0.146

Table 5: Price List for Uncertainty Resolution
Only the columns specifying the WU were shown to the subjects. Consumption and WU are measured in units of 30 seconds. In Option A
the uncertainty was resolved immediately and in Option B only right before engaging in the work task at date 3.
Subjects who always choose Option A were assigned a $TP = 0.164$

C Instructions

The instructions below are translated from the original German instructions. The instructions were distributed sequentially. Subjects were given time to carefully read the instructions and ask questions before they were read aloud to the participants again.

Instructions

Welcome to our experiment!

General Rules You are not allowed to talk and exchange information with other participants during the experiment. You are not allowed to use electronic devices or bring your own books etc. Please turn off your mobile phone now. Please use only the programs and functions of today's experiment. Do not talk to other participants. Please raise your hand if you have a question. An Experimenter will then come to your place and answer your question. Please don't ask your questions out loud. If you question is relevant for other participants we will repeat them aloud.

Overview This is a three-part experiment. As announced, you have to be able to come to the lab apart from today also on May 18th, at 10:00am (date 2) and June 15th, at 10:00am (date 3). Each of the following sessions will take 90 minutes. If you cannot participate at one of these dates, please raise your hand now.

Today's experiment is about economic decisions making. The situations are not difficult and no IQ tests. Therefore, there is no "right" answer. We are only interested in knowing how you decide in such decision situations.

Your task in the experiment is to select your preferred option (A and B) in 60 decision situations. The decision situations are divided in three parts (I, II and III), each consisting of 20 decision situations. Option A and B each specify a number of so-called work units, that you will have to carry out on date 2 and/or date 3. What exactly constitutes a work unit, will be explained subsequently.

How many work units you have to carry out on what date, depends partially on decisions today and partially on chance. At the end of today's date, one of the 60 decision situations will be randomly drawn. You will have to carry out the number of work units specified in Option A or B, depending on which Option you choose in the decision situation. Whatever decision is drawn you will always receive your preferred option A or

Figure 4: Screenshot of the Slider Task

B. It is therefore in your own interest, to carefully choose option A or B in each of the 60 situations. Each of the decision situations has the same probability to determine the amount of units you have to work.

For each date at which you have to carry out work units, you have to spend the full 90 minutes in the laboratory. After you completed your work units, you can surf on YouTube for the remaining time (in the following we call this "leisure").

Your Payment For your participation today, you receive a fixed amount of 5 €. Moreover, you receive 5 € for participation at each of the following dates. On top of that you receive a completion bonus of 35 € after you have shown up on time on all your assigned dates and have completed all of your assigned work units. In case you do not complete all assigned units, we will deduct money from your completion bonus (see below). All the money you earn from this experiment will be wired to you two business days after date 3. To this end, we will ask you for your bank account details at the end of this experiment. Alternatively, you can collect your payment at the office of the chair of macroeconomics (H52, Prof. Frank Heinemann, room H5106). If you are not willing to participate in the experiment under these conditions, please inform one of the experimenters.

Work units and "leisure" Each work unit consists of a couple of sliders that have to be moved from 0 to 50 on the computer screen (see Screenshot 1). You have 30 seconds to solve each of these units. This time should more than suffice to complete this task. Before you make the decisions that determine how many work units you have to complete at what date you will solve 10 of these units as practice, in order to get a feeling for the task. Should you have problems with operating the computer mouse or do not see yourself fit to solve these units for a duration of maximally 90 minutes, please inform one of the experimenters.

After you have completed your work units on date 2 and 3, a browser opens automatically and you can surf the remaining time on YouTube. The less you have to work, the more you can surf freely on YouTube. Headphones are provided at your place. You are free in watching whatever you like on YouTube - however, you may only surf on YouTube and not other websites (Gmail, Facebook, news, etc.). Your surf behavior is explicitly *not* part of this experiment. No data will be gathered, saved or processed in this part of the experiment. Also, no passwords will be saved. The internet connection will go through the network of the Technical University of Berlin. Note: During the time you do not solve work units, you are not allowed to read your own books and the like. Moreover, you are not allowed to use electronic devices.

What happens if you do not solve all assigned work units? Missing up to two work units will not decrease your payoff. All missed units beyond that reduce your completion bonus. Each work unit that has not been completed reduces your completion bonus by 1 € (maximally you can loose the whole completion bonus).

Determination of work units to be completed The Experiment consists of three parts. Each of these parts contains 20 decision situations, in which you choose between Option A and Option B. You will make these choices in each of these three parts. Which of these 60 decision situations determines the work units you have to complete will be determined randomly. At the end of today's experiment, you will throw two dice to this end. Depending on your decisions today, you thus determine the amount of work units you have to complete. Of course you may inspect the dice for their fairness.

Selection of decision situations The throw of a six sided die determines which of the three parts (I, II or III) will be selected. If you throw a "1" or a "2", the decisions from part I will determine the amount and distribution of work units. If you throw a "3" or "4", part II will be selected and if you throw a "5" or "6", part III will be selected. After that, you throw a 20-sided die, that determines which of the 20 decision situations will be selected.

Example: Imagine your threw a "1" with the first die. This means that part I is selected. Suppose that now you throw a "12" with the 20-sided die. In this case, decision situation “12” will determine the amount of the work units you have to complete. The amount of work units you have to complete now depends on the option you have chosen in this decision situation.

This random selection process may seem complicated. However, its only purpose is to ensure that all 60 decision situations have the same probability to be selected.

Let’s go Please complete the 10 practice work units now. After that you will be given the instructions for part I.

Part I

In this part you face a total of 20 decision situations (arranged one underneath the other on the backside). In each of these decision situations you have to choose either Option A or Option B, by marking the respective box with a cross. With Option A, all work units have to be completed at date 2 and with Option B, all work units have to be completed at date 3.

Example: Suppose Part I and decision situation "12" have been randomly selected, and determine the amount of work units to be completed. Depending on whether you chose A or B, there will be different consequences. Suppose you chose A in this decision situation. In this case you have to complete 80 work units on date 2. In case you decided to choose Option B, however, you have to complete 73 work units on date 3.

Note: If this part is selected randomly, you only have to show up in the laboratory on one of the two dates 2 and 3, depending on which option you have chosen. If you have any questions, please raise your hand. An experimenter will then come to your place. Please fill out Part I on the backside now.

Part I

Summary of the instructions:
1) Please select for each of the 20 decision situations, which option you prefer
2) All decision situations have the same probality to be selected
3) After all work units are completed, you can surf YouTube for the remaining time.

decision situation	**Option A** work units date 2	**Option B** work units date 3	your decision
1	80	90	□ A or □ B
2	80	87	□ A or □ B
3	80	85	□ A or □ B
4	80	83	□ A or □ B
5	80	82	□ A or □ B
6	80	81	□ A or □ B
7	80	80	□ A or □ B
8	80	79	□ A or □ B
9	80	78	□ A or □ B
10	80	77	□ A or □ B
11	80	75	□ A or □ B
12	80	73	□ A or □ B
13	80	71	□ A or □ B
14	80	69	□ A or □ B
15	80	67	□ A or □ B
16	80	64	□ A or □ B
17	80	60	□ A or □ B
18	80	56	□ A or □ B
19	80	52	□ A or □ B
20	80	40	□ A or □ B

Figure 5: Price List Part I

Part II

Similar to Part I, you face 20 decision situations (arranged one underneath the other on the backside). In each of these decision situations you have to choose either Option A or Option B, by marking the respective box with a cross. For both options, a coin flip (done at the end of the experiment today) determines how many work units you have to complete. Depending on whether you chose Option A or B, the result of the coin flip has different implications.

Example: Suppose Part II and decision situation "8" have been randomly selected to determine the amount of work units to be exerted. Suppose further that you have chosen Option A in this decision situation. As described in the decision situation, you have to complete 70 work units, if the coin flip yields *heads* and 90 work units if the coin flip yields *tails*. However, if you chose option B instead, you have to complete 20 work units if the coin flip yields *heads* and 150 work units if the coin flip yields *tails*.

Note: If this part is selected randomly, you have to complete the work units at only of the dates 2 and 3. On which of the dates you have to show up will be decided at the end of this experiment depending on your preferences and availability. If you have any questions, please raise your hand. An experimenter will then come to your place. Please fill out Part II on the backside now.

Part II

Summary of the instructions:

1) Please select for each of the 20 decision situations, which option you prefer
2) All decision situations have the same probality to be selected
3) After all work units are completed, you can surf YouTube for the remaining time.

decision situation	Option A heads	Option A tails	Option B heads	Option B tails	your decision
1	70	90	20	178	□ A or □ B
2	70	90	20	174	□ A or □ B
3	70	90	20	170	□ A or □ B
4	70	90	20	166	□ A or □ B
5	70	90	20	162	□ A or □ B
6	70	90	20	158	□ A or □ B
7	70	90	20	154	□ A or □ B
8	70	90	20	150	□ A or □ B
9	70	90	20	146	□ A or □ B
10	70	90	20	142	□ A or □ B
11	70	90	20	138	□ A or □ B
12	70	90	20	134	□ A or □ B
13	70	90	20	130	□ A or □ B
14	70	90	20	126	□ A or □ B
15	70	90	20	122	□ A or □ B
16	70	90	20	118	□ A or □ B
17	70	90	20	114	□ A or □ B
18	70	90	20	110	□ A or □ B
19	70	90	20	106	□ A or □ B
20	70	90	20	102	□ A or □ B

Figure 6: Price List Part II

Part III

As in Part I and II, you face 20 decision situations (arranged one underneath the other on the backside). In each of these decision situations you have to choose either Option A or Option B, by marking the respective box with a cross. Both options contain a sure amount of work units that have to be completed at date 2, as well as a coin flip that determines the amount of work units at date 3. With Option A you can flip the coin today, i.e. you will know today how many work units you have to complete on date 3 and how much "leisure" you have. With option B you flip the coin on date 3. That means you only know at date 3 how many work units you have to complete at date 3 and how much "leisure" you have.

Example: Suppose Part III and decision situation "17" determine the amount of work units that have to be completed. Suppose you have chosen Option B in this decision situation. In this case you have to complete 66 work units on date 2. On date 3 you come to the lab and flip a coin. If the coin flip yields *heads* you have to complete 10 work units and if the coin flip yields *tails* you have to complete 160 work units. Suppose, however, you have chosen Option A instead. In this case you have to complete 80 work units on date 2. Moreover, you flip the coin today and you will know today how many work units you have to complete on date 3. If the coin flip yields *heads* you have to complete 10 work units and if the coin flip yields *tails* you have to complete 160 work units.

Note: If this part is selected randomly, you have to show up at the lab on dates 2 and 3. If you have any questions, please raise your hand. An experimenter will then come to your place. Please fill out Part III on the backside now.

Part III

Summary of the instructions:
1) Please select for each of the 20 decision situations, which option you prefer
2) All decision situations have the same probality to be selected
3) With Option A the coin flip happens today. With Option B the coin flip happens on date 3
3) After all work units are completed, you can surf YouTube for the remaining time.

	Option A (coin flip today)			Option B (coin flip on date 3)			
decision situation	date 2	date 3 heads	date 3 tails	date 2	date 3 heads	date 3 tails	your decision
1	80	10	160	105	10	160	□ A or □ B
2	80	10	160	99	10	160	□ A or □ B
3	80	10	160	94	10	160	□ A or □ B
4	80	10	160	90	10	160	□ A or □ B
5	80	10	160	87	10	160	□ A or □ B
6	80	10	160	85	10	160	□ A or □ B
7	80	10	160	83	10	160	□ A or □ B
8	80	10	160	82	10	160	□ A or □ B
9	80	10	160	81	10	160	□ A or □ B
10	80	10	160	80	10	160	□ A or □ B
11	80	10	160	79	10	160	□ A or □ B
12	80	10	160	78	10	160	□ A or □ B
13	80	10	160	77	10	160	□ A or □ B
14	80	10	160	75	10	160	□ A or □ B
15	80	10	160	73	10	160	□ A or □ B
16	80	10	160	70	10	160	□ A or □ B
17	80	10	160	66	10	160	□ A or □ B
18	80	10	160	61	10	160	□ A or □ B
19	80	10	160	55	10	160	□ A or □ B
20	80	10	160	48	10	160	□ A or □ B

Figure 7: Price List Part III