On the Elicitation of Time Preference under Conditions of Risk: Online Appendices

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A Model predictions

A.1 Predictions under discounted expected utility

In this Appendix, I demonstrate that the standard model of discounted expected utility (DEU) predicts identical choices under each of the risk conditions for both of my experiments. I adopt a general specification of the discount function to emphasize that its particular functional form (for example, exponential or hyperbolic) is not germane to the issue of differential behavior under risk versus certainty.[1] In keeping with my experimental design, I specialize to cases in which there are equal probabilities of payment on both the sooner and later payment dates.

A.1.1 Multiple price list

Let $u(\cdot)$ denote the (atemporal) utility function, and let $D(\cdot)$ denote the discount function. Consider two dates, t and $t+k$, where t denotes the front-end delay from the date of the experiment to the sooner payment date, and k is the additional delay to the later payment date. Finally, let B denote exogenous background consumption.

Consider the binary choice between Option A, which pays the exogenous amount C_t (as specified by the experimenter) with probability p on date t (or zero otherwise), and Option B which pays C_{t+k} with probability p on date $t+k$. A subject prefers Option A (Option B) as:

$$D(t)\left[p\,u(C_t+B)+(1-p)\,u(B)\right]+D(t+k)\,u(B) \gtrless D(t)\,u(B)+D(t+k)\left[p\,u(C_{t+k}+B)+(1-p)\,u(B)\right]$$

or equivalently, as:

$$D(t)\,p\left[u(C_t+B)-u(B)\right] \gtrless D(t+k)\,p\left[u(C_{t+k}+B)-u(B)\right]$$

So long as the probability of payment p is equal on both dates, this inequality does not depend upon the specific value of p, and in particular it remains unchanged when $p=1$ such that both payment options are certain. This is a restatement of the proposition that A&S derive in the context of a CTB design (see Appendix A.1.2 below), as applied to the setting of an MPL.

A.1.2 Convex time budget under independent risks

In the independent risks version of the CTB design, there are two independent lotteries that determine whether or not payment is received on the sooner and later payment dates. A subject chooses the budget allocations c_t, to be received with probability p on date t (or zero otherwise), and c_{t+k} to be received with probability p on date $t+k$, to maximize:

$$D(t)\left[p\,u(c_t+B)+(1-p)\,u(B)\right]+D(t+k)\left[p\,u(c_{t+k}+B)+(1-p)\,u(B)\right] \tag{1}$$

[1] A&S also present arguments for alternative specifications of the utility function that are equally applicable to the cases considered here.

subject to the future value budget constraint:

$$(1+r)\,c_t + c_{t+k} = m$$

where $(1+r)$ is the gross experimental interest rate.

The "tangency condition" for an interior solution states that the ratio of discounted, expected, marginal utilities should equal the relative price ratio:

$$\frac{D(t)\,p\,u'(c_t+B)}{D(t+k)\,p\,u'(c_{t+k}+B)} = (1+r)$$

So long as the probability of payment p is equal on both dates, this tangency condition does not depend upon the specific value of p, and in particular it remains unchanged when $p=1$ such that payments on both dates are certain. This is the proposition that A&S set out to test in their main $(1,1)$ versus $(0.5,0.5)$ manipulation.

A.1.3 Convex time budget under perfectly correlated risks

In the correlated risks version of the CTB design, a single lottery determines whether or not payment is received on both the sooner and later payment dates. A subject chooses the budget allocations c_t to be received on date t and c_{t+k} to be received on date $t+k$, where the entire portfolio is received with probability p (or zero otherwise), to maximize:

$$p\left[D(t)\,u(c_t+B) + D(t+k)\,u(c_{t+k}+B)\right] + (1-p)\left[D(t)\,u(B) + D(t+k)\,u(B)\right] \tag{2}$$

Clearly, this expression is algebraically equivalent to (1), resulting in an equivalent tangency condition (and solution function) which again does not depend upon the value of p, and in particular remains unchanged when $p=1$ such that all payments are certain.

A.2 Extension to a non-additive specification

The standard DEU model thus predicts identical choices across all three risk conditions in my CTB experiment (certainty, independent risks, and correlated risks). Intuitively, in that model both discounting and expected utility are linear operators, and so it does not matter whether a subject maximizes *discounted expected utility* as in (1) or *expected discounted utility* as in (2). In particular, the model *does not* predict intertemporal diversification in the independent risks condition compared to the correlated risks condition in which diversification is not possible.

To generate such a prediction, it is necessary to break the nexus between (1) and (2) by introducing a non-additive specification. One simple way to do this has been explored by Andersen et al. (2011), who estimate such a model under specific functional form assumptions. For ease of notation, define $\xi(c_t, c_{t+k}) \equiv D(t)\,u(c_t) + D(t+k)\,u(c_{t+k})$ and disregard background consumption from here on. Then the approach adopted by Andersen et al. embeds ξ within a concave *intertemporal* utility function $U(\cdot)$, over which expectations are formed in the usual manner.[2]

In this specification, in a CTB with correlated risks, a subject chooses c_t and c_{t+k} to maximize:

$$p\, U\left(\xi\left(c_t, c_{t+k}\right)\right) + (1-p)\, U\left(\xi\left(0,0\right)\right)$$

The tangency condition for an interior solution is now:

$$\frac{p\, U'\left(\xi\left(c_t, c_{t+k}\right)\right) D(t)\, u'\left(c_t\right)}{p\, U'\left(\xi\left(c_t, c_{t+k}\right)\right) D(t+k)\, u'\left(c_{t+k}\right)} = (1+r) \tag{3}$$

Once again, this does not depend upon the value of p, and in particular it remains unchanged when $p = 1$ such that all payments are certain. This simple non-additive specification thus continues to predict identical choices under certainty as compared to *correlated* risks.

However, under *independent* risks c_t and c_{t+k} would be chosen to maximize:

$$p\left[p\, U\left(\xi\left(c_t, c_{t+k}\right)\right) + (1-p)\, U\left(\xi\left(c_t, 0\right)\right)\right] + (1-p)\left[p\, U\left(\xi\left(0, c_{t+k}\right)\right) + (1-p)\, U\left(\xi\left(0,0\right)\right)\right]$$

In this case, the tangency condition becomes:

$$\frac{p\left[p\, U'\left(\xi\left(c_t, c_{t+k}\right)\right) + (1-p)\, U'\left(\xi\left(c_t, 0\right)\right)\right] D(t)\, u'\left(c_t\right)}{p\left[p\, U'\left(\xi\left(c_t, c_{t+k}\right)\right) + (1-p)\, U'\left(\xi\left(0, c_{t+k}\right)\right)\right] D(t+k)\, u'\left(c_{t+k}\right)} = (1+r) \tag{4}$$

Comparing this expression to (3), the expected marginal intertemporal utility of a payment received on date t now incorporates an additional term corresponding to the case in which payment is received on date t but not on date $t+k$, and *vice-versa* for the marginal utility of a payment received on date $t+k$. It is the consideration of these additional cases, not present in the correlated risks condition, that gives rise to the motive for intertemporal diversification under independent risks. As a result, the tangency condition in (4) is no longer invariant to the value of p.[3]

[2] Andersen et al. adopt CRRA specifications for both the atemporal utility function $u(\cdot)$ and the intertemporal utility function $U(\cdot)$.

[3] The standard model is nested as the special case in which the intertemporal utility function $U(\cdot)$ is linear, such that $U'(\cdot)$ is constant, in which case (4) collapses to (3) and so all three risk conditions are equivalent as before.

B Details of experimental parameters

B.1 Parameters of the multiple price list experiment

Table B1 summarizes the parameters of the risk preference tasks in the MPL experiment. In each decision row, a subject was required to make a binary choice between Option A or Option B. Payoffs are expressed in AUD. At the time of the MPL experiment, one AUD was worth approximately USD 1.10. The expected value information in the final two columns was not presented to subjects.

Table B1: Risk Preference Decisions in the MPL Experiment.

Decision Row	Probability of High Payoff	Option A High Payoff	Option A Low Payoff	Option B High Payoff	Option B Low Payoff	EV of Option A	EV of Option B
1	0.1	16	13	31	1	13.3	4.0
2	0.2	16	13	31	1	13.6	7.0
3	0.3	16	13	31	1	13.9	10.0
4	0.4	16	13	31	1	14.2	13.0
5	0.5	16	13	31	1	14.5	16.0
6	0.6	16	13	31	1	14.8	19.0
7	0.7	16	13	31	1	15.1	22.0
8	0.8	16	13	31	1	15.4	25.0
9	0.9	16	13	31	1	15.7	28.0
10	1.0	16	13	31	1	16.0	31.0
11	0.1	19	12	27	2	12.7	4.5
12	0.2	19	12	27	2	13.4	7.0
13	0.3	19	12	27	2	14.1	9.5
14	0.4	19	12	27	2	14.8	12.0
15	0.5	19	12	27	2	15.5	14.5
16	0.6	19	12	27	2	16.2	17.0
17	0.7	19	12	27	2	16.9	19.5
18	0.8	19	12	27	2	17.6	22.0
19	0.9	19	12	27	2	18.3	24.5
20	1.0	19	12	27	2	19.0	27.0

Table B1: Risk Preference Decisions in the MPL Experiment (continued).

Decision Row	Probability of High Payoff	Option A High Payoff	Option A Low Payoff	Option B High Payoff	Option B Low Payoff	EV of Option A	EV of Option B
21	0.1	17	11	30	4	11.6	6.6
22	0.2	17	11	30	4	12.2	9.2
23	0.3	17	11	30	4	12.8	11.8
24	0.4	17	11	30	4	13.4	14.4
25	0.5	17	11	30	4	14.0	17.0
26	0.6	17	11	30	4	14.6	19.6
27	0.7	17	11	30	4	15.2	22.2
28	0.8	17	11	30	4	15.8	24.8
29	0.9	17	11	30	4	16.4	27.4
30	1.0	17	11	30	4	17.0	30.0
31	0.1	28	2	18	14	4.6	14.4
32	0.2	28	2	18	14	7.2	14.8
33	0.3	28	2	18	14	9.8	15.2
34	0.4	28	2	18	14	12.4	15.6
35	0.5	28	2	18	14	15.0	16.0
36	0.6	28	2	18	14	17.6	16.4
37	0.7	28	2	18	14	20.2	16.8
38	0.8	28	2	18	14	22.8	17.2
39	0.9	28	2	18	14	25.4	17.6
40	1.0	28	2	18	14	28.0	18.0

Table B2 summarizes the parameters of the time preference tasks in the MPL experiment. In each decision row, a subject was required to make a binary choice between Option A or Option B. Delay lengths are expressed here in days, although they were presented to subjects in terms of weeks, and payments are expressed in AUD. The gross interest rate information in the final column was not presented to subjects.

Each decision was faced under two different risk conditions: one in which all payments were certain, and one in which payments were received with 50% probability. Half of the subjects completed the discounting tasks under certainty before the discounting tasks under risk, while for the other half this order was reversed.

Table B2: Time Preference Decisions in the MPL Experiment.

Decision Row	Front-end Delay (t) to Sooner Option	Further Delay (k) to Later Option	Sooner Payment (Option A)	Later Payment (Option B)	Gross Interest Rate $(1+r)$
1	7	21	20	21	1.05
2	7	21	20	22	1.10
3	7	21	20	23	1.15
4	7	21	20	24	1.20
5	7	21	20	25	1.25
6	7	21	20	26	1.30
7	7	21	20	27	1.35
8	7	21	20	28	1.40
9	7	21	20	29	1.45
10	7	21	20	30	1.50
11	7	42	20	30	1.50
12	7	42	21	30	1.43
13	7	42	22	30	1.36
14	7	42	23	30	1.30
15	7	42	24	30	1.25
16	7	42	25	30	1.20
17	7	42	26	30	1.15
18	7	42	27	30	1.11
19	7	42	28	30	1.07
20	7	42	29	30	1.03

Table B2: Time Preference Decisions in the MPL Experiment (continued).

Decision Row	Front-end Delay (t) to Sooner Option	Further Delay (k) to Later Option	Sooner Payment (Option A)	Later Payment (Option B)	Gross Interest Rate ($1+r$)
21	7	63	20	21	1.05
22	7	63	20	22	1.10
23	7	63	20	23	1.15
24	7	63	20	24	1.20
25	7	63	20	25	1.25
26	7	63	20	26	1.30
27	7	63	20	27	1.35
28	7	63	20	28	1.40
29	7	63	20	29	1.45
30	7	63	20	30	1.50
31	7	84	20	30	1.50
32	7	84	21	30	1.43
33	7	84	22	30	1.36
34	7	84	23	30	1.30
35	7	84	24	30	1.25
36	7	84	25	30	1.20
37	7	84	26	30	1.15
38	7	84	27	30	1.11
39	7	84	28	30	1.07
40	7	84	29	30	1.03

B.2 Parameters of the convex time budget experiment

Table B3 summarizes the parameters of the CTB experiment. In each decision row, a subject was required to allocate an endowment of 100 tokens between Payment A (received on date t) and Payment B (received on date $t+k$). Delay lengths are expressed here in days, although they were presented to subjects in terms of weeks, and token exchange rates are expressed in AUD. Consistent with A&S, the gross interest rate information in the final column was not presented to subjects. These parameters are identical to those in A&S Table 1, except that the delay lengths were changed from 28 and 56 days in A&S to 35 and 70 days to avoid a public holiday, and that payments were denominated in AUD instead of USD. At the time of the CTB experiment, one AUD was worth approximately USD 1.05.

Each decision was faced under three different risk conditions: one in which all payments were certain, one in which the sooner and later payments were received with 50% probability as realized by two independent lotteries, and one in which the sooner and later payments were received with 50% probability as realized by a single lottery. Half of the subjects completed these three risk conditions in the order *Independent-Certain-Correlated*, while for the other half this order was reversed.

Table B3: Decision Parameters for the CTB Experiment.

Decision Row	Front-end Delay (t)	Further Delay (k)	Token Endowment	Sooner Token Value	Later Token Value	Gross Interest Rate $(1+r)$
1	7	35	100	0.20	0.20	1.00
2	7	35	100	0.19	0.20	1.05
3	7	35	100	0.18	0.20	1.11
4	7	35	100	0.17	0.20	1.18
5	7	35	100	0.16	0.20	1.25
6	7	35	100	0.15	0.20	1.33
7	7	35	100	0.14	0.20	1.43
8	7	70	100	0.20	0.20	1.00
9	7	70	100	0.19	0.20	1.05
10	7	70	100	0.18	0.20	1.11
11	7	70	100	0.17	0.20	1.18
12	7	70	100	0.16	0.20	1.25
13	7	70	100	0.15	0.20	1.33
14	7	70	100	0.14	0.20	1.43

C Instructions for the multiple price list experiment

ELIGIBILITY TO PARTICIPATE

Welcome to today's session, and thank you for coming here on time. Please do not talk to the other participants while the session is in progress. Mobile phones must also be turned off. If you have a question, please raise your hand, and one of us will come to you to answer it in private.

In this study, there is a chance you may receive part of your payment in the future.

Therefore, to be eligible to participate, you must be willing to receive this part of your payment by cheque, to be written to you by Dr Stephen Cheung, a Lecturer in the School of Economics. This cheque would be drawn on the University of Sydney branch of the National Australia Bank.

The cheque would be delivered by Express Post to your nominated residential mailing address in Sydney, at a date that depends on both your decisions in the study, and on chance. The latest you could receive this payment is thirteen weeks from today, in the last week of classes in Semester two.

Therefore, to take part in this study, you must be willing to provide your name and residential mailing address in Sydney. This information will only be seen by Dr Cheung and his assistants.

After payment has been sent, this information will no longer be retained. Your identity will not be a part of any subsequent data analysis.

Finally, you must be willing to stay for the full duration of today's session; otherwise you will not receive any payment at all.

If you do not agree to all of these points, please raise your hand now.

If you agree, please turn over this page to sign the consent form, and hand it in now.

GENERAL INFORMATION AND EARNINGS

This study is financed by the Faculty of Arts and Social Sciences and concerns the economics of decision making. The instructions are simple, and you will benefit from considering them carefully.

In this study you will make a total of 120 choices involving amounts of money that differ with respect to the time when money is received, and/or the chances of receiving the money. These decisions will be divided into two sets. There are 40 choices in Decision Set I, and 80 choices in Decision Set II.

These decisions are not designed to test you – the only correct answers are the ones that you really think are best for you.

Afterwards, we will ask you to complete a questionnaire about yourself. This information is for our records only. Our records and the results of our research will not identify any individual or the choices he or she made in any way. All records will be linked to an anonymous ID number only.

At the end, we will call you into the office, one at a time, to calculate your earnings.

You will be paid $5 for participating, and you can also earn a considerable amount in addition to this. How much you earn will depend partly on chance and partly on the choices that you make.

Your earnings from the study are made up of three parts.

- Firstly, we will pay a participation fee of $5 if you submit valid responses for all 120 decisions as well as the questionnaire. This will be paid to you **in cash at the end of the session**.
- Secondly, you will be paid according to your choice in one randomly-selected decision from Decision Set I. The amount you receive will depend on both the choice that you made, as well as on chance. This amount will also be paid to you **in cash at the end of the session**.
- Thirdly, you will be paid according to your choice in one randomly-selected decision from Decision Set II. The date of this payment depends on the choice that you made, while the amount depends on both your choice as well as on chance.

In some choices in Decision Set II there is a possibility – to be decided by chance – that you may not receive any payment at all. If the decision that is chosen to count involves chance, we will roll a ten-sided die at the end of the session to determine whether or not any payment is made.

This means that you will be told whether or not you will receive any payment in Decision Set II – and if so, how much and when – before you leave today.

If it is determined that you will receive a payment in Decision Set II, it will be sent to you **by cheque**, delivered by Express Post to your nominated residential mailing address in Sydney, **on a date determined by your own choice**.

DECISION SET I

In Decision Set I, you will make choices between two options labelled "A" and "B". We will present you with 40 of these decisions.

All decisions have the same format. The only difference is that the amounts of money in Options A and B, and the chances that each amount will be paid, will differ from one decision to the next.

The 40 choices are further divided into four sets of ten. Within each set of ten decisions the amounts of money remain the same, and it is only the chances that each amount will be paid that change.

You will be paid according to your choice in one of the 40 decisions in Decision Set I. At the time you make your choices you will not know which decision will be selected for payment. Since all decisions are equally likely to be chosen, you should treat each decision as if it may be the decision that counts.

At the end of the session, we will roll a four-sided die and a ten-sided die to randomly determine which one of the 40 decisions will be the one that counts. The payment that you receive will be determined by the choice that you made – either Option A or Option B – in the selected decision.

We will then roll the ten-sided die a second time to determine what payment you will receive, based upon your choice of Option A or B. This amount will be added to your $5 participation fee, and paid to you in cash at the end of the session.

Now please look at the first Decision Table on the next page.

This Decision Table shows ten decisions. Each decision is a paired choice between "Option A" and "Option B". You will be asked to make a choice between these two options in each decision row.

Before you start making your choices, let us explain how these choices affect your earnings. We will use a ten-sided die to determine payoffs; the faces are numbered from 1 to 10 (the "0" face of the die will serve as 10). Now, please look at Decision 1 at the top of the table.

Option A pays $16 if the roll of the ten-sided die is 1, and $13 if the roll is 2–10. Option B pays $31 if the roll of the die is 1, and $1 if the roll is 2–10.

The other decisions are similar, except that as you move down the table, the chances of the higher payoff in each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the higher payoff for sure, so your choice here is between $16 and $31.

For each of these ten decisions, you are asked to choose Option A or Option B by marking an "X" in the appropriate box in each row. You may choose A for some decision rows and B for other rows, and you may make your decisions in any order.

The other Decision Tables are similar, except that the amounts of money offered in Options A and B will differ in each table.

One of the 40 decisions in Decision Set I will be randomly selected in the end to count toward your earnings. You will not know in advance which decision will be used. Each decision has an equal chance of being used in the end.

Your earnings from Decision Set I will be determined at the end of the session, when you are called into the office to be paid.

- Firstly, we will roll a four-sided die to decide which of the four Decision Tables will count.
- Next, we will roll a ten-sided die to decide which of the ten rows in the chosen table will count. (If this roll of the die is "0" then the tenth row will be chosen.)
- Finally, we will roll the ten-sided die a second time to determine your earnings for the option that you chose, either Option A or Option B, in the decision selected by the first two die rolls.

For example, if the roll of the four-sided die is 2, then Decision Table 2 is chosen. If the first roll of the ten-sided die is 8, then Decision 18 is chosen to count. Finally, if the second roll of the ten-sided die is 4, then your earnings would be $19 if you chose Option A, or $27 if you chose Option B.

Please make your choices by marking an "X" in the appropriate box in each row of each Decision Table. If you have a question, please raise your hand, and one of us will come to assist you in private.

DECISION SET II

In Decision Set II, you will make choices between two options labelled "A" and "B". These choices involve receiving money at two different points in time. In each case Option A is "sooner" and

Option B is "later". We will present you with 80 of these decisions.

All decisions have the same format. They differ in the amounts of money and payment dates, as well as the chances that the payments will be made. You could receive payment as early as one week from today, or as late as the last week of classes in Semester two, or another date in between.

It is important to note that some of these payments involve chance. In some decisions, there is a possibility that you may not receive any payment at all. You will be fully informed of the chances associated with the two options at the time that you make each decision.

The 80 choices are further divided into eight sets of ten. Within each set of ten decisions, the payment dates and chances that payments are made remain the same. It is only the amounts of money in Options A and B that change.

You will be paid according to your choice in one of the 80 decisions in Decision Set II. At the time you make your choices you will not know which decision will be selected for payment. Since all decisions are equally likely to be chosen, you should treat each decision as if it may be the decision that counts.

At the end of the session we will roll an eight-sided die and a ten-sided die to randomly determine which one of the 80 decisions will be the one that counts. The amount and date of your payment will be determined by the choice that you made – either Option A or Option B – in the selected decision.

If the decision that is chosen to count involves chance, we will roll the ten-sided die again to determine whether any payment is made. This means that you will be told whether or not you will receive any payment in Decision Set II – and if so, how much and when – before you leave today.

If it is determined that you will receive a payment, it will be sent to you by cheque, by Express Post to your nominated residential mailing address in Sydney, on the date specified by your choice.

One business day before the scheduled payment date, the cheque will dispatched for delivery by Express Post by Dr Cheung and his assistants. Australia Post guarantees next business day delivery for mail sent by Express Post to addresses within the Sydney metropolitan region.

Attached to your Participation Information Statement is Dr Cheung's business card. Please keep this in a safe place. If it is determined that you will receive a payment by cheque, but you do not receive your cheque on the nominated date, you should contact Dr Cheung.

To process payment by cheque, we will need to collect your name and residential mailing address in Sydney. This will only be seen by Dr Cheung and his assistants. After payment has been sent, this information will no longer be retained. Your identity will not be a part of subsequent data analysis.

Now please turn to the first Decision Table on the next page.

This Decision Table shows ten decisions. Each decision is a paired choice between "Option A" and "Option B". You will be asked to make a choice between these two options in each decision row.

Option A pays \$20 one week from today if the roll of a ten-sided die is 1–5, or nothing otherwise. Option B pays \$21 four weeks from today if the roll of the die is 1–5, or nothing otherwise.

The other decisions are similar, except that as you move down the table, the amount of money offered in Option B increases.

For each of these ten decisions, you are asked to choose Option A or Option B by marking an "X" in the appropriate box in each row. You may choose A for some decision rows and B for other rows, and you may make your decisions in any order.

The other seven Decision Tables are similar except that the payment dates, amounts of money, and chances that payments will be made, will differ in each table.

Although you will make 80 decisions in Decision Set I, only one of these will be randomly selected in the end to count toward your earnings. You will not know in advance which decision will be used. Each decision has an equal chance of being used in the end.

Your earnings from Decision Set II will be determined at the end of the session, when you are called into the office to be paid.

- Firstly, we will roll an eight-sided die to decide which of the eight Decision Tables will count.
- Next, we will roll a ten-sided die to decide which of the ten rows in the chosen table will count. (If this roll of the die is "0" then the tenth row will be chosen.)
- Finally, if the decision that is chosen to count involves chance, we will roll the ten-sided die a second time to determine whether or not any payment is made. If a payment is to be made, the amount and date are determined by the choice that you made in the selected decision.

For example, if the roll of the eight-sided die is 2, then Decision Table 2 is chosen. If the first roll of the ten-sided die is 8, then Decision 18 is chosen to count.

Finally, if the second roll of the ten-sided die is 4, then you would receive $27 one week from today you chose Option A, or $30 seven weeks from today if you chose Option B. However, if the second roll of the ten-sided die were 6, then you would not receive any payment.

Please make your choices by marking an "X" in the appropriate box in each row of each Decision Table. If you have a question, please raise your hand, and one of us will come to assist you in private.

D Instructions for the convex time budget experiment

ELIGIBILITY TO PARTICIPATE

Welcome to today's session, and thank you for coming here on time. Please do not talk to the other participants while the session is in progress. Mobile phones must also be turned off. If you have a question, please raise your hand, and someone will come to you to answer it in private.

In this study, you will receive all of your payments in the future.

Therefore, to be eligible to participate, you must be willing to receive your payments by cheque, to be written to you by Dr Stephen Cheung, a Lecturer in the School of Economics. These cheques will be drawn on the University of Sydney branch of the National Australia Bank.

The cheques will be delivered by Express Post to your nominated residential mailing address in Sydney, on two dates that depend on both your decisions in the study, and on chance. The first payment will come one week from today. The latest that you could receive the second payment is eleven weeks from today, in the last week of classes this semester.

Therefore, to take part in this study, you must be willing to provide your name and residential mailing address in Sydney. This information will only be seen by Dr Cheung and his assistants.

After payment has been sent, this information will no longer be retained. Your identity will not be a part of any subsequent data analysis.

Finally, you must be willing to stay for the full duration of today's session; otherwise you will not receive any payment at all.

If you do not agree to all of these points, please raise your hand now.

If you agree, please turn over this page to sign the consent form, and hand it in now.

EARNINGS

For completing today's study, you will receive a minimum of $10. You will receive this in two payments of $5, which will arrive on two different dates. The first payment will come one week from today. The second will be on a date to be determined by chance, as explained below.

You may also receive additional earnings from the study. These depend on both your own decisions, as well as on chance. They would be added to one or both of your two minimum payments of $5.

Today you will make 42 choices, but only one of them will be randomly selected at the end to count toward your earnings.

In each choice, you must decide how to allocate money between two points in time; one date is "sooner" and the other is "later". This means you could receive payments as early as one week from today, as late as the last week of classes this semester, or another date in between.

It is important to note that some of these decisions involve chance. There is a chance that your sooner payment, your later payment or both payments may not be sent at all.

- In one-third of the decisions, whether or not you receive the sooner payment is determined by rolling a purple ten-sided die, while the later payment is determined by a white ten-sided die. Therefore in these decisions, the two payments are determined by *two separate die rolls.*
- In one-third of the decisions, both payments are determined by *a single die roll.* In these decisions, both the sooner and later payments are determined by rolling the white ten-sided die.
- Finally, in one-third of the decisions, the payments do not depend on any die roll at all.

The nature of these chances will always be clearly indicated at the top of each decision sheet.

Once all 42 decisions have been made, we will draw a numbered ball from the bingo cage. This will determine which decision will be the one that counts, and the corresponding payment dates.

We will use this decision to determine your earnings. Since every decision is equally likely to be chosen, you should treat each decision as if it may be the one that counts.

If the decision that is chosen to count involves chance, we will then determine whether or not you receive the payments by rolling the ten-sided die. This means that you will be told whether or not you will receive these payments before you leave today.

Your earnings from the decision that counts will be added to the two minimum payments of $5 each. If, by chance, one or both of your payments is not sent, you will receive only the $5 payment on that date. Thus, you will always receive at least $5 on the sooner date and at least $5 on the later date.

One business day before each scheduled payment date, a cheque will dispatched for delivery by Express Post by Dr Cheung and his assistants. Australia Post guarantees next business day delivery for mail sent by Express Post to addresses within the Sydney metropolitan region.

Attached to your Participation Information Statement is Dr Cheung's business card. Please keep this in a safe place. If you do not receive one of your cheques on the designated date, please contact Dr Cheung.

INSTRUCTIONS

In each decision you are asked to divide 100 tokens between two payments at two different dates: Payment A (which is sooner) and Payment B (which is later).

Tokens will be exchanged for money. The tokens you allocate to Payment B (later) will always be worth at least as much as the tokens you allocate to Payment A (sooner).

The sample decision below is similar to the ones you will make today. It shows the choice to allocate 100 tokens between Payment A on 27 March and Payment B on 10 April. In the example, each token allocated to 27 March is worth $0.10, while each token allocated to 10 April is worth $0.15. You may allocate some tokens to the sooner date and some to the later date.

Example: If you were to allocate 62 tokens to 27 March and 38 tokens to 10 April, then you would have the chance to receive 62 × $0.10 = $6.20 on 27 March (+ $5 minimum payment) and the chance to receive 38 × $0.15 = $5.70 on 10 April (+ $5 minimum payment).

Today's date will always be highlighted in red on the calendar. The sooner date will be marked in green, and the later date in blue. The dates will also be indicated in the table on the right.

In the actual study, there are seven decisions on each table, and you will complete six tables in total.

Chance of receiving payments:

Each decision sheet also shows the chances that each payment is sent. In the example, Payment A would be sent if the roll of the purple ten-sided die is between 1 and 7, while Payment B would be sent if the roll of the white ten-sided die is between 1 and 3.

In each decision we will inform you of the exact nature of the die rolls that determine whether your payments are sent. If this decision was chosen as the one that counts, we would determine the actual payments by rolling the ten-sided die.

Example: Suppose that you allocated 62 tokens to 27 March and 38 tokens to 10 April. If this decision was chosen as the one that counts, we would roll both the purple and white ten-sided die.

- If the purple die landed on 1, 2, 3, 4, 5, 6, or 7, Payment A would be sent and you would receive $6.20 (+ $5 minimum payment) on 27 March. If the purple die on landed on 8, 9, or 0, Payment A would not be sent and you would receive only the $5 minimum payment on 27 March.

- If the white die landed on 1, 2, or 3, Payment B would be sent and you would receive $5.70 (+ $5 minimum payment) on 10 April. If the white die landed on 4, 5, 6, 7, 8, 9, or 0, Payment B would not be sent and you would receive only the $5 minimum payment on 10 April.

SUMMARY

- You will receive a minimum of $10, in two payments of $5 which will arrive on two different dates. Any additional payments will be added to one or both of the two minimum payments.

- You will make a total of 42 decisions, and one of them will be randomly selected at the end to determine your earnings.

- You will always allocate exactly 100 tokens. Tokens that you allocate to Payment A (sooner) and Payment B (later) will be exchanged for money at different rates. The tokens you allocate to Payment B will always be worth at least as much as the ones you allocate to Payment A.

- Payment A and Payment B will have varying degrees of chance. In some choices they depend on two separate die rolls, in some they depend on a single die roll, and in some they do not depend on any die roll. You will be fully informed of the exact nature of these chances.

- On each decision sheet you will make seven decisions. For each decision you will allocate 100 tokens. Allocate exactly 100 tokens in each decision: no more, no less.

- At the end of the session, a random number will be drawn from the bingo cage to determine which decision will be the one that counts. Because each decision is equally likely to be chosen, you should treat each decision as if it may be the one that determines your payments.
- If necessary, we will then roll one or two ten-sided die to determine whether or not the payments you chose will actually be sent.
- Your payments, by cheque, will be sent to the address you provide.
- Each cheque will be dispatched by Express Post one business day before payment is due. Australia Post guarantees next business day delivery.
- You have been given the business card of Dr Stephen Cheung. Keep this card in a safe place and contact Dr Cheung immediately if one of your payments is not received.

Reminder: Please make sure that the total tokens you allocate between Payment A and Payment B sum to exactly 100 tokens in each row.

On your desk are two envelopes: one for the sooner payment and one for the later payment. Please take the time now to address these to yourself at your own residential mailing address in Sydney.

E Sample decision sheet from the CTB experiment

DECISION TABLE 1

Calendar						
M	**Tu**	**W**	**Th**	**F**	**Sa**	**Su**
March 2012						
19	20	21	22	23	24	25
26	27	28	29	30	31	
April 2012						
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						
May 2012						
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			
June 2012						
				1	2	3
4	5	6	7	8	9	10

	Payment A: 27 March (1 week from today) **Chance of payment: 50%** **Payment sent if: roll of PURPLE die is 1-5**		**Payment B: 1 May (6 weeks from today)** **Chance of payment: 50%** **Payment sent if: roll of WHITE die is 1-5**
Decision 1	______ tokens at **$0.20** each on 27 March	and	______ tokens at **$0.20** each on 1 May
Decision 2	______ tokens at **$0.19** each on 27 March	and	______ tokens at **$0.20** each on 1 May
Decision 3	______ tokens at **$0.18** each on 27 March	and	______ tokens at **$0.20** each on 1 May
Decision 4	______ tokens at **$0.17** each on 27 March	and	______ tokens at **$0.20** each on 1 May
Decision 5	______ tokens at **$0.16** each on 27 March	and	______ tokens at **$0.20** each on 1 May
Decision 6	______ tokens at **$0.15** each on 27 March	and	______ tokens at **$0.20** each on 1 May
Decision 7	______ tokens at **$0.14** each on 27 March	and	______ tokens at **$0.20** each on 1 May

PLEASE MAKE SURE A + B TOKENS = 100 IN EACH ROW.