Certainty preference, random choice, and loss aversion
ONLINE APPENDIX

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A Stochastic theories of choice

Decisions in experiments are notoriously noisy. Deterministic theories of decision making under risk are thus typically paired with stochastic models describing how noise may influence decision making patterns (Conte, Hey, and Moffatt, 2011; von Gaudecker, van Soest, and Wengström, 2011). I have discussed a very specific type of *systematic* error, consisting in switching towards the middle of a choice list. To model non-systematic errors, three different models are typically used in the literature. The first consists in a fixed probability of making a random error when choosing between prospects, typically referred to as a 'tremble' (Harless and Camerer, 1994). Such errors are especially useful to explain monotonicity violations. Since the latter have largely been excluded from the data and this error structure makes no further predictions for the issues discussed in the paper, I will not further discuss this. The random preference model predicts that preference parameters may be picked at random from a set of preference parameters (Loomes and Sugden, 1995). Again, this error structure makes no differential predictions on the tasks discussed above. Arguably the most commonly used error structure consists in Fechner errors (Hey and Orme, 1994). This deserves some further discussion, as it could in principle account for some of the patterns I described.

Fechner errors may provide an alternative explanation to both the preference for certainty and the reframing explanations. While it is relatively straightforward to design an implementation that is immune to the systematic error explanation formalized in the main text, purely random errors may impact observations due to the chained nature of the tasks when comparing PEs to CEs (Hershey and Schoemaker, 1985; Johnson and Schkade, 1989). Assume that the elicited dimension in step one is observed with some error, i.e. $p_p = \hat{p} + \epsilon_p$ or $y_c = \hat{y} + \epsilon_c$, i.e. there is some randomly distributed error term attached to the observation. Further assume that $\epsilon \sim N(0, \sigma^2)$, i.e. the error is normally distributed with mean zero and variance σ^2 (Hey and Orme, 1994).

I will discuss only the implications for probability equivalents in the interest of brevity, but the second case has similar implications (see Hershey and Schoemaker, 1985, section 5, for a more detailed discussion). Starting from the probability equivalent, the second step will consist in eliciting $y^* \sim (x; p_p)$, i.e. the sure amount of money that makes the decision maker indifferent to playing a prospect offering the switching probability from the PE task at a prize x or else 0. From this, we obtain $y^* = u^{-1}(\hat{p} + \epsilon_p) + \epsilon_c$ by EUT and the usual normalizations. That is, the switching outcome indicating indifference will now contain two disturbance terms. One is a random error that is realized in this new choice list. The other is the error realized in the PE list, which is carried over to this new choice list because of the chained nature of the task.

Now assume a risk neutral decision maker. A first stage response with a negative error will be interpreted as risk seeking, and a response with a positive error as risk averse. This may then result in second stage responses to indicate relatively more risk seeking behavior than in the first stage as found by Hershey and Schoemaker (1985), simply based on the fact that the initial error is 'corrected' (i.e., high risk aversion due to an error in PEs may not be replicated for CEs). Hershey and Schoemaker (1985) excluded such an account on quantitative terms, considering it incompatible with the strength of the effects found (see also the more general results collected by Johnson and Schkade (1989)). In the case presented in this paper, I can fully exclude such a noise account. Indeed, the explanation proposed above creates an issue only when the response mode effects strongly interacts with the initial response (i.e., only subjects who are initially risk averse in the PE list become risk averse in the CE task, and vice versa). This is not the case in the data presented, where these effects hold *on average*, so that Fechner errors cannot account for the results.

B Distribution of responses

We have seen in the main text that uncertainty equivalents in the real incentive conditions resulted in the estimation of significant risk seeking based on a nonparametric test, even though the average value fell directly on the point of risk neutrality. This suggest that responses on the choice lists are skewed. Table 1 reports some descriptive statistics on the different choice lists employed, including the mean, median, standard deviation, skewness, kurtosis, minimum and maximum. These measures are based on the measures used in the main text, i.e. excluding multiple switching and monotonicity violations.

Table 1: Descriptive statistics for different choice lists

choice task	mean	median	stand. dev.	skewness	kurtosis	min	max
PE (hyp.)	0.45	0.45	0.26	0.13	2.16	0.05	0.95
UE (hyp)	0.68	0.65	0.15	0.28	2.13	0.45	0.95
PE (real)	0.49	0.55	0.21	-0.28	2.83	0.05	0.95
UE (real)	0.67	0.65	0.13	0.20	2.39	0.45	0.95
$CE(p_p)$	235.55	247.5	116.88	-0.17	2.11	22.5	227.5
LE	0.36	0.45	0.14	-1.25	3.12	0.05	0.45
$CE(0.5)$	214.75	202.5	111.49	-0.08	2.32	22.5	427.5
$PE(\tilde{y})$	0.57	0.55	0.21	-0.39	3.01	0.05	0.95

C Full-lenght instructions (English)

Below I include the full-length instructions in English.

Experimental tasks (please explain each task separately)
We would like to ask you to make some choice that involve trading off different lotteries, or lotteries and sure amounts of money. We will ask you for your choices in several such tasks, each of which may involve several choices. Please consider these tasks carefully and indicate your choices. Once you have taken all the decisions, ***one of our choices will be randomly selected and played for real money***. Paying close attention to all the dimensions of the decision problem is important, inasmuch as it may determine how much money you will win in the end. I will provide you with detailed information on each of the tasks. If you have any questions or doubts, do not hesitate to ask. There are no right or wrong answers, we are only interested in your preferences.

[Instructions for enumerators:] Please explain each of the tasks carefully. In particular, point out whether the comparison is between two lotteries, or between a lottery and a sure amount of money. Also point out what changes within a choice list. Once you are done with the first choice list, write down the first probability for which the participant prefers the lottery (option A) over the sure amount of money (option B). Do so in private, without showing this to the participant. You will need this number in choice problem 3.

Please take care in explaining the probabilities and outcomes involved. Show both outcomes and probabilities physically, using real money and a bag with numbered or coloured balls. Before getting started, show a choice problem between two lotteries, and illustrate how the extraction process will work. Make sure you explain that one choice will be played for real money, and that it is optimal to decide for each choice as if it were the one being played for real. Makes sure participants understand the trade-offs between lotteries before getting started.

Task 1 [*Instructions for enumerators*:] Record the first probability for which option A is chosen and write it down in secret

First, we will ask you a question over an amount for certain, or an amount that will depend on which of ten numbers you draw from a bag. Option A offers you a chance to win 450 Rs or 0 Rs. The probability of winning increases as you move down the list. Option B always gives you Rs 150 for sure.

	Option A	**Choice**		**Option B**
		A	**B**	
0	**0%** chance of 450 Rs, 100% chance of 0 Rs	O	O	150 Rupees for sure
1	**10%** chance of 450 Rs, 90% chance of 0 Rs	O	O	150 Rupees for sure
2	**20%** chance of 450 Rs, 80% chance of 0 Rs	O	O	150 Rupees for sure
3	**30%** chance of 450 Rs, 70% chance of 0 Rs	O	O	150 Rupees for sure
4	**40%** chance of 450 Rs, 60% chance of 0 Rs	O	O	150 Rupees for sure
5	**50%** chance of 450 Rs, 50% chance of 0 Rs	O	O	150 Rupees for sure
6	**60%** chance of 450 Rs, 40% chance of 0 Rs	O	O	150 Rupees for sure
7	**70%** chance of 450 Rs, 30% chance of 0 Rs	O	O	150 Rupees for sure
8	**80%** chance of 450 Rs, 20% chance of 0 Rs	O	O	150 Rupees for sure
9	**90%** chance of 450 Rs, 10% chance of 0 Rs	O	O	150 Rupees for sure
10	**100%** chance of 450 Rs, 0% chance of 0 Rs	O	O	150 Rupees for sure

Task 2

This works like task 1. However, you are now asked to compare two lotteries. Option A is the same as before. Option B now always gives a 50% chance of obtaining 450 Rs and a 50% chance of obtaining 150 Rs. The probability of winning in option A increases as you move down the list.

	Option A	**Choice**		**Option B**
		A	**B**	
0	**0%** chance of 450 Rs, 100% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
1	**10%** chance of 450 Rs, 90% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
2	**20%** chance of 450 Rs, 80% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
3	**30%** chance of 450 Rs, 70% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
4	**40%** chance of 450 Rs, 60% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
5	**50%** chance of 450 Rs, 50% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
6	**60%** chance of 450 Rs, 40% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
7	**70%** chance of 450 Rs, 30% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
8	**80%** chance of 450 Rs, 20% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
9	**90%** chance of 450 Rs, 10% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs
10	**100%** chance of 450 Rs, 0% chance of 0 Rs	O	O	50% chance of 450 Rs, 50% chance of 150 Rs

Task 3 [*Instructions for enumerators:*] *The probability of switching needs to be taken from task 1, take the first preference for option A.*
You are again asked to choose between two options. Option A gives you a fixed chance of ____% at 450 Rs, or else 0 Rs. Option B gives you an amount for sure. As you move down the list, the sure amount of money increases. Please indicate a choice for each line.

	Option A	**Choice**		**Option B**
		A	**B**	
0	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**0** Rupees for sure
1	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**45** Rupees for sure
2	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**90** Rupees for sure
3	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**135** Rupees for sure
4	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**180** Rupees for sure
5	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**225** Rupees for sure
6	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**270** Rupees for sure
7	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**315** Rupees for sure
8	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**360** Rupees for sure
9	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**405** Rupees for sure
10	_____% chance of 450 Rs, _____% chance of 0 Rs	O	O	**450** Rupees for sure

Task 4
We now ask you to make a choice between two lotteries. Option A offers a chance at 450 Rs or Rs 0, with a probability of obtaining the prize that increases as you go down the list. Option B always offers a 50% chance at 150 Rs and a 50% chance at 0.

	Option A	**Choice**		**Option B**
		A	**B**	
0	**0%** chance of 450 Rs, 90% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
1	**10%** chance of 450 Rs, 90% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
2	**20%** chance of 450 Rs, 80% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
3	**30%** chance of 450 Rs, 70% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
4	**40%** chance of 450 Rs, 60% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
5	**50%** chance of 450 Rs, 50% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
6	**60%** chance of 450 Rs, 40% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
7	**70%** chance of 450 Rs, 30% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
8	**80%** chance of 450 Rs, 20% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
9	**90%** chance of 450 Rs, 10% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs
10	**100**% chance of 450 Rs, 0% chance of 0 Rs	O	O	50% chance of 150 Rs, 50% chance of 0 Rs

Task 5

You are again asked to choose between two options. Option A gives you a fixed chance of 50% at 450 Rs and a chance of 50% at Rs. 0. Option B gives you an amount for sure. As you move down the list, the sure amount of money increases. Please indicate a choice for each line.

	Option A	Choice A	Choice B	Option B
0	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**0** Rupees for sure
1	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**45** Rupees for sure
2	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**90** Rupees for sure
3	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**135** Rupees for sure
4	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**180** Rupees for sure
5	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**225** Rupees for sure
6	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**270** Rupees for sure
7	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**315** Rupees for sure
8	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**360** Rupees for sure
9	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**405** Rupees for sure
10	50% chance of 450 Rs, 50% chance of 0 Rs	O	O	**450** Rupees for sure

Task 6

We now ask you to make a choice between two lotteries. Option A offers a chance at 450 Rs or 0 Rs, with a fixed probability of 40% of obtaining the prize. Option B always offers an 80% chance at a prize, which increases as you go down the list, and a 20% chance at 0.

	Option A	Choice A	Choice B	Option B
0	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **0** Rs, 20% chance of 0 Rs
1	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **45** Rs, 20% chance of 0 Rs
2	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **90** Rs, 20% chance of 0 Rs
3	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **135** Rs, 20% chance of 0 Rs
4	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **180** Rs, 20% chance of 0 Rs
5	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **225** Rs, 20% chance of 0 Rs
6	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **270** Rs, 20% chance of 0 Rs
7	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **315** Rs, 20% chance of 0 Rs
8	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **360** Rs, 20% chance of 0 Rs
9	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **405** Rs, 20% chance of 0 Rs
10	40% chance of 450 Rs, 60% chance of 0 Rs	O	O	80% chance of **450** Rs, 20% chance of 0 Rs

Task 7 [Instructions for enumerators:] Insert the first amount for which option B was chosen in task 5 into option B below

Below, we ask you to choose between a lottery and a sure amount. Option A offers you either 450 Rs or else 0 Rs, with a probability of winning that increases as you move down the list. Option B offers you the same sure amount throughout.

	Option A	Choice A	Choice B	Option B
0	**0%** chance of 450 Rs, 90% chance of 0 Rs	O	O	_____ Rupees for sure
1	**10%** chance of 450 Rs, 90% chance of 0 Rs	O	O	_____ Rupees for sure
2	**20%** chance of 450 Rs, 80% chance of 0 Rs	O	O	_____ Rupees for sure
3	**30%** chance of 450 Rs, 70% chance of 0 Rs	O	O	_____ Rupees for sure
4	**40%** chance of 450 Rs, 60% chance of 0 Rs	O	O	_____ Rupees for sure
5	**50%** chance of 450 Rs, 50% chance of 0 Rs	O	O	_____ Rupees for sure
6	**60%** chance of 450 Rs, 40% chance of 0 Rs	O	O	_____ Rupees for sure
7	**70%** chance of 450 Rs, 30% chance of 0 Rs	O	O	_____ Rupees for sure
8	**80%** chance of 450 Rs, 20% chance of 0 Rs	O	O	_____ Rupees for sure
9	**90%** chance of 450 Rs, 10% chance of 0 Rs	O	O	_____ Rupees for sure
10	**100%** chance of 450 Rs, 0% chance of 0 Rs	O	O	_____ Rupees for sure

Task 8

We now ask you to make a choice between two lotteries. Option A offers a chance at 450 Rs or 0 Rs, with a fixed probability of 10% of obtaining the prize. Option B always offers a 20% chance at a prize, which increases as you move down the list, and an 80% chance at 0.

	Option A	Choice A	Choice B	Option B
0	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **0** Rs, 80% chance of 0 Rs
1	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **45** Rs, 80% chance of 0 Rs
2	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **90** Rs, 80% chance of 0 Rs
3	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **135** Rs, 80% chance of 0 Rs
4	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **180** Rs, 80% chance of 0 Rs
5	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **225** Rs, 80% chance of 0 Rs
6	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **270** Rs, 80% chance of 0 Rs
7	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **315** Rs, 80% chance of 0 Rs
8	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **360** Rs, 80% chance of 0 Rs
9	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **405** Rs, 80% chance of 0 Rs
10	10% chance of 450 Rs, 90% chance of 0 Rs	O	O	20% chance of **450** Rs, 80% chance of 0 Rs

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