Supplement to "Ellsberg meets Keynes at an urn"

(*Quantitative Economics*, Vol. 14, No. 3, July 2023, 1133–1162)

Soo Hong Chew
China Center for Behavioral Economics and Finance, Southwestern University of Finance and Economics and Department of Economics, National University of Singapore

Bin Miao
School of Economics, Renmin University of China

Songfa Zhong
Department of Economics, National University of Singapore and Department of Economics, New York University Abu Dhabi

Appendix A: Supplementary tables and figures

Soo Hong Chew: chew.soohong@gmail.com
Bin Miao: binmiao11@gmail.com
Songfa Zhong: zhongsongfa@gmail.com

© 2023 The Authors. Licensed under the Creative Commons Attribution-NonCommercial License 4.0. Available at http://qeconomics.org. https://doi.org/10.3982/QE2253

TABLE A.1. The effect of background characteristics on attitudes toward risk and sources of uncertainty in Singapore subjects.

Variables	(1) Risk	(2) Full Ambiguity	(3) Interval Ambiguity	(4) Disjoint Ambiguity	(5) Full Compound	(6) p-q Compound	(7) Home	(8) Foreign
Female	−0.456	−0.142	−0.120	0.030	0.228	−0.164	0.078	0.294
	[0.136]	[0.173]	[0.168]	[0.187]	[0.183]	[0.189]	[0.150]	[0.150]
Age	−0.997	0.484	−0.524	0.058	1.039	−0.282	−0.413	−0.896
	[0.798]	[1.013]	[0.983]	[1.096]	[1.077]	[1.111]	[0.880]	[0.881]
Age^2	0.023	−0.010	0.013	0.000	−0.023	0.006	0.010	0.022
	[0.018]	[0.023]	[0.022]	[0.025]	[0.025]	[0.025]	[0.020]	[0.020]
Father education	−0.042	−0.052	−0.053	−0.005	−0.021	0.029	−0.026	−0.038
	[0.040]	[0.051]	[0.049]	[0.055]	[0.054]	[0.055]	[0.044]	[0.044]
Mother education	0.053	−0.023	−0.059	−0.028	−0.053	−0.024	−0.002	−0.012
	[0.043]	[0.055]	[0.053]	[0.059]	[0.058]	[0.059]	[0.047]	[0.047]
Number of siblings	−0.040	−0.123	−0.113	−0.072	−0.150	−0.022	−0.101	−0.073
	[0.065]	[0.083]	[0.080]	[0.090]	[0.088]	[0.091]	[0.072]	[0.072]
Family income	−0.000	−0.000	−0.000	−0.000	0.000	−0.000	−0.000	−0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Constant	16.792	−2.435	7.426	0.176	−10.094	4.176	4.516	9.513
	[8.771]	[11.128]	[10.803]	[12.045]	[11.836]	[12.214]	[9.670]	[9.686]
Observations	1797	1779	1775	1776	1773	1776	1772	1779
R-squared	0.015	0.004	0.006	0.001	0.004	0.001	0.002	0.005

TABLE A.2. The effect of background characteristics on attitudes toward risk and sources of uncertainty in Beijing subjects.

Variables	(1) Risk	(2) Full Ambiguity	(3) Interval Ambiguity	(4) Disjoint Ambiguity	(5) Full Compound	(6) p-q Compound	(7) Home	(8) Foreign
Female	−0.499	0.127	0.080	0.163	0.173	0.239	0.301	0.443
	[0.145]	[0.180]	[0.173]	[0.195]	[0.178]	[0.198]	[0.154]	[0.150]
Age	−0.518	0.117	−0.376	−0.387	−0.530	−0.974	0.025	0.002
	[0.435]	[0.537]	[0.517]	[0.583]	[0.533]	[0.591]	[0.468]	[0.450]
Age^2	0.011	−0.003	0.009	0.009	0.013	0.023	−0.001	−0.000
	[0.010]	[0.012]	[0.012]	[0.013]	[0.012]	[0.013]	[0.011]	[0.010]
Father education	0.012	0.044	0.057	0.020	0.099	0.161	0.165	0.231
	[0.069]	[0.085]	[0.082]	[0.093]	[0.085]	[0.093]	[0.073]	[0.072]
Mother education	0.040	0.056	0.051	0.150	0.098	0.006	−0.137	−0.211
	[0.065]	[0.081]	[0.078]	[0.088]	[0.080]	[0.089]	[0.069]	[0.069]
Number of siblings	0.021	0.092	0.074	0.009	0.080	0.070	−0.025	−0.025
	[0.058]	[0.072]	[0.069]	[0.078]	[0.071]	[0.079]	[0.062]	[0.060]
Family income	−0.000	0.000	0.000	0.000	−0.000	0.000	0.000	−0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Constant	11.522	0.026	4.257	3.853	5.651	8.468	−0.647	−0.367
	[4.804]	[5.931]	[5.710]	[6.445]	[5.890]	[6.531]	[5.182]	[4.971]
Observations	936	929	927	926	922	925	928	923
R-squared	0.018	0.005	0.005	0.010	0.013	0.016	0.011	0.022

TABLE A.3. Spearman correlations across the premium of each lottery.

	A	**A1**	**A2**	**C**	**C1**	**N**
A1	*0.747*					
A2	*0.556*	*0.632*				
C	0.549	0.569	0.501			
C1	0.426	0.449	0.421	*0.485*		
N	0.445	0.468	0.472	0.464	0.407	
N1	0.441	0.450	0.441	0.450	0.383	*0.865*

Note: The premium is computed as the difference between the CE of the risky lottery and that of the corresponding lottery.

TABLE A.4. Attitudes toward uncertainty by cognitive ability.

		Low Scores			High Scores			
	Lottery	Neutral	Aversion	Seeking	Neutral	Aversion	Seeking	p-value
A	Full ambiguity	21.4%	63.8%	14.8%	22.6%	66.0%	11.4%	0.033
A1	Interval ambiguity	24.3%	54.1%	21.7%	26.0%	57.3%	16.7%	0.074
A2	Disjoint ambiguity	24.8%	50.8%	24.4%	21.8%	56.2%	22.1%	0.278
C	Full compound risk	24.1%	55.5%	20.4%	22.2%	57.0%	20.9%	0.292
C1	p-q compound risk	23.1%	42.2%	34.7%	24.4%	46.2%	29.4%	0.056
N	Natural event (home)	33.0%	37.3%	29.7%	38.5%	33.7%	27.8%	0.541
N1	Natural event (foreign)	32.2%	42.3%	25.5%	38.2%	37.5%	24.3%	0.574

Note: This table presents the percentage of different attitudes toward each lottery by low cognitive ability (scores ≤ 57, $N = 1022$) and high cognitive ability (scores > 57, $N = 1059$). The last column reports the p-value using regression analysis with premium as dependent variable and score as independent variable.

TABLE A.5. Correlations across three types of uncertainty by cognitive ability.

	Low scores		High scores	
	Ambiguity	Compound risk	Ambiguity	Compound risk
Compound risk	0.813		0.837	
	(0.017)		(0.015)	
Natural event	0.608	0.714	0.557	0.604
	(0.011)	(0.017)	(0.011)	(0.015)

Note: This table presents the correlations for attitudes toward the three types of uncertainty by low cognitive ability (scores ≤ 57, $N = 1022$) and high cognitive ability (scores > 57, $N = 1059$).

TABLE A.6. Individual types by cognitive ability.

Ambiguity	Compound Risk	Natural Event	Low Scores	High Scores	p-Value
Nonneutral	Nonneutral	Nonneutral	67.4%	63.4%	0.067
Nonneutral	Nonneutral	Neutral	19.1%	21.5%	0.203
Neutral	Neutral	Neutral	4.6%	6.6%	0.070
Nonneutral	Neutral	Nonneutral	2.3%	0.5%	0.001
Neutral	Nonneutral	Nonneutral	2.0%	1.4%	0.325
Nonneutral	Neutral	Neutral	2.0%	2.4%	0.629
Neutral	Nonneutral	Neutral	1.7%	3.3%	0.029
Neutral	Neutral	Nonneutral	0.8%	0.9%	0.755

Note: This table presents the percentage of individual type classified by attitudes toward three types of uncertainty, by low cognitive ability (scores ≤ 57, $N = 1022$) and high cognitive ability (scores > 57, $N = 1059$).

TABLE A.7. Attitudes toward uncertainty: Singapore and Beijing subjects.

		Singapore			Beijing			
	Lottery	Neutral	Aversion	Seeking	Neutral	Aversion	Seeking	p-Value
A	Full ambiguity	22.0%	65.0%	13.0%	24.1%	63.0%	12.8%	0.000
A1	Interval ambiguity	25.2%	55.8%	19.1%	25.7%	53.2%	21.1%	0.000
A2	Disjoint ambiguity	23.2%	53.6%	23.2%	21.7%	52.0%	26.4%	0.001
C	Full compound risk	23.1%	56.3%	20.6%	25.1%	55.5%	19.4%	0.002
C1	p-q compound risk	23.8%	44.3%	32.0%	23.3%	31.5%	45.1%	0.000
N	Natural event (home)	35.9%	35.4%	28.7%	33.9%	34.3%	31.8%	0.207
N1	Natural event (foreign)	35.3%	39.8%	24.9%	33.4%	37.0%	29.6%	0.013

Note: This table presents the percentage of different attitudes toward each lottery, comparing Singapore and Beijing subjects.

TABLE A.8. Correlations across three types of uncertainty: Singapore and Beijing subjects.

	Singapore		Beijing	
	Ambiguity	Compound risk	Ambiguity	Compound risk
Compound risk	0.825		0.780	
	(0.012)		(0.015)	
Natural event	0.580	0.657	0.601	0.618
	(0.008)	(0.011)	(0.012)	(0.016)

Note: This table presents the correlations across attitudes toward three types of uncertainty, comparing Singapore and Beijing subjects.

TABLE A.9. Individual types: Singapore and Beijing subjects.

Ambiguity	Compound Risk	Natural Event	Singapore	Beijing	p-Value
Nonneutral	Nonneutral	Nonneutral	65.3%	68.5%	0.083
Nonneutral	Nonneutral	Neutral	20.4%	16.5%	0.012
Neutral	Neutral	Neutral	5.7%	4.0%	0.048
Nonneutral	Neutral	Nonneutral	1.4%	2.8%	0.005
Neutral	Nonneutral	Nonneutral	1.7%	1.9%	0.704
Nonneutral	Neutral	Neutral	2.2%	3.1%	0.133
Neutral	Nonneutral	Neutral	2.5%	2.1%	0.499
Neutral	Neutral	Nonneutral	0.9%	1.0%	0.689

Note: This table presents the percentage of individual type classified by attitudes toward three types of uncertainty, comparing Singapore and Beijing subjects.

TABLE A.10. Attitudes toward uncertainty by cognitive ability (Beijing subjects).

		Low scores			High scores			
	Lottery	Neutral	Aversion	Seeking	Neutral	Aversion	Seeking	p-Value
A	Full ambiguity	25.2%	63.3%	11.5%	23.3%	62.8%	13.8%	0.698
A1	Interval ambiguity	25.1%	54.7%	20.2%	26.1%	52.1%	21.8%	0.186
A2	Disjoint ambiguity	20.7%	51.6%	27.7%	22.4%	52.2%	25.4%	0.122
C	Full compound risk	23.1%	59.4%	17.5%	26.5%	52.7%	20.8%	0.041
C1	p-q compound risk	20.5%	34.2%	45.3%	25.3%	29.7%	45.0%	0.394
N	Natural event (home)	31.9%	36.4%	31.7%	35.3%	32.8%	31.9%	0.031
N1	Natural event (foreign)	31.8%	38.1%	30.1%	34.6%	36.2%	29.2%	0.065

Note: This table presents the percentage of attitude toward each lottery for Beijing subjects, by low cognitive ability (scores ≤ 56, $N = 526$) and high cognitive ability (scores > 56, $N = 663$). The last column reports the p-value using regression analysis with premium as dependent variable and score as independent variable.

TABLE A.11. Correlations across three types of uncertainty by cognitive ability (Beijing subjects).

	Low Scores		High Scores	
	Ambiguity	Compound Risk	Ambiguity	Compound Risk
Compound risk	0.788		0.776	
	(0.025)		(0.020)	
Natural event	0.632	0.626	0.581	0.611
	(0.019)	(0.025)	(0.015)	(0.021)

Note: This table presents the correlations for attitudes toward the three types of uncertainty for Beijing subjects, by low cognitive ability (scores ≤ 56, $N = 526$) and high cognitive ability (scores > 56, $N = 663$).

TABLE A.12. Individual types by cognitive ability (Beijing subjects).

Ambiguity	Compound Risk	Natural Event	Low Scores	High Scores	p-Value
Nonneutral	Nonneutral	Nonneutral	72.3%	65.9%	0.032
Nonneutral	Nonneutral	Neutral	15.2%	17.4%	0.356
Neutral	Neutral	Neutral	2.5%	5.0%	0.043
Nonneutral	Neutral	Nonneutral	2.2%	3.3%	0.319
Neutral	Nonneutral	Nonneutral	1.5%	2.2%	0.386
Nonneutral	Neutral	Neutral	3.2%	3.1%	0.941
Neutral	Nonneutral	Neutral	2.0%	2.2%	0.764
Neutral	Neutral	Nonneutral	1.2%	0.9%	0.575

Note: This table presents the percentage of individual type classified by attitudes toward three types of uncertainty for Beijing subjects, by low cognitive ability (scores ≤ 56, $N = 526$) and high cognitive ability (scores > 56, $N = 663$).

TABLE A.13. Summary statistics of attitudes toward types of uncertainty in Experiment 2.

				Relative to EV			Relative to Risk		
Variable	Obs	Mean	Std. Dev.	Neutral	Aversion	Seeking	Neutral	Aversion	Seeking
A. Moderate prospect									
Risk	149	8.000	3.811	15.4%	66.4%	18.1%			
Ambiguity	149	7.631	3.719	12.1%	72.5%	15.4%	41.6%	34.9%	23.5%
Compound	149	8.188	3.934	15.4%	63.8%	20.8%	44.3%	29.5%	26.2%
Natural event	149	8.034	4.041	12.8%	66.4%	20.8%	47.0%	27.5%	25.5%
B. Moderate hazard									
Risk	149	13.503	4.231	13.4%	18.8%	67.8%			
Ambiguity	149	13.168	4.504	12.8%	26.9%	60.4%	36.9%	38.9%	24.2%
Compound	149	12.779	4.346	12.1%	26.2%	61.7%	35.6%	38.9%	25.5%
Natural event	149	12.953	4.261	13.4%	24.2%	62.4%	40.9%	38.3%	20.8%
C. Longshot prospect									
Risk	149	12.047	4.474	15.4%	26.2%	58.4%			
Ambiguity	149	10.732	4.063	16.8%	35.6%	47.7%	32.9%	51.0%	16.1%
Compound	149	10.926	4.120	19.5%	36.9%	43.6%	34.2%	45.0%	20.8%
Natural event	149	10.966	4.071	19.5%	34.9%	45.6%	31.5%	45.0%	23.5%
D. Longshot hazard									
Risk	149	8.651	5.265	14.8%	59.1%	26.2%			
Ambiguity	149	8.993	4.893	14.8%	59.1%	26.2%	32.2%	32.9%	34.9%
Compound	149	9.195	5.283	7.4%	56.4%	36.2%	35.6%	30.9%	33.6%
Natural event	149	9.409	5.100	12.8%	54.4%	32.9%	34.9%	26.2%	38.9%
E. Mixed lottery									
Risk	149	8.369	4.897	8.1%	64.4%	27.5%			
Ambiguity	149	7.564	4.205	10.1%	73.2%	16.8%	34.9%	41.6%	23.5%
Compound	149	7.899	4.341	8.7%	71.8%	19.5%	30.9%	40.3%	28.9%
Natural event	149	8.342	4.815	10.7%	64.4%	24.8%	32.9%	35.6%	31.5%

TABLE A.14. Summary statistics of attitudes toward types of uncertainty in Experiment 2 with full sample.

				Relative to EV			Relative to Risk		
Variable	Obs	Mean	Std. Dev.	Neutral	Aversion	Seeking	Neutral	Aversion	Seeking
Risk	208	8.096	4.538	13.9%	64.4%	21.6%			
Ambiguity	208	7.707	4.390	11.1%	70.7%	18.3%	39.4%	35.6%	25.0%
Compound	208	8.130	4.508	13.5%	63.5%	23.1%	43.3%	28.9%	27.9%
Natural event	208	7.894	4.502	13.0%	65.9%	21.2%	44.7%	30.3%	25.0%
B. Moderate hazard									
Risk	208	13.447	5.038	13.5%	20.2%	66.4%			
Ambiguity	208	13.192	5.064	12.5%	26.9%	60.6%	35.1%	37.0%	27.9%
Compound	208	12.870	5.016	12.5%	25.0%	62.5%	36.5%	36.1%	27.4%
Natural event	208	13.029	4.886	13.9%	23.6%	62.5%	38.5%	37.0%	24.5%
C. Longshot prospect									
Risk	208	11.784	5.466	13.0%	30.8%	56.3%			
Ambiguity	208	10.591	4.836	14.9%	38.5%	46.6%	36.1%	47.6%	16.4%
Compound	208	10.678	4.929	19.2%	38.0%	42.8%	33.2%	44.2%	22.6%
Natural event	208	10.827	4.947	18.3%	37.5%	44.2%	36.5%	40.4%	23.1%
D. Longshot hazard									
Risk	208	9.380	6.251	11.5%	56.3%	32.2%			
Ambiguity	208	9.841	5.872	12.0%	55.3%	32.7%	32.7%	33.2%	34.1%
Compound	208	10.120	6.302	7.7%	51.4%	40.9%	35.6%	29.8%	34.6%
Natural event	208	10.159	6.131	11.1%	50.5%	38.5%	38.0%	26.4%	35.6%
E. Mixed lottery									
Risk	208	8.346	5.244	7.2%	63.5%	29.3%			
Ambiguity	208	7.659	4.824	7.2%	72.1%	20.7%	34.6%	38.5%	26.9%
Compound	208	7.971	4.798	7.7%	68.8%	23.6%	31.3%	38.9%	29.8%
Natural event	208	8.438	5.322	8.2%	63.0%	28.9%	32.2%	35.1%	32.7%

TABLE A.15. Correlations across three types of uncertainty in Experiment 2 with full sample.

	A–C	**A–N**	**C–N**
Moderate prospect	0.482	0.460	0.433
Moderate hazard	0.632	0.492	0.618
Longshot prospect	0.665	0.584	0.545
Longshot hazard	0.594	0.546	0.590
Mixed lottery	0.606	0.581	0.656
Average	0.596	0.533	0.569

Note: This table reports the Spearman correlations with full sample. $N = 208$.

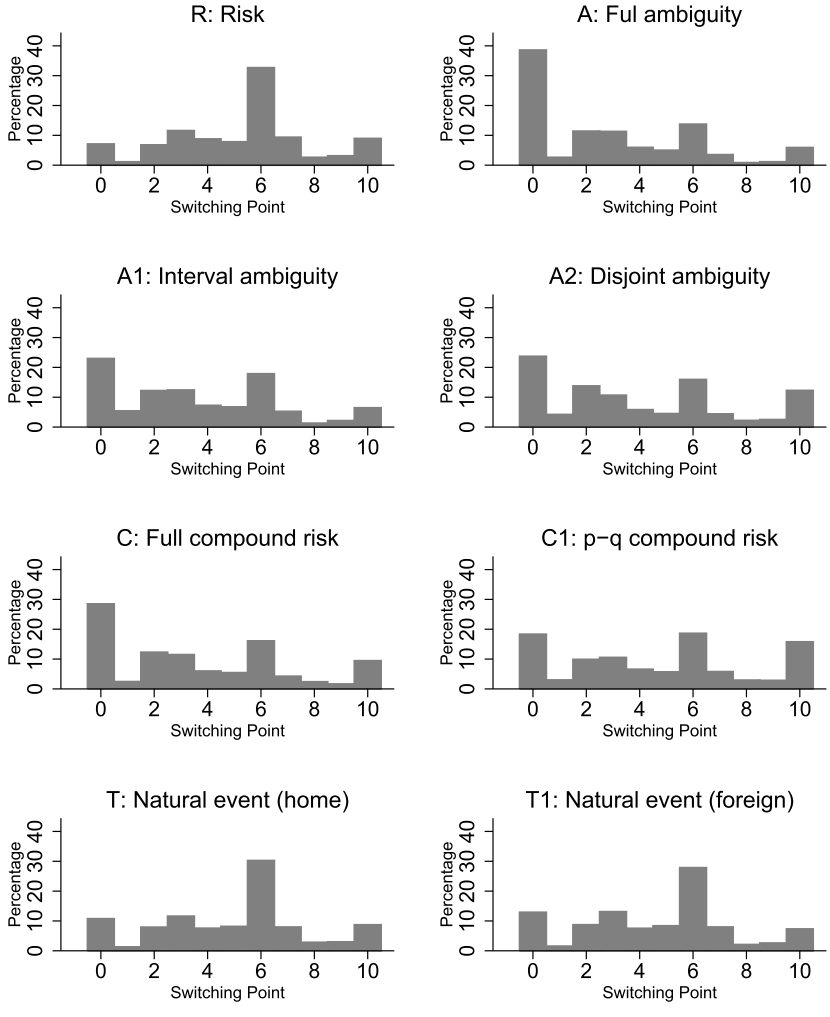

FIGURE A.1. Distribution of switching points for each lottery.

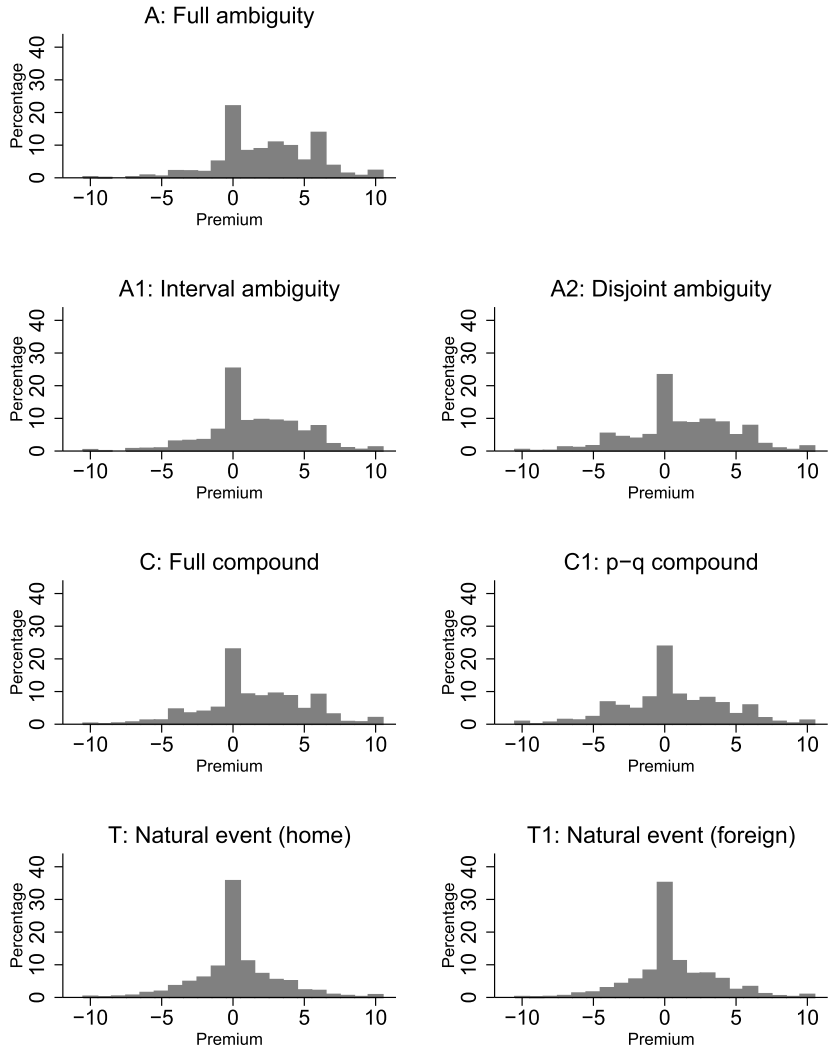

FIGURE A.2. Distribution of uncertainty premium for each lottery.

Co-editor Garance Genicot handled this manuscript.

Manuscript received 22 September, 2022; final version accepted 21 February, 2023; available online 23 February, 2023.