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This paper presents an experimental study analyzing common consequence effects with binary choice, willingness-to-pay (WTP), and willingness-to-accept (WTA). Consistent with previous research we do not find clearcut evidence of fanning out in the absence of certainty effects. Violation rates of EU are more pronounced for WTP and WTA than for choice data. Moreover, there is a strong tendency for violations in the direction of fanning out. Our results reinforce the significance of common consequence effects and provide support for the operation of cancellation in prospect theory.

Keywords: common consequence effects, fanning out, WTP, WTA, cancellation

JEL classification: C91, D81

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Common Consequence Effects with Pricing Data

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Abstract

This paper presents an experimental study analyzing common consequence effects with binary choice, willingness-to-pay (WTP), and willingness-to-accept (WTA). Consistent with previous research we do not find clearcut evidence of fanning out in the absence of certainty effects. Violation rates of EU are more pronounced for WTP and WTA than for choice data. Moreover, there is a strong tendency for violations in the direction of fanning out. Our results reinforce the significance of common consequence effects and provide support for the operation of cancellation in prospect theory.

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1 Introduction

Common consequence effects – including the famous paradox of Allais (1954) – are the most prominent experimental design for observing violations of expected utility (EU) theory. A common consequence effect (CCE) occurs if the preference between two lotteries with a common outcome changes when in both lotteries the same probability mass is shifted from this common outcome to a different common outcome. Numerous empirical studies reported this type of violation of EU and provided thereby motivation for the development of alternative theories like cumulative prospect theory (CPT), rank-dependent utility (RDU) or the TAX model. Given this significant role and the long tradition of CCEs it is surprising that almost all studies analyzed them with pairwise choice data whereas work relying on alternative elicitation methods like pricing data is virtually absent in the economics literature.[2] From an economic perspective pricing behaviour is more relevant as market transactions usually involve buying and selling instead of choices. If CCEs would (not) occur for pricing behaviour their economic relevance could be reinforced (challenged).

In principle pricing and choice data of an individual should be based on the same preference ordering but many empirical observations show that this is not the case in practice. The most prominent example of such response mode effects is the preference reversal phenomenon (Lichtenstein and Slovic, 1971) where the preference order between two alternatives elicited by a straight choice is opposite to the preference order elicited by minimal selling prices. Given this evidence, the incidence of CCEs may fundamentally differ between choice and pricing data. But also for different pricing data response mode effects can be observed. Most prominent seems to be the disparity between willingness-to-pay (WTP) and willingness-to-accept (WTA), see Knetsch and Sinden (1984). Several studies showed that not only preference elicited by choice and pricing may differ but also the various pricing methods can lead to different preference orderings (Coppinger et al., 1980; Cox et al., 1982; Isaac and James, 2000; Berg et al., 2005; Hey et al., 2009). Therefore, the incidence of CCEs may also vary for different pricing methods.

In the present paper we consider eight different CCEs and elicit preferences by pairwise choice, WTP (maximal buying price) and WTA (minimal selling price). For the elicitation of WTP and WTA we employ incentive-compatible second-price auctions. Our experimental design is presented in the next section. Section 3 contains our results and Section 4 concludes.

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[2] There are some studies in the psychological literature (e.g. Birnbaum and Beeghley, 1997) which have, however, a different focus.

2 Experimental Design

The experiment was conducted at the University of York (EXEC) with 24 subjects. The experiment involved 30 lottery pairs, 12 of which are analyzed in the present paper, see Table 1. Lotteries were presented as segmented circles on the computer screen. Subjects had to attend five separate sessions and at the end of all sessions one question for each subject was randomly chosen and played out for real. The average payment to the subjects was £34.17 with £80 being the highest and £0 being the lowest payment.

	Safe Lottery				*Risky Lottery*			
No.	£0	£10	£30	£40	£0	£10	£30	£40
1	0.00	0.60	0.10	0.30	0.02	0.60	0.00	0.38
2	0.30	0.60	0.10	0.00	0.32	0.60	0.00	0.08
3	0.00	0.50	0.50	0.00	0.35	0.00	0.50	0.15
4	0.50	0.50	0.00	0.00	0.85	0.00	0.00	0.15
5	0.00	0.20	0.30	0.50	0.20	0.00	0.00	0.80
6	0.50	0.20	0.30	0.00	0.70	0.00	0.00	0.30
7	0.00	0.20	0.70	0.10	0.20	0.00	0.40	0.40
8	0.00	0.00	0.50	0.50	0.10	0.00	0.00	0.90
9	0.50	0.00	0.50	0.00	0.60	0.00	0.00	0.40
10	0.00	0.00	0.75	0.25	0.00	0.10	0.25	0.65
11	0.00	0.25	0.50	0.25	0.00	0.35	0.00	0.65
12	0.25	0.25	0.50	0.00	0.25	0.35	0.00	0.40

Table 1: The lottery pairs

In the five sessions subjects had to perform altogether eight tasks three of which will be analysed in the present paper:

- report a preference for all pairwise choice questions (CHOICE task);
- report the willingness-to-pay (i.e. the maximal buying price) for lottery (WTP task);
- report the willingness-to-accept (the minimal selling price) for each lottery (WTA task);

For all tasks we used incentive-compatible elicitation mechanisms. If a question of the choice task was chosen for the reward, the subject could simply play out the preferred lottery. For the WTP and WTA tasks standard second-price auctions were employed.

3 Results

Our stimuli in Table 1 involve altogether eight CCEs which are listed in the first two columns of Table 2. Let us consider CCE No. 1 consisting of lottery pairs 1 and 2. Table 1 shows that each pair consists of a relatively safe and a relatively risky lottery and that pair 2 can be constructed by pair 1 by shifting probability mass of 30% from the common outcome £40 to the common outcome £0 in both lotteries. According to EU, this manipulation must not change preferences between both lotteries, i.e. an EU maximizer will choose either the safe lottery in both pairs or the risky lottery in both pairs. There are two possible patterns of violating EU which will be termed fanning out (FO) and fanning in (FI) according to Machina (1982). FO (FI) holds if the degree of risk aversion is increasing (decreasing) with the attractiveness of lotteries. Note that the lotteries in pair 1 are more attractive than the lotteries in pair 2 according to the criterion of first-order stochastic dominance. Consequently, a violation of EU in the direction of FO (FI) occurs if a subject chooses the safe (risky) lottery in pair 1 and the risky (safe) lottery in pair 2. Previous empirical research revealed that violations of EU for choice data are systematic since the FO pattern was much more frequently observed than the FI pattern. This is particularly true for CCEs which involve a certainty effect, i.e. one alternative is a certain outcome. However, there are also studies which observed more FI than FO patterns (e.g. Conlisk, 1989; Prelec, 1990) for stimuli which do not involve certainty effects. Also from a theoretical point of view FO is not always the dominant pattern under CPT (see Wu and Gonzalez, 1998). As the last column of Table 2 shows, we have selected our stimuli such that the most prominent parameterizations of CPT (Tversky and Kahneman, 1992) and the TAX model of Birnbaum and McIntosh (1996) imply either FO or consistency with EU for all our CCEs.

No.	Pairs	CHOICE			WTP			WTA			Predicted	
		EU	FO	FI	EU	FO	FI	EU	FO	FI	CPT	TAX
1	1&2	54.2	**37.5**	8.3	41.7	**50.0**	8.3	50.0	**29.2**	20.8	FO	FO
2	3&4	50.0	16.7	**33.3**	58.4	**33.3**	8.3	54.2	**33.3**	12.5	FO	FO
3	5&6	79.2	4.2	**16.6**	45.8	**33.4**	20.8	75.0	**16.7**	8.3	FO	FO
4	5&7	91.6	4.2	4.2	37.5	**41.7**	20.8	75.0	**16.7**	8.3	EU	EU
5	8&9	75.0	**20.8**	4.2	45.8	**45.8**	8.3	58.3	**25.0**	16.7	FO	FO
6	10&11	54.2	**33.3**	12.5	54.2	**37.5**	8.3	41.7	**41.7**	16.6	FO	EU
7	11&12	54.2	20.8	**25.0**	54.2	**29.2**	16.6	37.5	**33.3**	29.2	EU	FO
8	10&12	54.2	**29.2**	16.6	33.3	**50.0**	16.7	54.2	**37.5**	8.3	FO	FO
all		64.1	**20.8**	15.1	46.4	**40.1**	13.5	55.7	**29.2**	15.1		

Table 2: Results

Columns 3-5 of Table 2 present the results of our experiment. For all three elicitation methods and all eight CCEs the table reports the fraction of subjects behaving consistent with EU and the fractions of observed FO and FI patterns. For choice data FO is observed more frequently than FI for four CCEs while the opposite holds in three cases. In total there are more FO than FI responses (20.8% compared to 15.1%) but this difference is insignificant according to the test of Conlisk (1989). In this respect our results are consistent with those of previous studies: there no clearcut evidence of FO if certainty effects are not involved. Comparing choice and pricing data, the last row of Table 2 reveals that consistency with EU is less common for WTP and WTA than for choice data (all differences are significant at least at the 5%-level). Moreover, for all our eight CCEs FO is more frequently observed than FI in the case of both WTP and WTA. In total the difference between FO and FI amounts to 26.6 percentage points for WTP and 14.1 percentage points for WTA (both differences significant at the 1%-level).

4 Conclusions

Our results clearly show that violations of EU in the context of CCEs are more pronounced for pricing than for choice data. Moreover, in the case of pricing these violations are systematic in the direction of FO. Since pricing is more important for real economic behaviour than choice, this evidence reinforces the need to analyze economic problems with alternatives to EU like CPT, RDU or TAX. A possible explanation for our results is cancellation: in original prospect theory Kahneman and Tversky (1979) proposed that subjects cancel common outcomes before choosing between two lotteries. Since for pricing decisions each lottery is evaluated in isolation, the operation of cancellation cannot be applied here and, therefore, common outcomes have a higher impact than for binary choice.

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