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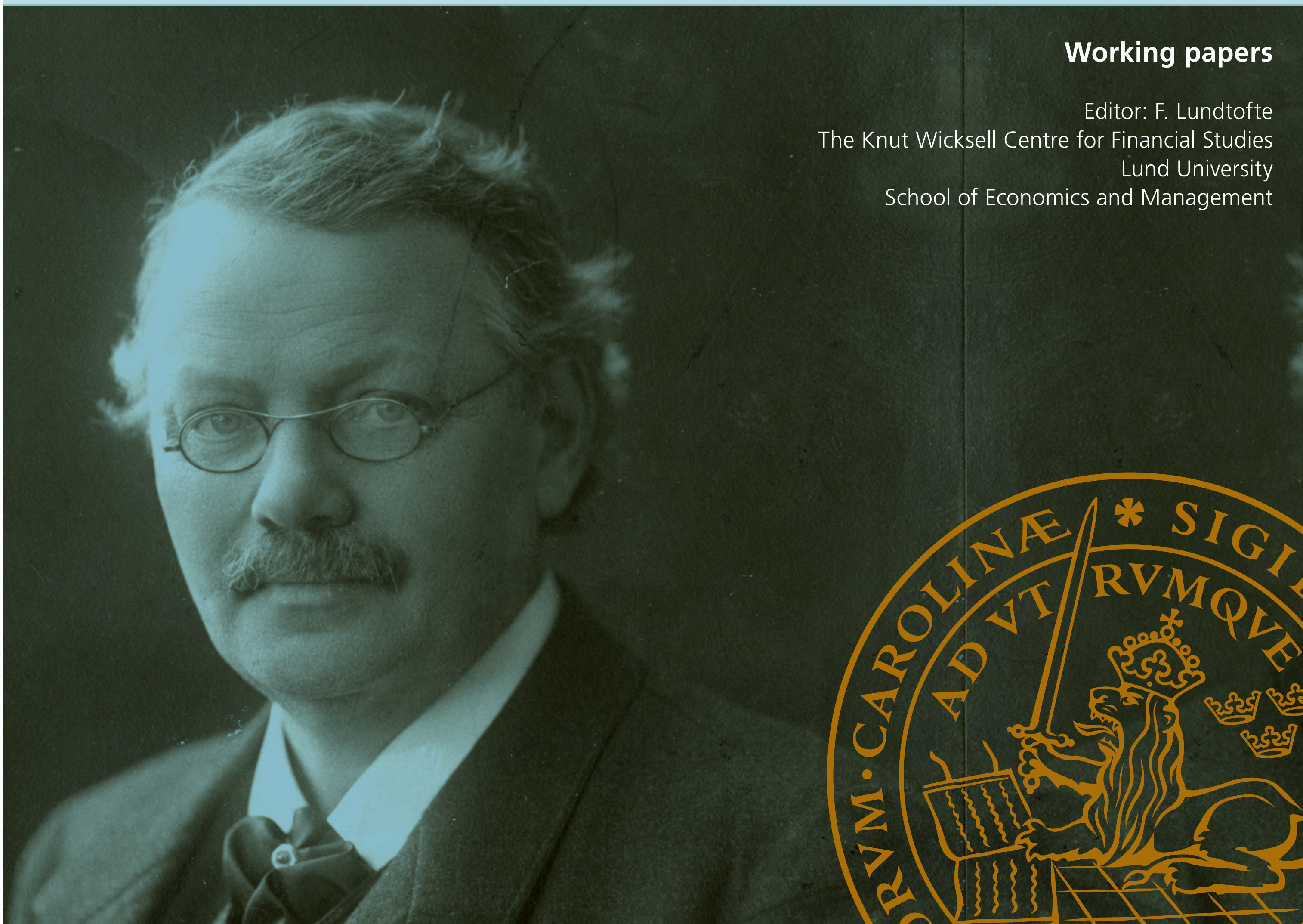

Deciding for others reduces loss aversion*

Ola Andersson[†], Håkan J. Holm[‡], Jean-Robert Tyran[§] and

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Abstract:

We study risk taking on behalf of others, both when choices involve losses and when they do not. We conduct a large-scale incentivized experiment with subjects randomly drawn from the Danish population. On average, decision makers take the same risks for other people as for themselves when losses are excluded. In contrast, when losses are possible, decisions on behalf of others are more risky. Using structural estimation, we show that this increase in risk is substantial and is due to a decrease in loss aversion when others are affected by their choices. This finding is consistent with the account of the dual process model, i.e. an interpretation of loss aversion as a bias in decision making.

Keywords: Risk taking; loss aversion; experiment

JEL Codes: C91; D03; D81; G02

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1. Introduction

Loss aversion is the tendency to evaluate outcomes relative to a reference point and to be more sensitive to negative departures from this reference point than to positive ones. This tendency is one of the most well-established departures from the canonical expected utility model and it is commonly viewed as an irrational bias. In a survey on loss aversion, Camerer (2005, p.132) states that "loss aversion is often an exaggerated emotional reaction of fear, an adapted response to the prospect of genuine, damaging, survival-threatening loss… Many of the losses people fear the most are not life threatening, but there is no telling that to an emotional system that is overadapted to conveying fear signals." Loss aversion has been linked to a broad range of empirical findings in economics and finance including the equity premium puzzle (Benartzi and Thaler 1995), the disposition effect (Odean 1998), the endowment effect (Kahneman et al. 1990), seller behavior on housing markets (Genesove and Mayer 2001, Stephens and Tyran 2012), and labor supply decisions (Camerer et al. 2007, Fehr and Goette 2007, Crawford and Meng 2011). Evidence from professional golf players on the PGA Tour suggests that not even the combination of experience, competition and high stakes is sufficient to eliminate this bias (Pope and Schweitzer 2011).

In this paper, we provide evidence showing that making decisions on behalf of others reduces loss aversion. This finding suggests that managing risks for other people, which has its well-known pros and cons in various respects (e.g., related to moral hazard), may also have this very specific de-biasing advantage, which to our knowledge has not been demonstrated before. We report experimental evidence from situations with no monetary conflict of interest between the decision maker and the other stakeholders. We administer our experiment to a large number of subjects who were randomly drawn from the general Danish population.

We find that when choosing between risky prospects for which losses are ruled out by design, the decision makers' choices on behalf of others are indistinguishable from choices they make on their own behalf. In contrast, when the payoff domain includes losses, we find that those making choices on their own behalf tend to shy away from taking risk when such risky prospects involve the possibility of losses while this is much less the case for those who make the same choices on behalf of others. Using structural estimation techniques, we show that this behavioral difference cannot be explained by a difference in risk aversion. Instead the behavioral difference can be explained by a significantly lower loss aversion when decisions are made on behalf of others.

The dual-process model of decision making provides a possible explanation for why loss aversion is lower when decisions are made on behalf of others. According to this model, decisions are driven by an interplay of emotional (affective/hot) and cognitive (deliberative/cold) processes (Kahneman 2003, Loewenstein and O'Donoghue 2004, Rustichini 2008).[1] It seems plausible that individual decisions and decisions on behalf of others differ with respect to the relative importance of the two systems. Recent neuroeconomic evidence from intertemporal choice situations confirms this view by showing that individuals are less affectively engaged when making decisions for others (Albrecht et al. 2010).

Taking a broader perspective, risk-taking on behalf of others is present in many situations. Examples abound and include behavior related to management, financial investments and hiring. Indeed, in the wake of the recent financial crisis, actors in the financial sector were accused of excessive risk taking on behalf of others, which spurred a public debate. This underlines the importance of understanding risk taking on behalf of others in general. To this end, the current paper adds to a small but emerging literature on this topic.

2. Related literature on risky decision making on behalf of others

Given the obvious importance of studying risk taking on behalf of others, it is surprising that only a handful of experimental studies on the topic is available, and the results of these studies are mixed.[2, 3] Sutter (2009) and Chakravarty et al. (2011) find increased risk taking on behalf of others and Reynolds et al. (2009) and Eriksen and Kvaløy (2010) find the opposite result.[4] Bolton and Ockenfels (2010) find no effect and Pahlke et al. (2010) find increased risk taking in the positive domain and decreased risk taking in the negative domain. Montinari and Rancan (2013) find that social distance can matter for risk taking on behalf of others and observe decreased risk taking on behalf of friends (but not on behalf of anonymous strangers). Yet, the designs of these studies differ in various respects, which makes comparisons of results difficult. For instance, Eriksen and Kvaløy (2010), Sutter (2009) and Montinari and Rancan (2013) use an investment game, Bolton and Ockenfels (2010) use binary decisions and Chakravarty et al. (2011) a multiple price list.

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[1] Ashraf, Camerer and Loewenstein (2005) put loss aversion in the context of the two-system perspective and ascribe loss aversion to be driven more by affective than deliberate decision making. Sokol-Hessner et al. (2012) provide fMRI evidence that loss aversion is connected to activity in the parts of the brain that are related to affective information processing.

[2] This research area should not be confused with the abundant literature on individual risk-preferences. One prominent line of this research is dedicated to the structural estimation of such preferences (see e.g. Holt and Laury 2002, Harrison et al. 2007, von Gaudecker et al. 2011). We also consider investigations concerning situations where there is a strong monetary conflict of interest between the decision maker and the other stakeholders (see for instance, Agranov et al. 2013,Andersson et al. 2013b and Lefebvre and Vieider 2013) as peripheral to the present study.

[3] There is also a small emerging literature on decision making on behalf of others that is not primarily dealing with risk taking. Kvaløy and Luzuriaga (2013), for example, let subjects play the trust game on behalf of others.

[4] Increased risk taking on behalf of others is consistent with Daruvala's (2007) result that people predict that others (especially if these "others" are men) will take more risk than themselves, while decreased risk taking is consistent with the finding by Charness and Jackson (2009) that individuals take less strategic risk on behalf of others than on their own.

Pahlke et al. (2012, henceforth PSV) is closely related to our paper in that these authors demonstrate a de-biasing effect on loss aversion (as we do), but their de-biasing comes from a different mechanism and the papers also differ in other important ways. PSV report a de-biasing effect resulting from being accountable vs. not being accountable for the decisions made on behalf of someone else.[5] The effect is found by comparing risk taking when decision makers meet receivers face-to-face to explain their decisions vs. when they do not meet them face-to-face. PSV find that when the payoff domain is mixed, such an accountability requirement increases risk-taking on behalf of others but no such effect is observed for purely positive or purely negative outcomes. While we compare individual decision making vs. decision making on behalf of others (plus other comparisons in a 2x2 design required to make systematic inferences), PSV only consider decision making on behalf of others with different degrees of accountability. Another difference concerns the subject pool. PSV use a lab experiment with a student subject pool and we use an internet experiment with a subject pool from the general population. Finally, while the degree of social distance and degree of anonymity is varied between treatments in PSV, it is held constant in ours.

Our paper makes several contributions to the literature on decision making on behalf of others.[6] First, we provide a novel combination of econometric and experimental techniques. To the best of our knowledge, we are the first to fit a structural model of choice to a large experimental data set from a mixed domain (involving risky choices with both gains and losses).[7] This approach enables us to jointly estimate parameters for risk aversion and loss aversion. Hence, our empirical strategy permits us to distinguish effects on risk aversion from effects on loss aversion. In addition, our structural model allows decision errors to be heterogeneous, which is important as error propensities may depend on the treatment. Second, our experimental approach involves systematic and comprehensive testing in a full two-by-two experimental design. In this design, either only the decision maker is paid, one receiver is paid, both are paid or none is paid. This design enables us to obtain proper benchmarks to tease out what is driving behavior. Third, we use innovative procedures in recruiting subjects and implementing the experiment. In particular, we employ a “virtual lab” approach by running our experiment over the internet with a large and heterogeneous sample of the general population. All previous studies used samples of students and it is well known that student populations may differ

[5] See also Pollmann et al. (2014) for a similar study where the decision maker is evaluated before or after uncertainty is resolved.

[6] There is also a literature focusing on distributive preferences for allocation rules (of which some are risky) in different social contexts (see e.g., Cettolin and Riedl 2011, Rohde and Rohde 2011, Linde and Sonnemans 2012, Cappelen, et al. 2013).

[7] Subsequent to our work, Vieider et al. (2014) have used a similar structural model to analyze data from an experiment conducted with a student sample. They confirm the main results presented here.

from each other with respect to social preferences (see e.g., Fehr et al. 2006) and risk preferences (see e.g., von Gaudecker et al. 2012).

3. A virtual lab approach

By applying a "virtual lab" approach we are able to reach a heterogeneous subject pool while maintaining a high level of experimental control. We use the iLEE (Internet Laboratory for Experimental Economics) platform developed at the University of Copenhagen.[8] The platform follows the routines and procedures of standard laboratory experiments (no cheating, incentives, randomization, instructions etc.). The main difference is the fact that participants make their choices remotely, e.g. at home, in front of their computer. One could argue that this constitutes a more natural environment than the typical experimental laboratory, since today, many economic decisions and transactions such as e-banking and online shopping are made in this environment. However, when it comes to the elicitation of risk preferences, earlier research indicates that estimation results do not depend on whether preferences are elicited using standard laboratory experiments or via internet experiments.[9]

3.1 Recruitment and subject pool

Subjects were recruited in collaboration with Statistics Denmark (the statistics agency of Denmark). In 2008, Statistics Denmark drew a random sample of 22.027 individuals from the Danish population (aged 18-80) and subsequently sent out hardy copy invitation letter to the selected individuals via regular mail. The letter explained that all receivers were randomly selected from the Danish population, that the earnings from the experiment will be paid out via electronic bank transfer, and that choices are fully anonymous. The receivers were asked to log on to the iLEE webpage using a personal identification code. Anonymity was maintained through the personal identification code, which only Statistics Denmark could decode. Once logged on to the iLEE webpage, the subjects got detailed instructions about the experiment. In addition they also had access to e-mail and telephone support.[10]

Of the invited individuals 2,291 participated and completed a first wave of experiments. These participants have since then been subsequently been re-invited three times over the years 2008-2011

[8] See http://www.econ.ku.dk/cee/iLEE/iLEE_home.htm for a detailed description of the iLEE platform. The platform has been used for studies on a broad range of topics, see Thöni et al. (2012) for an example.

[9] von Gaudecker et al. (2012) estimate risk preferences both for a student sample in the lab and the general population using the internet-based CentERpanel (a platform that bears close resemblance with the iLEE). They find that the general population is on average more risk averse and displays much more heterogeneity than the student population. However, these results are driven by socio-economic differences between samples rather than the mode of experimental implementation (i.e. lab vs. internet).

[10] The participants could log out at any time and then log in again to continue where they had left off.

(approximately one year apart) to take part in new waves of experiments. Each wave consists of several modules which can be an incentivized and interactive experiment, a preference elicitation task (as in our case) or a non-incentivized questionnaire. In general, the modules within a wave are constructed to be independent of each other (for an exact description of the modules contained in each wave see http://www.econ.ku.dk/cee/iLEE/iLEE_home.htm). Our primary data in this paper comes from the third wave of experiments, although we will also use measures and socioeconomic information provided in the first wave. In total, 740 individuals completed our risk task as decision makers.[11]

3.2 The experimental design

The subjects choose between risky lotteries in a version of the well-established multiple price list (MPL) format. Each subject makes choices in 4 MPLs which differ by whether they include the possibility of incurring losses. Half of the choices involve losses (called Loss below), half of the choices exclude losses by design (NoLoss). We implement the following treatment conditions:

1. **Individual**: Individual decision with payment to the decision maker.
2. **Hypothetical**: Individual decision without payment.
3. **Both**: Both the decision maker and the receiver are paid.
4. **Other**: Only the receiver is paid.

Each subject was randomly allocated to one of the four treatments, and in Both and Other they were randomly assigned to be either a decision maker or a receiver. In the latter two treatments subjects were matched with another random participant in the experiment and subjects were informed about this fact.[12] Each decision maker went through the four sets of lottery choices (Each set was presented on a separate screen, see Table 1). Screens 1 and 3 involve the possibility of losses (denoted Loss henceforth), whereas screens 2 and 4 exclude the possibility of losses (denoted NoLoss henceforth). The general structure of each MPL is the same in all four sets: each lottery screen involves ten decisions between two gambles called the Left gamble and the Right gamble. Each gamble has two different outcomes presented in Danish crowns (DKK) that occur with probability one half. The Left gamble is constant whereas the payoffs of the favorable outcome (Tails) in the Right gamble are increasing.

[11] Table A1 in Online Appendix A compares our two samples with the Danish population with respect to age, gender and education. Our samples are representative with respect to age and gender, but we have an overrepresentation of highly educated people compared to the Danish population.

[12] On the first screen, all subjects read the instructions describing the decision situation. Further down the screen, they were informed that a random draw was to determine whether they would make the decisions or be assigned the role as the passive receiver. On the following screen, the role was revealed and those assigned to be decision makers continued to the decision screens and the other were routed to another module of the experiment.

The order of screens was randomized and subjects received no information about the outcome of the lottery until all decisions were made. After the experiment, one decision problem was randomly selected to be played out and participants were paid according to the outcome of that gamble. See Online Appendix D for further details about the experiment including a sample of screenshots.

Table 1. Payoff configurations (DKK)

	Screen 1 (Loss)				**Screen 2 (NoLoss)**			
	Left Gamble		Right Gamble		Left Gamble		Right Gamble	
	Heads	Tails	Heads	Tails	Heads	Tails	Heads	Tails
Decision 1	11	65	-25	65	49	70	12	70
Decision 2	11	65	-25	90	49	70	12	90
Decision 3	11	65	-25	100	49	70	12	110
Decision 4	11	65	-25	110	49	70	12	120
Decision 5	11	65	-25	120	49	70	12	130
Decision 6	11	65	-25	135	49	70	12	140
Decision 7	11	65	-25	150	49	70	12	150
Decision 8	11	65	-25	175	49	70	12	175
Decision 9	11	65	-25	220	49	70	12	220
Decision 10	11	65	-25	370	49	70	12	350
	Screen 3 (Loss)				**Screen 4 (NoLoss)**			
	Left Gamble		Right Gamble		Left Gamble		Right Gamble	
	Heads	Tails	Heads	Tails	Heads	Tails	Heads	Tails
Decision 1	-9	40	-51	40	72	86	20	80
Decision 2	-9	40	-51	80	72	86	20	100
Decision 3	-9	40	-51	90	72	86	20	120
Decision 4	-9	40	-51	100	72	86	20	130
Decision 5	-9	40	-51	115	72	86	20	150
Decision 6	-9	40	-51	135	72	86	20	160
Decision 7	-9	40	-51	160	72	86	20	180
Decision 8	-9	40	-51	190	72	86	20	200
Decision 9	-9	40	-51	220	72	86	20	230
Decision 10	-9	40	-51	280	72	86	20	290

The choice to keep the probability fixed at p = 0.5 and vary only the payoffs at each screen has several advantages (similar procedures have been used by e.g., Binswanger 1980 and Tanaka et al. 2010). Using 50-50 gambles makes the procedure easy to understand. This is especially important in our study, since we targeted a very heterogeneous population. We believe that even though people may have problems interpreting probabilities, the situation in which two outcomes have the same chance of occurring is quite straightforward also for our subjects. This approach appears to get support from Dave et al. (2010) who find that people with a low level of numeracy may have problems to understand MPL formats with varying probabilities. Keeping probabilities fixed, we disregard potential effects from probability weighting (Quiggin 1982; Fehr-Duda and Epper 2012).

Our treatments are motivated by our interest in understanding how the risk exposure of a passive receiver affects decision makers' behavior. Indeed, comparing Other with Individual is the main objective for this study, but simply comparing the outcomes in the two treatments would not reveal the causes of behavioral differences. The reason is that going from one treatment to the other involves changing two aspects. In particular, going from Individual to Other means to remove incentives for the decision maker *and* to introduce payoff consequences for the receiver at the same time. We therefore ran the Hypothetical and Both as control treatments. By comparing Hypothetical and Other, we can test how the risk exposure of the passive receiver affects behavior when the decision maker has no individual incentives. Comparing Individual and Both addresses the effect of the risk exposure of the passive receiver while keeping the decisions maker's individual incentives constant. Our systematic approach in our two-by-two design involves "ceteris paribus" changes which allows us to properly identify causal effects.

4. Results

In this section, we analyze the data in two steps. First, we compare summary measures of risky choices across treatments. Second, we estimate a structural model of choice that allows us to distinguish between treatment effects on risk aversion and loss aversion.

4.1 Descriptive statistics

In total, 740 subjects completed the experiment between July 14 and September 19, 2010. We exclude subjects whose decision times were among the fastest 10% of the sample because they are likely to have rushed through the screens without paying sufficient attention to the content.[13] The remaining 668 decision makers are evenly spread across the four treatments (Individual: 166; Hypothetical: 155; Both: 176; Other: 171). The average time for the full sample to complete the four screens was slightly above 5 minutes). Ninety percent of the participants finished within 8 minutes or less. It took participants in Both and Others around 25-40 seconds longer to complete than participants of the Individual and Hypothetical treatments, most likely due to the increased complexity of the situation and longer instructions. Total average earnings in the whole wave were DKK 297 (USD 49.2) and the

[13] However, our results are qualitatively robust to including the fastest 10% of the sample. See Online Appendix C for details.

average earnings in the experiment discussed here were DKK 45 (USD 7.5), which includes the one third of subjects that did not get paid since they were decision makers in Hypothetical or Other.[14]

We begin to analyze the data by studying how many times subjects chose the safe lottery (Nrsafe), i.e., the Left lottery. Figure 1a shows the average Nrsafe in the two MPL without losses (NoLoss) and Figure 1b the average Nrsafe in the two MPL where losses can occur (Loss) by treatment, along with the 95 percent confidence intervals.

Figure 1a shows that the treatment variation had only a small, if any, effect on risk taking when the decision situation involves only gambles without losses. That is, decision makers make the same choices irrespective of whether these choices only affect their own payoffs or only someone else's payoff when losses are not an option. This impression is confirmed by Mann-Whitney tests, which are insignificant (see Online Appendix B for test details).

Figure 1b shows substantial variation between treatments when losses are possible.[15] Indeed, compared to Individual, all other treatments display more risk taking behavior. The most stark difference is between Individual and Hypothetical (Mann-Whitney test: p-value = 0.008).[16]

There is also a difference between Both and Individual (Mann-Whitney test: p-value = 0.071). The difference between Individual and Other is not statistically significant with a p-value just above the 10% level (Mann-Whitney test: p-value = 0.107). We also run the same set of tests after removing all subjects that were inconsistent in the sense of switching back and forth on a screen.[17] Again, there is no statistically significant difference between treatments on the screens without losses (Mann-Whitney tests, all p-values > 0.29) and less risk taking in the Individual treatment when gambles do involve losses (Mann-Whitney tests: Individual vs. Hypothetical p-value = 0.007; Individual vs. Both p-value = 0.099; Individual vs Other p-value = 0.074). In summary, when losses are possible subjects seem to take more risk with other peoples' money. To show that this change is driven by differences in loss aversion between treatments, we will now employ structural estimation techniques. This allows us to estimate separate treatment effects on risk aversion and loss aversion.

[14] At the time of the experiment 1 DKK was traded for 0,166 USD.

[15] Note that it is not meaningful to compare the average number of safe choices between the NoLoss and Loss screens since the gambles differ between these screens. For instance, the fact that the average numbers of safe choices for the individual treatment are almost identical across the two panels in Figure 1 does not imply that there is no loss aversion.

[16] All Mann-Whitney tests in this paper are two-sided.

[17] We here follow the argument of Charness, Gneezy and Imas (2013, p. 50) who state that "If inconsistent choice data is treated as noise and dropped, it can be said with some confidence that the individuals who are left understood the instructions and are revealing their true preferences"

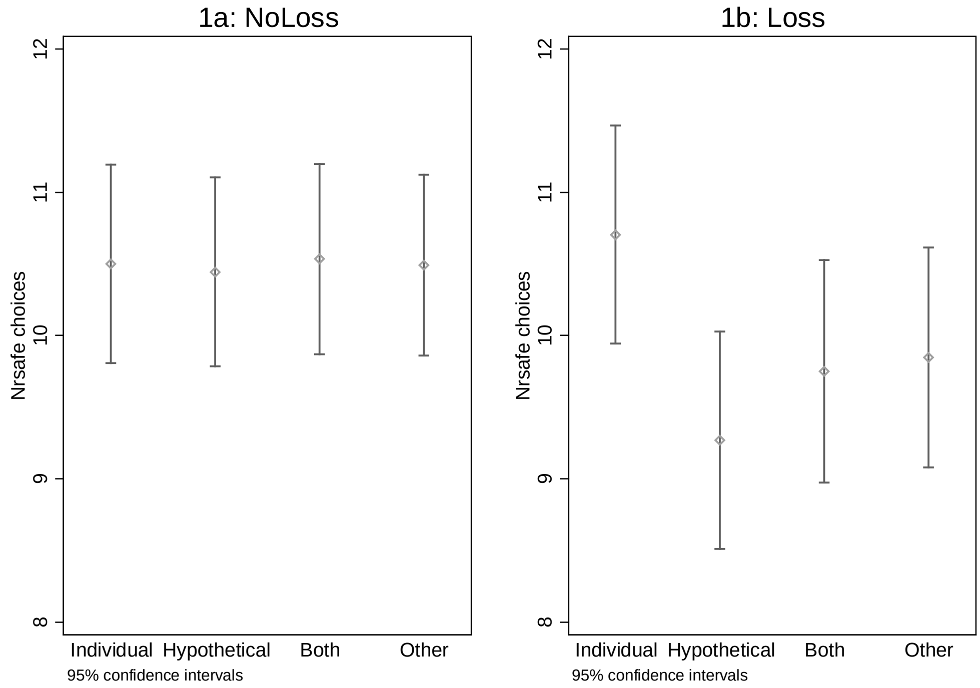

Figure 1: Average Nrsafe by treatment with 95% confidence intervals

4.2 Structural estimation

We estimate a structural model under the assumption that individuals have constant relative risk aversion (CRRA) and display loss aversion.[18] That is, the utility function has the following form

$$u(x) = \begin{cases} \dfrac{x^{1-\gamma}}{1-\gamma} & \text{if } x \geq 0 \\ -\lambda \dfrac{(-x)^{1-\gamma}}{1-\gamma} & \text{if } x < 0, \end{cases} \tag{1}$$

where γ is the coefficient of relative risk aversion and λ is the loss aversion parameter.[19] Using the utility function in (1) the expected utility of a lottery A is given by

$$EU(A) = \sum_{a \in A} p(a)u(a)\,. \tag{2}$$

We calculate the difference in expected utility between the lotteries Left (L) and Right (R)

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[18] Using the CRRA utility function is the main approach in the structural literature (see e.g. Andersen et al. 2008 who also use subjects that are randomly sampled from the Danish population).

[19] Even though prospect theory suggests that the risk aversion parameter γ should be distinct over the two domains, we estimate the same risk aversion parameter for both domains since this is required to identify the loss aversion parameter in our model (see Köbberling and Wakker 2005).

$$\Delta EU = \frac{EU(L) - EU(R)}{\mu},$$

and following Wilcox (2011), we normalize by dividing by $\mu > 0$, which is defined as the difference between the maximum utility and the minimum utility over all prizes in each lottery pair. Acknowledging the stochastic nature of the decision making process, we assume that individuals evaluate differences in expected utility with some noise. More specifically, we utilize the Fechner error structure that was popularized by Hey and Orme (1994) which states that the L lottery will be chosen if

$$\Delta EU + \tau\varepsilon > 0, \text{ where } \varepsilon \sim N(0,1), \tag{3}$$

where τ is a structural noise parameter. We can then write the likelihood function as

$$L = \begin{cases} \Phi\left(\frac{\Delta EU}{\tau}\right) & if\ Left \\ 1 - \Phi\left(\frac{\Delta EU}{\tau}\right) & if\ Right, \end{cases} \tag{4}$$

where Φ is the cumulative distribution function of the standard normal. We estimate (4) using maximum likelihood methods. The parameters of interest to be estimated are γ (reflecting risk preferences), λ (reflecting loss aversion) and τ (reflecting noise). We estimate average parameters and allow for heterogeneity by letting the parameters depend linearly on treatment dummies and covariates. Standard errors are clustered at the individual level.[20]

Table 2 presents the results. In Model 1, we let the preference parameters γ and λ depend on the treatment and a set of control variables. It is clear from the coefficients of the treatment dummies that the main effects go through the loss aversion parameter. As compared to the baseline Individual treatment, the Hypothetical, Both and Other treatments are all associated with significantly lower loss aversion (see column λ, first three lines). These results are confirmed in Model 2 where we in addition allow for heterogeneity in the noise parameter τ.[21] The regressions control for gender, age, education, cognitive ability and cognitive reflection in all specifications since these have shown to be important determinants of risky behavior in previous studies (e.g., Dohmen et al. 2010, Andersson et al. 2013a).[22] Our findings confirm previous studies showing that females are more risk and loss averse and that age and education are closely linked to noisy decision making (Dave et al. 2010, von

[20] We thus allow for heteroskedasticity between and within individuals, and for autocorrelation within individuals.

[21] Andersson et al. (2013a) discuss and show the importance of allowing heterogeneous noise in the estimations. Not controlling for such heterogeneity might lead to biased inference on the relationship between covariates and preference parameters.

[22] Cognitive ability is measured using a 20-item progressive matrices test (Beauducel et al. 2010) and cognitive reflection is measured using the cognitive reflection test proposed by Frederick (2005). Both tasks were performed in the first wave of iLEE experiments about two years before our risk task.

Gaudecker et al. 2011). In particular, we corroborate the main results of Andersson et al. (2013a) that cognitive ability is not related to the curvature of utility function but is strongly related to the noise parameter.

Table 2: Structural estimation

	Model 1			Model 2		
	γ	λ	τ	γ	λ	τ
Hypothetical	-0.027	-0.379**		-0.032	-0.278*	0.008
	[0.056]	[0.189]		[0.044]	[0.144]	[0.013]
Both	0.035	-0.383***		0.033	-0.328**	0.017
	[0.044]	[0.148]		[0.044]	[0.146]	[0.014]
Other	0.028	-0.424***		0.004	-0.332**	0.012
	[0.043]	[0.139]		[0.035]	[0.137]	[0.014]
Female	0.093***	0.270**		0.080**	0.305***	0.012
	[0.033]	[0.109]		[0.033]	[0.105]	[0.009]
Age (35-44)	0.037	0.034		0.018	-0.012	0.011
	[0.042]	[0.151]		[0.051]	[0.137]	[0.013]
Age (45-54)	0.109**	-0.295**		0.072	-0.214	0.020
	[0.045]	[0.150]		[0.045]	[0.132]	[0.013]
Age (55-64)	0.198***	-0.101		0.141***	0.027	0.069***
	[0.043]	[0.153]		[0.050]	[0.176]	[0.022]
Age (65-)	0.073	-0.346*		-0.035	-0.213	0.102***
	[0.069]	[0.202]		[0.150]	[0.354]	[0.034]
Education 1	0.040	-0.005		0.069	-0.121	-0.033
	[0.065]	[0.243]		[0.051]	[0.196]	[0.024]
Education 2	0.015	0.071		0.034	0.020	-0.019
	[0.058]	[0.226]		[0.048]	[0.200]	[0.023]
Education 3	-0.002	-0.226		0.043	-0.241	-0.056**
	[0.089]	[0.278]		[0.054]	[0.197]	[0.023]
Cognitive ability	-0.006	0.018		0.001	0.006	-0.007***
	[0.006]	[0.022]		[0.008]	[0.022]	[0.002]
Cognitive reflection	0.001	0.020		0.013	-0.059	-0.020***
	[0.016]	[0.065]		[0.015]	[0.066]	[0.007]
Constant	0.078	1.575***	0.191***	0.031	1.714***	0.260***
	[0.091]	[0.363]	[0.007]	[0.090]	[0.336]	[0.032]
Observations	25,680	25,680	25,680	25,680	25,680	25,680

Notes: Individual is the baseline treatment. Education1 refers to participants' degrees from high school and vocational school, Education2 represents tertiary education up to 4 years and Education3 tertiary education of at least 4 years. Participants with basic schooling (up to 10 years of schooling) are our baseline category. Cognitive ability measures the number of correct answers (ranging between 0 and 19) on a progressive matrices test (Beauducel et al. 2010). Cognitive reflection scores range from 0 to 3 and indicate the number of correct answers to the cognitive reflection test proposed by Frederick (2005). Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Model 2 allows the noise parameter to be heterogeneous across treatments and observable characteristics, whereas Model 1 does not.

In Online Appendix C we show that our results are essentially identical if we restrict the set of covariates. The results are also robust to using the full sample (i.e. not excluding the fastest 10%), and to restricting the sample further by removing inconsistent subjects that switched lottery more than once within a screen. We also show that the results are unchanged if we extend the econometric model with a tremble parameter which captures the idea that subjects may tremble and choose one of the lotteries at random. That is, we find that our results are robust to adding a constant probability of choosing randomly between the lotteries to the Fechner error that depends on the utility difference of the lotteries. This added noise term allows us to better capture violations of stochastic dominance, such as choosing the Right gamble at the first row, which is not encompassed by the Fechner error. See Online Appendix C for details and estimation results.

To get a sense of the magnitude of the drop in loss aversion, consider a generalized version of the lottery pairs in Screen 1. A subject makes choices between the Left gamble which gives 11 or 65 DKK with equal probability and the Right gamble which gives -25 or x with equal probably. Which is the smallest integer x that will make a subject prefer the Right lottery according to our estimates? For a subject in the Individual treatment with average preference parameters γ and λ, x is equal to 140, whereas x is equal to 128, i.e. about 9 percent lower, in the Other treatment.[23] Another way of quantifying the size of the effect is to measure the impact in terms of Certainty Equivalents (CE). In particular, we can take the average parameters of the Other treatment as a baseline set of preferences and then calculate the loss in CE that would arise by considering the behavioral bias induced by the increased loss aversion in the Individual treatment. To exemplify, consider Decision 6 on Screen 1, in which $x = 135$. A subject with average preference parameters γ and λ from the Individual treatment will choose the Left gamble and the corresponding average subject from the Other treatment will chose the Right gamble. Using the baseline preference parameters from the Other treatment the CE of the subject is 39.2 DKK for the Right lottery. If such an individual instead chooses the Left gamble, the CE is 36.2 DKK. That is, adding the bias induced by the increase in loss aversion reduces the CE with 3 DKK or 8 percent.

4.3 Discussion

The decrease in loss aversion reported above may potentially come from two quite different mechanisms. The lower degree of loss aversion in Hypothetical may simply indicate the existence of a "hypothetical bias" meaning that subjects are less careful when there are no monetary consequences of their decisions. The observation that there is a "hypothetical bias" in risky decision making is not new (see e.g., Battalio et al. 1990, Holt and Laury 2002 and 2005, Harrison 2007), but there is little previous evidence from choices in the mixed domain and we find no evidence on hypothetical bias in loss aversion. The hypothetical bias potentially also offers an explanation of the decrease in loss

[23] We use the risk- and loss aversion parameters from the estimation in Model 2 in Table 2. For the median subject, the predicted parameters are $\gamma = 0.159$ and $\lambda = 1.519$ in the Individual treatment and $\gamma = 0.163$ and $\lambda = 1.187$ in the Other treatment.

aversion in Other. This would then suggest that subjects treat others' money just like "hypothetical money", and the fact that the social distance in this experiment is large may add to this effect. However, hypothetical cannot explain the decrease in the Both treatment because the subject's own money is also at stake in this condition. Hence, there must be an additional mechanism.

One plausible explanation is that, in contrast to risk aversion, loss aversion is not so much a manifestation of a "deep" preference but rather a type of bias and being responsible for someone else's payoff may motivate people to move away from such biases.[24] A potential rationale for why such a de-biasing effect may prevail is provided by the group identity literature. This literature has shown that group identity can be induced by very weak signals (see Charness et al. 2007, Chen and Li 2009, Charness and Sutter 2012). For example, Sutter (2009) has shown that, when group identity is sufficiently strong, individual decisions that affect other group members, become more risky compared to purely individual decisions. These results are in line with ours and our results suggest that this increase in risk taking is mainly driven by a decrease in loss aversion.

Another potential explanation of why subjects display less loss aversion when taking decisions on behalf of others is the dual-process model (Kahneman 2003, Loewenstein and O'Donoghue 2004, Rustichini 2008). In these models decisions are driven by an interplay of emotional (affective/hot) and cognitive (deliberative/cold) processes, is useful to consider. Ashraf, Camerer and Loewenstein (2005) consider loss aversion to be driven more by affective than deliberate decision making and recent neuroeconomic evidence supports this interpretation. In two studies of loss aversion, using lottery choices, subjects in a treatment group are asked to "think like a trader" (Sokol-Hessner et al. 2009 and Sokol-Hessner et al. 2013). These participants displayed significantly lower degree of loss aversion than those in a control group that were not instructed to think like a trader. By measuring skin conductance Sokol-Hessner et al. (2009) relate the moderation of loss aversion to a decrease in arousal connected to negative outcomes. Sokol-Hessner et al. (2013) go on to show, using fMRI, that the moderation of loss aversion is correlated with a decrease in amygdala activity, which is known to be crucial for affective information processing. We conjecture that the same mechanism is at work in our experiment. In particular, in our Both and Other treatment we (implicitly) ask decision makers to take a different perspective by letting them make decisions on behalf of others and it is likely that this induces the same dampening of activity in the amygdala.[25] Further support for this interpretation comes from Albrecht et al. (2010) who present fMRI evidence from intertemporal decision making. The results indicate that decision makers show less affective engagement when decisions are made on behalf of others.

[24] A similar debiasing effect regarding myopia by taking decisions on behalf of others is reported by Eriksen and Kvaløy (2010).
[25] If this conjecture holds then it might also offer an explanation to the group identity effects discussed earlier.

5. Conclusion

This paper investigates experimentally how people take risks on behalf of others, which is an issue in a broad range of economic and financial decisions. The experimental method is well suited for addressing this question since it allows for controlled variation in incentives while holding constant the multitude of contextual factors that surround these decisions outside the lab.

When decisions are concerned with situations in which losses are excluded by design, subjects choose about the same risk exposure when they decide for themselves, for some other person or for themselves together with another person.[26] When losses are possible, we find that decision makers are less loss averse when they also decide for someone else. These findings are consistent with the interpretation of loss aversion as a bias rather than a reflection of a deep preference, and decision making on behalf of others reduces this bias and bring decisions closer in line with rationality. The mechanism behind this effect may be that people make more "dispassionate" choices when they put themselves into the shoes of others. This interpretation is in line with recent findings in neuroeconomics (e.g., Sokol-Hessner et al. 2009, 2012).

It should be stressed that loss aversion is costly in general because people shy away from profitable investments. The reason is that losses loom large in people's minds when making choices on their own. But when making choices on behalf of others, losses are less salient and people therefore make more rational choices. In terms of policy implications, our results suggest that representative decision making is not necessarily a bad thing, for domains without losses conscientious decision making is observed and for domains with losses it can help to reduce a well-known bias.

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[26] The absence of conflicts of interests seems to be crucial for the moral imperative to be effective. Andersson et al. (2013b) investigate behavior when the decision maker is facing hedged payoff schemes or has to compete for reimbursement. Under those circumstances, they find evidence for increased risk taking on behalf of others also in gambles with positive outcomes.

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Deciding for others reduces loss aversion

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We study risk taking on behalf of others, both when choices involve losses and when they do not. We conduct a large-scale incentivized experiment with subjects randomly drawn from the Danish population. On average, decision makers take the same risks for other people as for themselves when losses are excluded. In contrast, when losses are possible, decisions on behalf of others are more risky. Using structural estimation, we show that this increase in risk is substantial and is due to a decrease in loss aversion when others are affected by their choices. This finding is consistent with the account of the dual process model, i.e. an interpretation of loss aversion as a bias in decision making.

Key words: Risk taking; loss aversion; experiment

JEL code: C91; D03; D81; G02

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