Gender, Risk and Stereotypes.

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Abstract

This paper reports results from an economic experiment where respondents are asked to make choices between risky outcomes for themselves and others. In addition, we elicit information about the respondents' perception of others risk preferences. We investigate whether subjects' own risk preferences and gender stereotypes are reflected in the prediction they make for the risk preferences of others and the way this occurs. We find no significant difference in risk preferences between men and women in the experiment. However, both men and women perceive women to be more risk averse than men. When predicting other people's risk preferences, the respondents tend to use a combination of their own risk preferences and stereotypes. Moreover, when making risky choices for others, the respondents generally use a combination of their own risk preferences and their average predicted risk preference of the targeted group.

Keywords: gender, risk aversion, risk predictions.

JEL Classification: A12, C91, D81, J16.

1. Introduction

There are a wide range of areas within modern society where people are required to make decisions involving risk on behalf of others i.e. policy makers, community leaders, physicians, financial advisors etc. In a situation where the risks are not borne by the decision maker, then, given no paternalism, the optimal decision would be one that reflects the will of those the decision affects. This requires an unbiased perception of the risk preference of those affected and that the decision made should perfectly reflect that perception. Although numerous experiments have been conducted on the measurement of risk preferences (e.g.: Carlsson et. al, 2005; Holt and Laury, 2002; Isaac and Duncan, 2000; Kachelmeier and Shehata, 1992), relatively little work has been undertaken on measuring how people predict the risk preferences of others (Hsee and Weber, 1997, 1998, 1999; Siegrist, et al., 2002; Eckel and Grossman, 2002, a,b; Chakravarty et. al, 2005), and as far as we are aware, the only study that has investigated how people

make choices for others in situations where the outcome may have various levels of risk is Chakravarty et al, 2005.[1]

This paper reports results from an incentive-compatible real-money risk experiment where participants were required to make choices between risky outcomes for themselves and others. Furthermore, we elicit information regarding the respondents' perception of other peoples risk preferences. We use the results to bring together a number of issues. We examine the accuracy of individuals' forecasts and the extent in which individuals own risk attitudes and the gender of the target are reflected in the prediction they make for the risk preferences of others. In addition, we examine whether subjects make risky choices on behalf of other people based solely on their expectation of the risk preference of those affected or whether their own risk attitudes are reflected in their choice.

While many neo-classical economists may assume that people have an unbiased perception of reality including predicting others' risk preferences, psychologists have presented a number of theories concerning people's perception of the risk preferences of others. The most straightforward of these theories is based on the false consensus effect and what Hsee and Weber (1997) refer to as the *default* hypothesis that simply states that people believe that others think like themselves and therefore predict the same risk preference for others.[2] Support for the default theory was found by Hsee and Weber (1997) as well as in a recent experiment by Chakravarty et al (2005).[3] Within the *Risk-as-value* hypothesis formulated by Brown (1965) people perceive themselves to be more risk seeking than their peers based on the related assumptions that risk seeking is an admirable characteristic (Shapira 1995) and that they are better than others – ergo, they are more likely to have a higher propensity for risk than others.[4] Hsee and Weber (1997) find evidence for what they refer to as the *Risk-as-feelings* hypothesis which

[1] The paper by Chakravarty et al. came to our attention after the experiments in this study were performed.
[2] The default hypothesis is analogous to the false consensus effect in social psychology where people tend to overestimate the degree to which their own behaviour, attitudes, beliefs etc. are shared by other people (Ross, Greene and House, 1977).
[3] In the Chakravarty et al study, respondents were required to predict the average risk propensity of the other participants by guessing the average choice made by all participants.
[4] See Siegrist et al., (2002) and references therein for results from studies testing the risk-as-value hypothesis.

states that an individual will predict that another is more risk neutral than them.[5] This theory is based on the notion that people often have strong feelings when faced with a risky choice and they have difficulty in conceiving that others have the same depth of feeling as themselves and therefore the prediction for the target regresses to risk neutrality.[6]

The hypotheses above use the premise that the predictor will project their determination of another's risk preference on the basis of their own, the *Stereotype* hypothesis on the other hand is based on the theory that the prediction of another person's risk preference is based on the predictor's stereotype about the group to which the target belongs in terms of gender, race etc. Studies by Hsee & Weber (1997, 1999) find evidence of such stereotyping on the basis of race while studies by Eckel & Grossman (2002,a,b) and Siegrist et al., (2002) find evidence of gender stereotyping when examining subjects predictions of the risk aversion of others.

Gender differences in risk responses are well documented in a number of different fields and although most of the empirical work suggests that women are indeed more risk averse than men, the evidence is not clear cut. Byrnes, et al., (1999) conducted a meta-analysis of 150 studies finding a significant difference in the risk attitudes of men and women. Men were generally greater risk takers although the gender difference varied with the risky environment. Studies exploring gender differences in risk aversion in the context of non-financial decisions concerning for example health (e.g: Kristiansen, 1990; Swanson, Dibble, and Trocki, 1995; Hersch, 1996) and traffic (e.g: Hersch, 1996; Brinig, 1995; Svenson, 1978) behaviour find evidence of women's greater risk aversion. A number of studies indicate women are more risk averse than men in financial risk taking; see for example Sunden and Surette (1998), Jianakoplos and Bernasek (1998), Bajtelsmit, Bernasek and Jianakoplos (1999), Pålsson (1996). The same pattern is observed from a number of experimental studies eg: Levin et al, (1988),

[5] See Loewenstein et al., (2001) for a detailed description of the *Risk-as-feelings* theory.

[6] Hsee and Weber (1997) find that the risk-as-feelings hypothesis holds when the target is anonymous. However, in a second study, they find that when respondents are asked to predict the risk preferences of an individual visible to them, the results are consistent with the default hypothesis. The authors explain the results by arguing that it is easier for individuals to project their own feelings towards risk in the case where the target is vivid than when the target is abstract.

Eckel and Grossman (2002,a,b), Powell and Ansic (1997), Levy, Elron and Cohen (1999). However, not all studies support the stereotype that men are less risk averse than women in financial decision making. Schubert et al (1999) find no general gender differences when subjects face contextual decisions[7] and argue that adequate conclusions cannot be drawn using results from abstract gambling experiments.[8] Other studies that contradict the notion of gender differences in risk attitudes are Kruse and Thompson (2001, 2003) as well as Holt and Laury (2002).

Even if the evidence on whether women are in fact more risk averse than men is not clear cut, the mere perception that women have a lower risk propensity may lead to statistical discrimination that has an impact on womens' (and mens') opportunities, incomes and choices. If women are perceived to be less able to make risky decisions, then they may be less likely to be given corporate promotions underlying the concept of the "glass ceiling". Johnson and Powell (1994) find no differences in decision quality and risk propensity between male and female managers and argue that the exclusion of women from such positions may be based on false stereotypes derived from observations from the non-managerial population. Eckel and Grossman (2002, a.) note that if women are perceived to be more risk averse or less willing to risk the breakdown of negotiation then they may receive less generous initial offers in employment negotiations and face more aggressive bargaining, leading to lower negotiated wages.[9] Wang (1994) finds evidence of gender stereotyping by financial advisors where female clients were offered lower risk-return investments relative to those offered to male clients. Stereotyping may even have effects in the area of health care where evidence from several studies show that doctors tend to prescribe less aggressive treatment for women patients compared with men exhibiting the same symptoms (e.g., Schulman, et. al. 1999; Tobin et. al. 1987), but where patient preferences alone do not explain these

[7] The authors conducted an experiment where subjects were required to make abstract gambling decisions as well as financially motivated risky decisions embedded in an investment or insurance context.

[8] In addition they point out those results from survey data showing gender specific risk attitudes may be due to differences in individuals' opportunity sets. This theory is supported partly by the results of Säve-Söderberg who studied premium pension portfolio choices and found that after controlling for a wide range of variables that the only significant gender difference appeared at the upper end of the risk distribution.

[9] Eckel and Grossman also refer to a model developed by Vesterlund (1997) where if more risk-averse workers can be identified, then they (women if the stereotype is applied) face a distribution of wages that is stochastically dominated by the distribution for the less-risk-averse group even when the productivity of the two types of workers are identical.

gender disparities (e.g., Saha, et al., 1999; Schecter et. al. 1996), indicating that the difference in treatment may be caused by the physician's gender stereotype of patients' risk preferences.

The gender stereotype with regard to risk is one of the issues considered in this study. We also examine the extent to which subjects' own risk preferences are reflected in the predictions they make for the risk preferences and the choices they make on the behalf of others. Although we found no significant relationship between gender and stated risk preference, both sexes predicted that women were more risk averse than men. The results also suggest that the participants own risk preferences are a significant factor when they estimate the risk preferences of others. Furthermore, when required to make risky choices on behalf of the other participants, we find again that the individuals own attitudes to risk is a factor on which they base their choice.

The rest of the paper is organised as follows: sections 2 and 3 provide a description of the experimental design and procedure. The results from the study are presented in section 4 followed by the conclusions in section 5.

2. The Experiment

The experiment was conducted in two parts. The purpose of the first part was to elicit the risk preference of each of the subjects as well as the subject's prediction of the risk preference of each of the other participants in that session for the same risk scenario. In the second part the subject was required to make a similar decision for the rest of the group as a whole but at no risk to themselves.

In the first part of the experiment, individuals were asked to state their certainty equivalence for a gamble with a 50% probability of receiving either 200 SEK or 0 SEK.[10] We use this approach rather than the standard reservation price method in order to minimise any loss aversion effects. The question was presented in a similar fashion to the example below.

[10] At the time the experiment was conducted, 1 USD = 7.3 SEK

Figure 1: *Description of the question used to determine individuals' own certainty equivalences.*

Question 1

You are presented with two alternatives below.

Alternative 1:

A dice is thrown

In the case of an odd number you receive	0 SEK
In the case of an even number you receive	200 SEK

Alternative 2:

You are unconditionally given	*C* SEK

For what value of C do you consider Alternative 1 to be *as good as* Alternative 2?

Answer: I like both alternatives *equally* when C = _____ SEK

In order to avoid strategic responses, a modification of the Becker DeGroot Marschack (1964) procedure is used where the certainty equivalences are matched with a randomly drawn number to determine the individual's payoff. The response to question 1 provides each *individual's own certainty equivalence (OCE),* which is used as the measure of risk aversion.

The follow up question in this part of the experiment then asked each participant to predict the response to question 1 by *each* of the other 10 participants in their session. The only information a subject has on which to base their prediction are the visual clues provided by observing the others. These responses can be used to calculate

- *each individual's average prediction of the whole group (PCE)*
- *each individual's average prediction for the men in the group(PCE^m)*
- *each individual's average prediction for women in the group(PCE^f)*

The information obtained from the responses to the question and its follow-up i.e. an individual's own and their prediction of the certainty equivalence's of others, allows analysis of the issues presented in the introduction: (i) To what extent are subjects' own risk preferences reflected in the prediction they make for the risk preferences of others? (ii) Is there a stereotype effect with regard to gender and risk?.

Within the second part of the experiment, each participant faced the same choice as in question 1. The difference was that the choice was made on behalf of the *other* participants in the session. Each individual was given 200 SEK regardless of the outcome for the others in the group. The payment was made to the subject to avoid negative feelings of not receiving any money themselves as well as an attempt to anchor the feeling that the decision made for others is a payment for performing a "task". The subject would thus be more inclined to make the effort to reach a well considered decision. The question was presented in a similar fashion to the example below:

Figure 2: *Description of the question used to determine the individual's certainty equivalence when the outcome affects others.*

Question 2

Your task is to make a decision on behalf of the *other* people in this group. You will receive 200 SEK for this task regardless of the outcome for the others in the group.

Alternative 1:

A dice is thrown

In the case of an odd number the other 10 people *each* receive 0 SEK

In the case of an even number the other 10 people *each* receive 200 SEK

Alternative 2:

Each of the other 10 people unconditionally receive C SEK

You will receive 200 SEK regardless of the outcome in both alternatives.

For what value of C do you consider Alternative 1 to be *as good as* Alternative 2?

Answer: I like both alternatives *equally* when C = _____ SEK

The responses will allow some interesting comparisons between the first and second part of the experiment. First of all we can test to what extent the subjects based their answer on what they believe the rest of the group's preference would be (which can be calculated by the individual's average prediction of the whole group in the follow up question in part 1). Second, and more importantly, we can test whether the individual's response in question 2 reflects the actual will of the group as ascertained by calculating the average of the actual certainty equivalence stated by the rest of the group in the results of question 1.

3. Experimental Procedure

The study was conducted with undergraduates from various disciplines at Karlstad University in Sweden. A total of 71 men and 61 women in groups of 11 participated in 12 separate experimental sessions, each of which lasted around 40 minutes. There was a minimum of 2 and maximum of 8 women in each session. In order to guarantee a full head count at each session, 12 students were summoned on each occasion but only the first 11 arrivals were accepted. The 12^{th} was paid a show-up fee of 50 SEK. The participants were seated with unobstructed views of each other but without being able to see the written responses of other individuals. They were specifically instructed not to communicate with each other for the duration of the session. Each participant was given an envelope containing a questionnaire with full instructions as well as a small card with a unique identity number (1 – 132). The same number was printed on the back of the questionnaire. The participants were requested to keep this identity number secret. Verbal instructions with supporting overheads along with the written instructions were used throughout the session. The payment procedure and the anonymity it ensured was explained at the beginning of each session. The participants were informed that they would be given time to answer each question before the next was presented. They were instructed to place their pens on their table to indicate when they had finished each task. They were made aware that they could ask for assistance at any time.

At the start of each session, the tasks and the incentive mechanism were explained using an example similar to question 1. The incentive mechanism was illustrated with trial runs assuming different C values. The cognitive demand on the students is considerable

in this kind of experiment, so great pains were taken to ensure that the students had understood the nature of the task as well as the incentive mechanism. In order to assist the subjects in the certainty equivalence questions, they were asked to consider the following:

If you have difficulty in answering the questions, consider the following procedure: Set C to any random number and ask yourself whether you would prefer alternative 1 or 2 for that specific value of C. If you like both alternatives equally, then keep that value as your answer to C. If you prefer alternative 2 then lower the value of C slightly and ask yourself the same question again. Similarly if you prefer alternative 1, then raise the value of C slightly. Repeat the steps, iteratively increasing or decreasing the value of C until you reach the value where you are equally happy with both alternatives.

To identify each participant for the responses required to the follow up exercise to question 1, one of the letters (A – K) boldly printed to A4 size was distributed to each of the participants. The subjects were then told to regard each of the other participants in the session and predict their responses to the first question using the alphabet convention to identify each subject within their answer. While the subjects were performing this task, the experimenter was discretely noting the gender of the participant associated with each letter. Being students, the group was visually fairly homogenous in terms of ethnic background, age, dress etc. and the primary differentiating characteristic was gender.

At the end of each session, the payoff procedure was evoked. This had been explained to the participants at the beginning of the session. The method was that a number "R" was picked at random from a box. If the value of $R > C$, alternative 2 of the question was applicable and the individual received the higher amount R. When $R \leq C$, a dice was thrown by the instructor to invoke the gamble described in alternative 1 i.e. odd yields 0 SEK, even yields 200 SEK. The questionnaires were collected and the instructor threw a dice to establish which of the two questions would be used in the payoff procedure. If the pay-off procedure was used in

question 1, then the process above was repeated for every questionnaire, so that each individual's personal response affected their reward. In the case of question 2, one of the questionnaires was picked at random by the instructor and used to evoke the payment procedure once only but for the others in the group. The individual whose questionnaire is picked of course received 200 SEK. The entire payment process was conducted in full view of the participants in the session. The value of the payoffs for each individual (using their unique identity number) was written on the white-board and transcribed onto a sheet of paper. The instructor gave the payoff information to a third party. The participants collected their payment privately from the third party using the card with their identity number.

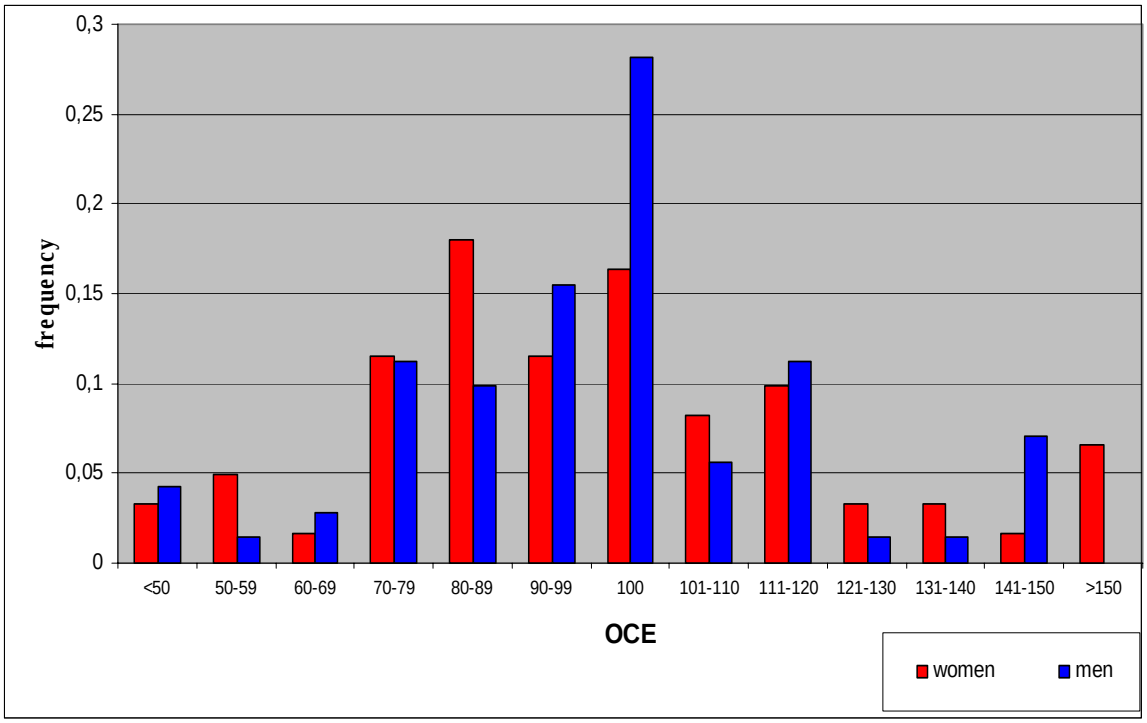
4. Results

Subjects own certainty equivalence

The estimates of participants own certainty equivalences (OCE) showed no difference between the risk preferences of men and women. The mean certainty equivalence of all participants was 97 SEK which is fairly close to the risk neutrality level of 100 SEK. The mean for females (98.28 SEK) was only slightly higher than that for males (95.9 SEK) and the null hypothesis that the mean OCE does not differ between the sexes cannot be rejected (t=0.464, p=0.643). This result was confirmed using the Mann-Whitney test (p=0.913). Detailed descriptive statistics of the participants $OCEs$ and the number of respondents in each risk category by gender are given in tables A1 and A2 in the appendix.

Even if the mean certainty equivalence is the same, the distribution of risk preferences can differ. Figure 3 below illustrates the distribution of the participants' certainty equivalences in intervals by gender. A Chi-2 test shows no significant relationship ($\chi^2(12) \cong 13.76$, p= 0.32) between gender and the risk preference interval chosen by the individual. This result is contrary to the majority view where women are generally regarded to be more risk averse than men.

Figure 3. *Histogram illustrating the distribution of OCEs in intervals by gender.*



Subjects predictions for the certainty equivalence of others.

In addition to choosing their own certainty equivalence, each subject also predicted the certainty equivalences of each of the other ten participants in the session making a total of 1320 predictions. Each subject's mean prediction for males (PCE^m) and females (PCE^f) as well as for the whole group (PCE) in each session is calculated so that three prediction observations are assigned to each participant. These are reported in Table 1.

Table 1. *Average certainty equivalence predictions for subjects by gender of target and predictor*. *Standard deviations are in parenthesis.*

Predictors	**N**	**Average predicted certainty equivalences.**			**Test statistics for differences in subjects' mean predictions for men and women**	
		PCE^m	PCE^f	*PCE*	t-test	Wilcoxon sign rank test
Female subjects	61	94.58 (20.03)	86.31 (20.28)	90.38 (16.93)	t=3.757 p<0.000	Z=-3.833 p<0.000
Male subjects	71	91.83 (19.68)	82.89 (19.82)	87.20 (17.63)	t=8.937 p<0.0001	Z=-4.812 p<0.000
All Subjects	132	93.10 (19.23)	84.47 (20.03)	88.67 (17.32)	t=5.901 p<0.000	Z=-6.054 p<0.000

The gender Stereotype.

We begin by testing whether there is a gender stereotype with respect to risk preferences. Contrary to the actual choices made but consistent with the gender stereotype, both sexes predicted that women were more risk averse than men, see table 1. The latter is consistent with the findings of Eckel & Grossman (2002,a,b) and Siegrist et al., (2002). The mean prediction by all subjects of 93.1 for males is significantly greater than the mean prediction of 84.47 for females. The mean prediction by women for women of 86.3 is significantly smaller than their prediction of 94.58 for men. Similarly, men's mean prediction of 82.89 for women is significantly smaller than their prediction of 91.83 for men. In addition the mean predictions for men and women did not significantly differ by gender (for men: t=0.819, p=0.414; for women: t=0.979, p=0.33).

Own preferences versus predictions.

In this section we compare individuals' own risk preference with their prediction of the risk preferences of others. First, we address the issue of whether subjects' predictions of others tend to regress to risk neutrality. If this is the case, then risk averse individuals will generally predict that others are less risk averse than themselves and vice versa for risk seekers. Tables A3 and A4 in the appendix show the participants' predictions

relative to own preference by risk category. If we consider subjects' average predictions for males (PCE^m) we find that $OCE < PCE^m$ in 48 cases within the risk averse category consisting of 63 individuals. Similarly, for risk seekers we find that $OCE > PCE^m$ in 36 of 39 cases. In both categories we can confirm that predictions regress towards neutrality ($\chi^2(1) = 17.28, p = 0.00$; $\chi^2(1) = 27.92, p = 0.00$ respectively)

In the case of subjects' predictions for women (PCE^f), we find somewhat different results for the risk averse category where only 24 of 63 cases are consistent with the theory that $OCE < PCE^f$, thus we can reject the hypothesis that $OCE < PCE^f$ for risk averse individuals. The predictions by subjects for women follow the pattern for men in the risk seeking group with $OCE > PCE^f$ in 38 of 39 cases. Thus, in the case of PCE^f only the risk seeking group's predictions' regress to risk neutrality.

Thus, individuals' risk predictions for others tend to regress towards risk neutrality. In the case of risk averse individuals however, this apparently depends on the gender of the target. Within the risk seeking group the respondents consistently predict the risk preference of others to be lower regardless of the sex of the target.

We can illustrate the relationship between individuals' own risk preferences and their prediction of the risk preferences of others using the piecewise linear regression model below:

$$PCE_j^i = \beta_0 + \beta_1 OCE_j + \beta_2 (100 - OCE_j) D_j + \varepsilon_j$$

where the dependent variable PCE_j^i is the prediction made by individual j of the average certainty equivalence of the other participants in the session belonging to gender i. In addition to the own certainty equivalence, we include the risk premium $(100 - OCE_j)$ for risk seeking respondents. The dummy variable, D_j, is equal to one if the risk premium is lower than 0, i.e. if the respondent is risk seeking. Finally, ε_j is a normally distributed error term. So if the individual is risk averse or risk neutral their average prediction for gender i is given by

$$PCE_j^i = \beta_0 + \beta_1 OCE_j + \varepsilon_j .$$

If the individual is risk seeking it is given by,

$$PCE_j^i = (\beta_0 + 100\beta_2) + (\beta_1 - \beta_2)OCE_j + \varepsilon_j$$

Consequently, if β_2 is positive, the intercept will be higher for risk seeking individuals and at the same time the slope will be flatter compared with risk averse individuals. The results of the regressions are given in table 2 below. A chow test[11] does not reveal any gender differences and therefore we do not perform separate regression for the predictions by male and female participants.

Table 2: *Regression results for certainty equivalence predictions for men and women by all subjects.*

	Coefficients	**t-value**	**p-value**
PCE^f			
Intercept (β_0)	19.28	2.921	0.004
OCE (β_1)	0.728	9.619	0.000
(100-OCE) *D (β_2)	0.621	4.968	0.004
R^2=0.477			
PCE^m			
Intercept (β_0)	38.94	5.854	0.000
OCE (β_1)	0.592	7.759	0.000
(100-OCE)*D (β_2)	0.367	2.954	0.004
R^2=0.424			

The coefficient β_2 is significant and positive in both cases. The regression equation for PCE^f estimates the average prediction for women's certainty equivalences made by risk averse and risk neutral subjects to be

$$PCE_j^f = 19.2 + 0.728OCE_j .$$

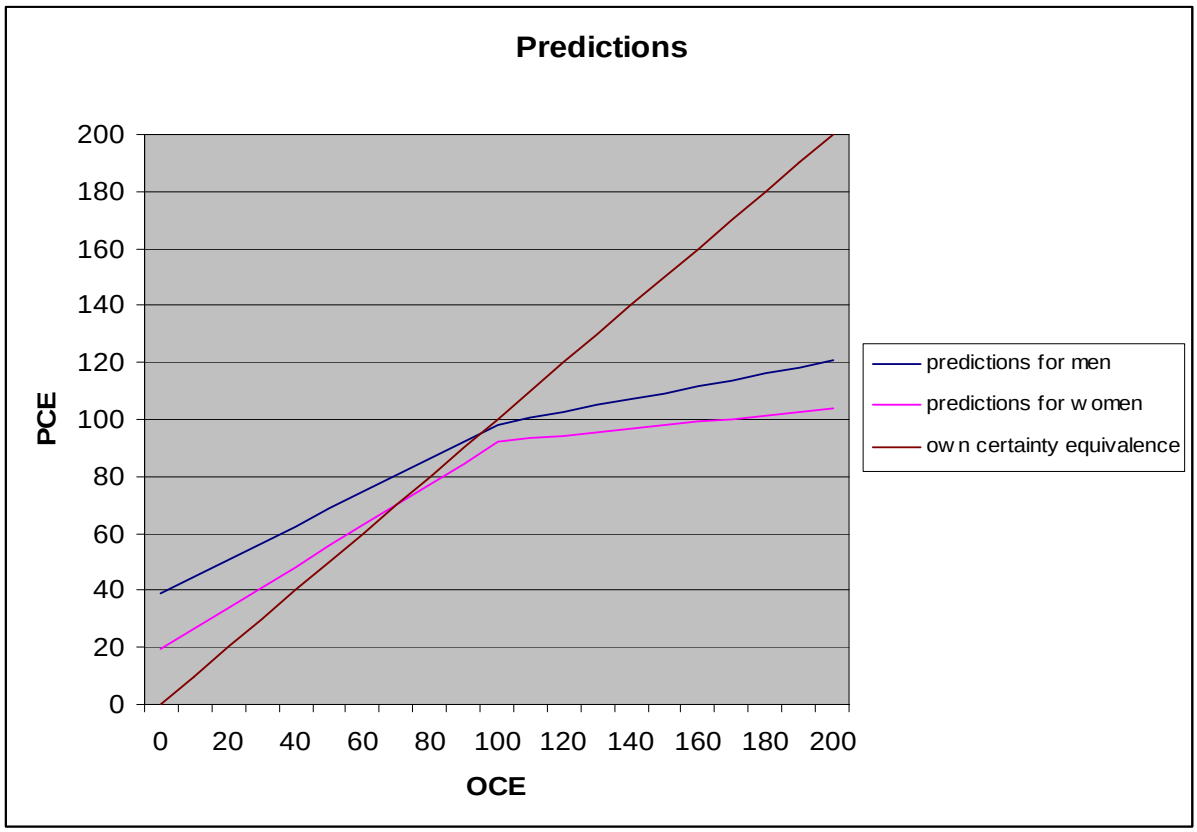
While the predictions for women made by risk seeking subjects are estimated at:

$$PCE_j^f = 75.64 + 0.116OCE_j$$

[11] F[3,126]=0.596,p=0.62 and F[3,126]=1.75576, p=0.16 for PCE^m and PCE^f respectively.

Similar expressions can be constructed for the prediction of males' certainty equivalence. In figure 3 below we illustrate the regression predictions by the participants.

Figure 3: *Predictions for males and females by all subjects.*



Firstly, predictions of female certainty equivalences are lower irrespective of the risk category or gender of the predictor. We see that the regression line for PCE^{f} intersects the 45^{o} line at $OCE = 70.6$, suggesting that the gender stereotype leads to moderately risk averse individuals predicting that women are more risk averse than themselves. Secondly, there is a significant and positive relationship between own certainty equivalence and the predicted certainty equivalences. Thus, subjects' perceptions of others' risk preferences are clearly influenced by their own preference.

The results allow us to reject the default theory that the participants believe that others have the same risk preference as themselves. The *risk-as-value* hypothesis is based on

the assumption that risk taking is admired in our society and people would wish to consider that they possess this admirable characteristic to a greater degree than others. The results from the predictions by risk averse individuals refute the *risk-as-value* hypothesis where the assumption is that individuals will consistently predict others as being more risk avert than them. However, because β_2 is positive, the slope is flatter for risk seeking individuals and as such the absolute distances between $OCE's$ and $PCE's$ is greater for this group it could be argued that *risk-as feelings* may play some role in the predictions people make for others.[12]

The *risk-as-feelings* hypothesis states that people do not believe that others share the same depth of feeling toward risk as them and thus tend to predict that others are more risk neutral than themselves. The results from this study confirm this theory with the exception of predictions for women by the risk averse subjects.

While the findings (at least in the case of predictions for males) appear to conform to the *risk-as-feelings* hypothesis, the results may also be seen as exhibiting a general mean reverting tendency, as in this particular case, average $OCE's$ lie close to risk neutrality and thus what may appear to be regression to risk neutrality for male predictions may in fact be predictions regressing to the mean.

One possible explanation for this result could be the effects of a false consensus effect and a gender stereotype effect influencing predictions. The false consensus effect in this case would represent a bias that occurs when people overestimate the degree to which their risk attitudes are shared by others. For example, although an extremely risk averse individual recognises that she is more risk averse than the mean, her estimation of the other subjects risk attitude is biased towards her own choice. In the case where the target is female, the gender stereotype that women are more risk averse than men will lower average predictions of women's risk attitudes relative that of men.

[12] Risk seekers, recognizing that they have a greater propensity for risky choices than others would regard risk seeking as a positive characteristic and would wish to consider that they possess this admirable characteristic to a greater degree than others and would thus increase the distance between themselves and others, while the opposite would be true for extremely risk averse individuals.

Individuals' choice on behalf of others

In the second part of the experiment the subjects were required to make a decision, at no risk to themselves, but where the outcome of their decision determined the pay-offs of the other participants of the session. We use CCE to denote this choice made by the individual. Under the premise that the optimal decision would be one that reflects the will of those whom the decision affects, the requirement would be that the subject accurately predicts the (average) will of the group and furthermore, bases her decision on that prediction. We assign a new variable ACE (Average Certainty Equivalence) to each individual which is the average OCE stated by the other 10 members of each session which we then use in order to make a comparison with PCE and CCE. We use ACE as an imputed measure to represent the "will of the group". We find that ACE is significantly different from PCE (t=5.478, p<0.000) implying that the subjects were, on average, inaccurate in their predictions. In addition, ACE is found to be significantly different from CCE (t=2.028, t=0.045) implying that the decisions made by the subjects did not generally reflect the will of the others in the group. We also find that subjects do not base their choice of CCE solely on their predictions of the others. Although the null hypothesis that there is no significant difference between the variables CCE and PCE (t=1.952, 0.053) cannot be rejected, the low level of significance indicates that other factors are relevant.

We perform a regression in order to ascertain to what degree individuals base their choice of outcome for others on what they believe the rest of the group's preference would be and also on their own certainty equivalence value. We use a simple OLS regression model below in order to estimate this relationship

$$CCE_j = \beta_0 + \beta_1 OCE_j + \beta_2 PCE_j + \varepsilon_j$$

where the dependent variable CCE_j is individual j's certainty equivalence when making the risky choice on behalf of the others in the group. The regression is based on the responses from the whole population as a chow test does not reveal any gender differences (F[3,126]=0.35138; p=0.79), thus we cannot motivate not using the restricted model. In addition it was found that own risk preference was not a significant

direct factor (although it implicitly enters the model through *OCE* and *PCE*). The results are presented in Table 3.

Table 3: *Regression results for choices made by all subjects on behalf of the other members of the session.*

	Coefficients	**t-value**	**p-value**	**Std. error**
CCE				
Intercept	31.638	3.134	0.002	10.094
OCE	0.297	3.163	0.002	0.094
PCE	0.363	2.289	0.024	0.159
R^2=0.287				

The values of the coefficients are possibly unreliable due to multicollinearity and therefore we cannot ascertain the exact weights individuals assign on the two variables.[13] However, it appears clear that individuals in this study do not base their choices for others solely on the predictions they made for the others in the group which would be expected if they would wish to reflect what they believed to be the will of the group, but also tend to base their choice of *CCE* on their own certainty equivalence values.

We refrain from excessive speculation on the psychological reasons behind this result although one possible factor may possibly be a feeling of paternalism on the part of the subject where she believes her choice to be the more "correct" than that of the other individuals in the group. Anchoring problems caused by the experimental design may also have contributed to this result as the framing of the questions where the individuals were asked to state their own preferences and their beliefs of others may have coloured their choice.

5. Conclusions

The first part of this study was designed to measure and compare the risk propensity of individuals as well as their prediction of the risk propensity of others. We find that the

[13] Two separate regressions were performed, using a single dependent variable OCE and PCE in each. We found the magnitude of the coefficient estimates to be similar to the pooled model.

individuals in this study were generally inaccurate in their predictions for others. We also find no significant relationship between gender and risk preference, both sexes however predict that women are more risk averse than men, which is contrary to the actual choices made but consistent with the gender stereotype.

When comparing individuals' own risk preference with their prediction of the risk preferences of others, we find that the category of risk preference to which the individual belongs is related to their prediction of the certainty equivalence of others. We find that individuals' risk predictions for others tend to regress towards risk neutrality. In the case of risk averse individuals however, this is only the true when the target is male. If the *risk-as-feelings* theory is accepted as the reason behind these results, then individuals who are extremely risk averse base their prediction on the recognition that they have stronger feelings against risk than most people. However, the regression to risk neutrality for the predictions for males may also be interpreted as a mean regressing tendency where a false consensus effect, together with a gender stereotype effect also provide an explanation for subjects' predictions for women. It is therefore not possible to take an unequivocal position on the validity of the *risk-as-feelings* hypothesis when explaining these results and a further study would be required in order to confirm the *risk-as-feelings* hypothesis. If for example, the same subjects were confronted with a similar choice as in the first experiment but where the stakes were increased ten-fold we may possibly find that many of the risk seeking respondents in the first experiment make risk averse choices in the second when the stakes are increased. If the *risk-as-feelings* hypothesis and thus regression to risk neutrality holds that these individuals would then reverse their predictions and believe themselves to be more risk averse than others. However, if the respondents still predict that they are less risk averse than others, then we would be required to reject the *risk-as-feelings* hypothesis.

In the second part of the experiment the subjects were required to make a decision, at no risk to themselves, but where the outcome of their decision determined the pay-offs of the other participants of the session. We find that the individuals in this study do not base their choices for others solely on the predictions they made for the others in the group which would be expected if they would wish to reflect what they believed to be

the will of the group, but also tend to base their choice for others on their own certainty equivalence values.

The results suggest several interesting areas for future research. Firstly, experiments using varying levels of stakes may provide further insight into the relationship between individuals' own risk preference and their prediction of the risk preferences of others. Secondly, experiments where real decision makers are included among the participants would facilitate comparison of predictions and decisions made for others vary by the different subject categories. Finally, as many decisions made for others are in the non-financial realm it would be of interest to design experiments that elicit subjects' risk preferences and risk predictions in situations where the risks are non-financial.

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Appendix

Table A1:*Descriptive statistics of OCE by gender of subject.*

	Male subjects	**Female subjects**	**All subjects**
Mean	95.9	98.28	97
Standard deviation	26.931	31.923	29.25
range	(20, 150)	(30, 180)	(20, 180)
N	71	61	132

Table A2: *Number of subjects in each risk category by gender*.

Risk preference	**Male subjects**	**Female subjects**	**All subjects**
Risk averse (OCE<100)	32 (45.1%)	31 (50.8%)	63 (47.7%)
Risk neutral (OCE=100)	20 (28.2%)	10 (16.4%)	30 (22.7%)
Risk seeking (OCE>100)	19 (26.8%)	20 (32.8%)	39 (29.5%)
Total	**71 (100%)**	**61 (100%)**	**132 (100%)**

Table A3: *Predictions for women relative to own certainty equivalence by risk category.*

	Risk preference category			
	Risk averse	**Risk neutral**	**Risk seeking**	**Total**
OCE < PCE ^{f}	24	4	1	**29**
OCE = PCE ^{f}	7	6	0	**13**
OCE > PCE ^{f}	32	20	38	**90**
Total	**63**	**30**	**39**	**132**

Table A4: *Predictions for men relative to own certainty equivalence by risk category.*

	Risk preference category			
	Risk averse	**Risk neutral**	**Risk seeking**	**Total**
OCE < PCE ^{m}	48	9	2	**59**
OCE = PCEm	3	4	1	**8**
OCE > PCE ^{m}	12	17	36	**65**
Total	**63**	**30**	**39**	**132**