The Effect of Relation When Taking Risk on Behalf of Others

- An Experimental Study

Universitetet i Stavanger

By

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The Effect of Relation When Taking Risk on Behalf of Others: An Experimental Study

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Abstract

Existing research within the field of taking risk on behalf of others have mainly focused on differences between the risk level individuals choose for themselves, relative to the risk level taken on behalf of others. In this experiment I take this research a bit further, by not only looking at this difference, but also the difference between the risk level taken on behalf of people that the participants do not know and people they are in close relation to. The results show no significant difference when adding relation as a variable. However, I do believe there is an effect, but that the results here was caused by limitations to the experiment. Further, there is evidence of individuals behaving with more risk aversion when taking risk on behalf of others, relative to themselves and we see that their betting behavior is affected by their belief of what other participants do.

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1.0 Introduction

Norwegians have never saved more money in mutual funds. According to the newspaper Dagens Næringsliv, by July 2017 Norwegians had placed NOK 1079 billion in mutual funds. This in an increase of as much as 10 % since the beginning of the year (Christensen, 2017). In other words, this means that we are trusting other people more and more to execute risk on our own behalf with our money. The challenge with this is that decision makers often get incentives for increasing risk taking on behalf of others, and we see this especially through the behavior of investors in the recent financial crisis. A problem with incentives is that it is hard to match these with the interests of the stakeholders (Andersson, Holm, Tyran, & Wengström, 2013).

Risk taking on behalf of others is something almost every one of us face frequently, whether you are a consultant, a fund manager or a nurse. Are people in these situations affected by the relation of the person they are taking risk on behalf of, or are they able to behave strictly professional and make the decision neutral in any situation? This question led me to research this area further.

This study will look to see if there is any significant difference in behavior when the bet on behalf of others is someone you are in close relation to. It will also look at the difference in behavior when betting on behalf of others in general compared to oneself. Recent studies have documented mixed results when it comes to taking risk on behalf of others (Eriksen, Kvaløy, & Luzuriaga, 2017), and even though there has been a great deal of research in this field already, I find no evidence that anyone has looked at the difference in effect of relation and no relation.

1.1 Structure

Does relation have an effect when taking risk on behalf of others?

To answer the research question, I have conducted an experiment based on a research design from a previous study. The experiment has been done in two separate groups, where both groups first had to take risk on behalf of themselves. Then, the Control Group had to take risk on behalf of a person in the room in which they would never learn the identity of, and the Treatment Group took risk on behalf of a chosen someone they were in close relation to. I have tried to find answer on the research question based on the following two hypotheses:

H_0: People tend to take the same amount of risk on behalf of people in close relation to them, as they do to people they do not know.

H_1: People tend to take more or less risk on behalf of people in close relation to them, than they do to people they do not know.

1.2 Structure

This thesis consists of 7 chapters. In chapter 2 there will be presented theory that is relevant for the topic and that will help discussing the data collected. The theory especially emphasizes on behavioral finance and behavioral economics to create a deeper understanding of why people do behave the way they do when making decisions involving money. In chapter 3 I will present the research method that has been used to find answer to the research question. The chosen design and how it has been used in this theses will also be explained. Chapter 4 contains a detailed explanation of the experiment and how that was executed. Data analysis and results will be presented in chapter 5, while chapter 6, will include discussion and limitations to the experiment. Then, at last I will conclude the thesis in chapter 7.

2.0 Theory

In this chapter I will present theory that is relevant for the subject of this thesis. It is presented to make a better understanding of the analysis further on.

2.1 Expected utility theory

Utility measures overall satisfaction from consuming a good or a service, meaning that it is affected by a number of factors. It is not only affected by that person's consumption of physical commodities, but also by psychological attitudes, previous experiences, pressure from a peer group and the environment surrounding the decision (Snyder & Nicholson, 2012).

Daniel Bernoulli studied expected utility and argued that people do not care directly about the money rewards when taking a bet, instead they respond to the utility these dollars provide. A rational decision-maker will therefore choose the gamble that yields the highest expected utility (Snyder & Nicholson, 2012).

2.1.1 Rational behavior

In economics we assume that people behave rationally, and it has been generally accepted that the expected utility theory has been a model of rational choice (Kahneman & Tversky, 1979). Therefore, most economic theories base their assumptions on the fact that rational behavior is the fundament of the decision made by individuals (Investopedia, 2018). John von Neumann and Oscar Morgenstern laid out basic axioms of rational behavior that needed to be present for a person to act rationally. These are *completeness*, *transitivity*, *continuity* and *independence* (von Neumann & Morgenstern, 1944).

2.1.1.1 Axioms of rational choice

Snyder and Nicholson describe the axioms of rational behavior that Neumann and Morgenstern laid out (2012, ss. 85-86).

I. *Completeness:*

An individual making a decision can always specify exactly one of the three following possibilities if A and B are *any* two possibilities:

1. «A is preferred to B»
2. «B is preferred to A» or
3. «A and B are equally attractive»

People are assumed not to be affected by indecision and are able to make a decision based on the assumptions. This assumption also makes it impossible for any decision-maker to both say, «A is preferred to B» and «B is preferred to A»

II. *Transitivity:*

If a decision-maker says that «A is preferred to B» and «B is preferred to C», then he must also be able to state that «A is preferred to C». This assumption is based on the decision-maker being fully informed about the decision and the consequences. It means that he should behave with continuity in the decisions made, and that the choices are transitive.

III. *Continuity:*

If a decision-maker says that «A is preferred to B» then situations similar to A must also be preferred to B. This assumption is used to analyze the response of the individual if there are small changes to i.e. price and income.

There is also a forth axiom that is a bit controversial in some areas because of its limited use in i.e. consumer theory.

IV. *Independence:*

A preference relation $\geq$ on the space of lotteries P satisfies independence if for all $p, p', p'' \in P$ and $\alpha \in [0,1]$, we have

$$p \geq p' \quad \Leftrightarrow \quad \alpha p + (1-\alpha)p'' \geq \alpha p' + (1-\alpha)p''$$

This means that the independence axiom states that the decision-maker prefer p to p'. *Substitution* axiom is another name used for this axiom, as it holds the idea that if p'' is substituted for part of p and p', the ranking should be the same between them (Levin, 2006).

2.2 Risk preferences

Economists and psychologists have been looking at individual risk attitudes through a variety of experimental methodologies. There is no doubt that people prefer different kinds of risk levels, but this is largely dependent on the question one wants to answer and the characteristics of the sample population (Charness, Gneezy, & Imas, 2013). In this thesis the sample population is relatively young, with an average age of 26,1 years. There have been mixed results when looking at risk preference and age. Brooks et al. (2018), Bellante et al. (2004) and Kumar (2009) found that people are more risk averse with age, whereas Boyle et al. (2012), Bucciol et al. (2011) and Jianakoplos et al. (2006) find that people are less risk averse with age. It is therefore not possible to state that younger people take more risk than older people and opposite, one also has to look at the sample population before concluding.

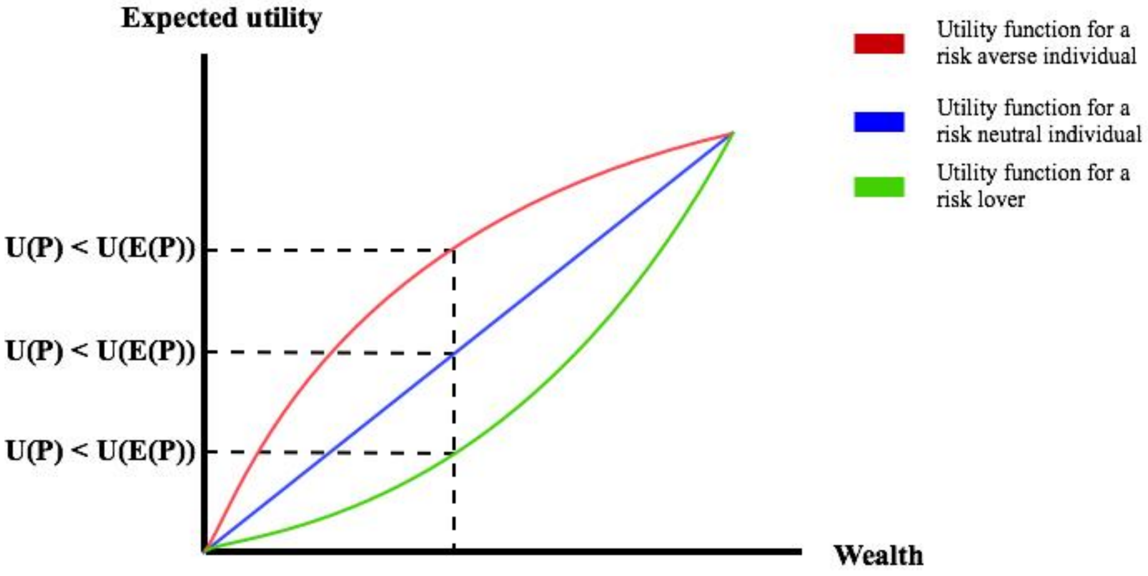

Figure 1. *Utility function for risk preferences.*

(Ackert & Deaves, 2010)

We usually categorize risk preference in to three groups; *risk aversion*, *risk neutral* and *risk lover*. In figure 1. we can see expected utility in relation to wealth for each of these three types of preferences.

Most investors are risk averse. These investors would reject portfolios that are fair games or worse and would only look for risky portfolios with expected rate of return by a certain percentage to account for the risk involved, meaning that $A > 0$ (Bodie, Kane, & Marcus, 2014, s. 170).

A risk neutral investor is an investor that prefer a higher level of risk than a risk averse investor, but lower level of risk than a risk lover. They are neither risk averse nor risk lovers, and therefore the name risk neutral. They judge prospects solely by their expected rates of return, meaning that $A = 0$ (Bodie, Kane, & Marcus, 2014, s. 172)

The polar opposite of the risk averse investor, is the risk lover. They are happy to engage in fair games and gambles and adjust the expected return upwards to experience the fun of the prospect's risk, meaning that $A < 0$ (Bodie, Kane, & Marcus, 2014, s. 172)

2.2.1 Risk preference in laboratory experiments

As I will highlight in chapter 3, an advantage with using experiment is that one can manipulate the independent variables to determine if this has any effect on the dependent variable (Gripsrud, Olsson, & Silkoset, 2016, s. 54). That way it is possible to exactly point out what one is trying to find answer to by including the right variables to observe the effect. Harrison and Rutström (2008) examined how to estimate risk attitudes of individuals through several experimental procedures. They found systematic evidence that participants in experiments in general behave with risk aversion. Some have a risk neutral approach, while only a very few exhibit the behavior of a risk-seeker.

2.3 Prospect theory

The prospect theory was introduced by Daniel Kahneman and Amos Tversky (1979, s. 263) to show choice problems in which preferences systematically violate the axioms of expected utility theory, as explained in chapter 2.1.1.1. According to Glenn W. Harrison and Elisabet Rutström (2008, s. 90), prospect theory has become the most popular alternative to expected utility theory, and it differs from it in three major ways:

1. In prospect theory the individual is allowed to have a subjective take on the probability weighting
2. One is allowed to have a reference point that is defined over the outcomes, and to have different utility functions for gains and losses.
3. One is allowed to be averse to losses. Individuals actually tend to be more averse to losses because the pain of losing weighs more than the happiness of winning.

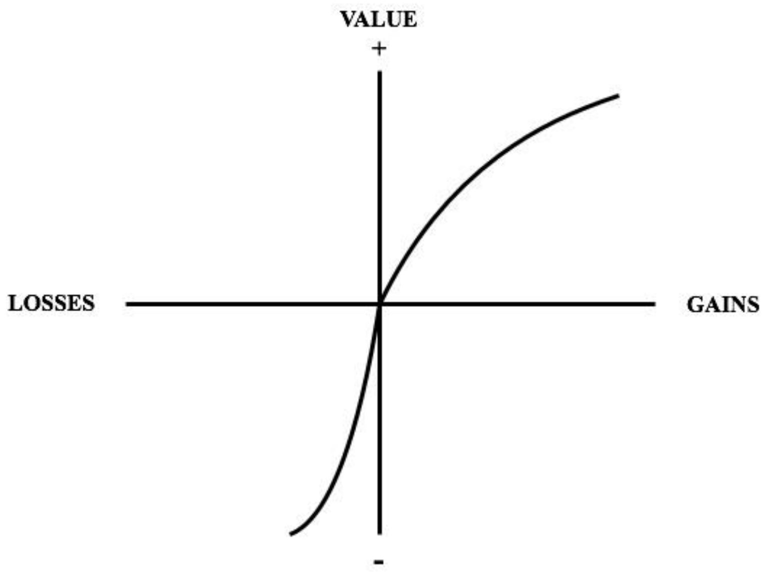

Figure 2. *A hypothetical value function.*

(Tversky & Kahneman, 1981)

As we can see from figure 2, it shows that losses weigh more than the happiness of winning. For example; there is a clear difference in subjective value between the gain of values closer to origin rather than further away. This means that the difference between $10 and $20, has a larger subjective value than the difference between $110 and $120. The relationship between these values is the same as the difference for the corresponding losses (Tversky & Kahneman, 1981).

2.3.1 Editing and evaluation

In prospect theory we distinguish between two phases when making a decision; the early phase called *editing* and the latter phase called *evaluation* (Kahneman & Tversky, Prospect Theory: An Analysis of Decision Under Risk, 1979, s. 274). The *editing* phase is the phase where one gets an overview of the situation and the choices to be made, and it consists of a preliminary analysis of the prospects that are offered. This often yields a simpler representation of these prospects before the prospects in the second phase are evaluated. From this the prospect with the highest value to the individual is chosen.

The editing phase consists of some major operations that will outline how one gets from the editing phase to the evaluation phase; *coding, combination* and *segregation*. (Kahneman & Tversky, Prospect Theory: An Analysis of Decision Under Risk, 1979, ss. 274-275).

- *Coding:* People tend to perceive outcomes as gains and losses, rather than an effect on wealth. The gains and losses are relative to some neutral reference point that is given when receiving a choice. It is however important to notice that the gains and losses can be affected by how the prospects that are offered are being formulated.
- *Combination:* When we have probabilities with identical outcomes, the prospects can be simplified. An example of this is when you have two possible payouts of 200, both with a probability of 25 % written like this: (200, .25; 200, .25), you should instead write (200, .50).
- *Segregation:* Some prospects do contain a guaranteed payout, and therefore has a riskless component. This can be segregated from the risky component to get a better overview. For example, a prospect has the following possible payouts and probabilities; (300, .80; 200, .20). This means that the prospect with certainty will yearn a payout of 200, and should therefore be simplified to (100, .80). The same can be done when it is opposite and yearns a certain loss instead of a certain gain.

2.3.2 Violation of axioms

Further on, there will be some examples (Tversky & Kahneman, 1981) of how the axioms presented by von Neumann and Morgenstern (1944), are being violated in real life, This is done to confirm that the prospect theory is a viable alternative to the expected utility theory in given cases.

Problem 1. Choose between:

A. *A sure gain of $240*
B. *25 % chance to gain $1000, and*
   75 % chance to gain nothing

Problem 2. Choose between

A. *A sure loss of $750*
B. *75 % chance to lose $1000, and*
   25 % chance to lose nothing

The biggest difference between these two problems is that the majority choice in problem 1 is risk averse, and the majority choice in problem 2 is risk taking. If we calculate expected payoff for both problems, we have that:

Problem 1:

*0,25*1000 +0,75*0 = 250 > 240*

A: 240 > B:250 → choose option B

Problem 2:

*0,75*1000 + 0,25*0 = 750 = 750*

A: 750 = B: 750 → Even though these are equal, one would still choose option B because there is still a 25 % chance that one would lose nothing.

From expected utility theory we know that we cannot only look at the expected payoff, but also the utility of the dollars provided. However, in reality, 84 % of the participants chose option A in problem 1 which is consistent with risk aversion, and 87 % of the participants chose option B in problem 2 which is consistent with risk seeking. This is a violation of the expected utility theory, because the participants seemed to change their risk preferences during the experiment.

2.3.3 Myopic Loss Aversion (MLA)

Myopic loss aversion is the combination of individuals being more sensitive to losses than to gains and that they tend to evaluate outcomes over a short time period (Thaler, Tversky, Kahneman, & Schwartz, 1997). Benartzi and Thaler (1995) illustrates how mental accounting (see chapter 2.4) and loss aversion together leads to what they call myopic loss aversion by using an example from Samuelson (1963). Samuelson asks a colleague if he is willing to take the following bet:

A 50 % chance to win $200 and a 50 % chance to lose $100.

His colleague turned the bet down but answered that he would have accepted such a bet if it happened 100 times. Benartzi and Thaler (1995) argued that this is an example of an investor being loss averse and will not accept the bet because of the time horizon. However, the colleague would be willing to take more risk of he did not have to evaluate the performance after each round, and also if the time period would have been greater. The example given would have the following utility function, where *x* is a change in wealth relative to the status quo:

$$U(x) = \begin{matrix} x & x \geq 0 \\ 2.5x & x < 0, \end{matrix}$$

That utility function would yield positive expected utility, with the distribution of outcomes created by the portfolio of two bets being; [$400, .25; $100, .50; -$200, .25] (Benartzi & Thaler, 1995). The fact that the colleague would not accept the bet only one time, is also inconsistent with expected utility theory, because if an individual would take one bet, he should also take all bets and opposite.

2.4 Irrationality

As mentioned in chapter 2.1.1 we assume in economics that people do behave rationally, and that is the basis of how we measure certain things. Behavioral economist, Richard Thaler, has introduced several new aspects that prove that people actually do behave irrationally, and do things that are not in their best interest especially around money (ING Groep N.V., 2017).

The phrase *mental accounting* was introduced by Thaler as a way of describing how the set of cognitive operations used by individuals will help households organize, evaluate and keep track of financial activities (Thaler, 1999). People tend to treat money differently depending on where the money came from and seem to change their spending habits because as a result of this. We see that people that have gained money that they usually would not have, could end up paying more for a good that they would if they did not have that money, and this is an example of mental accounting Thaler gives an example of a couple that gets an insurance payback, and end up spending the money on an extravagant restaurant in which they would never have paid for otherwise (Thaler, 1985).

The *house money effect* can be explained by the fact that people's behavior towards risk tend to change by prior gains and losses. After winning or losing money, their behavior steers towards a riskier character (Thaler & Johnson, 1990). An example of the house money effect can be explained by how people behave when betting at a casino. A person that is only comfortable betting $1 at a casino, would be way more likely to bet a higher amount after winning $100. This means that his betting habits has changed after a prior gain and is therefore affected by the house money effect. The reason for this is that most people feel that this money is not «owned» the same way that the $1 and is therefore easier to take risk with.

An example of the *break-even effect* can be explained by how people behave when trading stocks. A person that has just lost $10 million would be more likely to take a bet that would with 50 % chance earn $20 million and 50 % chance lose $5 million, than go for a safe investment that would with certainty earn $5 million. This because would rather break-even his losses then lower them.

The *endowment effect* is another hypothesis about behavior (Thaler, 1980). An example of this is how Professor Rosett, chair of the Economics Department at the University of Rochester, behaved in regard to a bottle of wine he bought. He bought the bottle for $4.95, and after several years the bottle of wine was valued at $100. It was never an option for him to buy a bottle of wine for more than $30, and he would not sell this bottle for $100, he would however drink it. This is in opposition to what economists would call rational behavior and is called the endowment effect (Thaler, 2017). The reason he would not sell it is because the sentimental value the bottle had.

2.5 Heuristics and biases

When decisions are made under uncertainty they are very often based on a limited number of simplifying heuristics instead of a well thought process (Griffin & Tversky, 2002). The purpose of heuristics is to reduce the effort associated with a decision, because the process of arriving at the optimal decision can be a complex algorithm that could be too time consuming (Shah & Oppenheimer, 2009).

The tension that is created within us when making a decision, reflects a gap between our intuitions and our beliefs about what is rational. We have two systems of reasoning, like two minds at work; one is following the more "natural assessment methods" like representativeness and availability and the other one is working from a more justifiable sets of beliefs from which we create a plan of action. The problem is that these two minds do not always agree on what is the best decision to make, and this sort of conflict dominates much of our behavior in our everyday life (Sloman, 2002).

One of the common heuristics for decision-making is called *diversification.* Simonson (1990) did an experiment where he tested this with students that had to picture themselves going to the grocery store to shop for food they would consume the next days. They got to choose products from seven product categories, where each of them contained different options like flavor of the yoghurt and types of milk. One group had to picture going to the store every day to shop the daily groceries, whereas the other group did it for three days at the time. He found that when you have to make a decision *now* on what to eat for the next three days, you make a greater variety than if you have to make the choice every day.

Another common heuristic is the *availability heuristic.* This happens when the strength of association is used as a basis for the individuals judgement of frequency. Tversky & Kahneman (1973) did an experiment with this in which they asked students to determine from a text if it was more likely that a word starts with K or that K is the third letter. Most students believed that there were more words starting with K but in reality, there are twice as many words from a random text that has K as the third letter. The reason the students believed what they did, is because it is way easier to come up with a word that starts with K, than the other alternative.

A third heuristic that is commonly being used when making decisions is called *representativeness.* Kahneman & Tversky (1972) explained this with an experiment where they asked the participants the following question: *«All families of six children in a city were surveyed. In 72 families the exact order of births of boys and girls was GBGBBG. What is your estimate of the number of families surveyed in which the exact order of births was BGBBBB?»* What they saw was that 72 of 95 participants believed that the first option was more likely than the second option, which is not true. The reason they believe so, is that there are more B’s in the second option, and our mind therefore tend to trick us in to believing that, the second outcome is less likely.

2.5.1 Illusion of control

Studies show that individuals tend to be more confident in a gamble than after when rolling a dice (Strickland, Lewicki, & Katz, 1966). As a result of illusions like that, people tend to confuse the difference between events that are controllable and uncontrollable (Presson & Benassi, 1996). Henslin (1967) did an experiment where he looked at how people behaved in a betting game where rolling a dice was the deciding factor. To some extent the participants behaved in regard to the odds, i.e. that the dice would land on what they needed to win, but further than that they also behaved with a form of belief that they could control the outcome.

2.5.2 Overconfidence

Overconfidence do have a strong positive and significant impact on risk taking behavior. Financial professionals are overconfident in both the general and the financial domains (Broihanne, Merlo, & Roger, 2014). People tend to be overconfident when strength is high and weight is low, and underconfident when strength is low and weight is high (Griffin & Tversky, 2002, s. 240). This means that if you have a friend that have just won a certain amount in a lottery, you tend to get overconfident in your chances of winning the same, not taking the probability in to consideration.

2.6 Risk taking on behalf of others

As mentioned earlier, I was not able to find evidence of research in the field of taking risk on behalf of others, when including relation as a variable. However, this thesis will also look at how people bet on behalf of others in general, and in this field of research the results have been mixed (Eriksen, Kvaløy, & Luzuriaga, Risk-taking on Behalf of Others, 2017).

Chakravarty et al. (2011) find that when making decisions on an anonymous individual people tend to be less risk averse than on behalf of themselves. Another study finds similar results, where portfolio managers are less risk averse with other people’s money than their own, even when they know the interests of the investors are different (Agranov, Bisin, & Schotter, 2014). On the other hand, Eriksen & Kvaløy (2010) and Pahlke et al. (2015) find that when taking risk with other people's money people tend to be more risk averse. Other results have shown that when making decisions on behalf of peers, one tend to invest on behalf of them as they believe they would do themselves (Füllbrunn & Luhan, 2015). This means that people do not make decisions based on their own preference, rather what they believe the other person would want.

3.0 Scientific method

In this chapter I will present the chosen method used to answer the research question. It will describe the research design and reasons for choosing this, as well as how the data has been gathered.

3.1 Quantitative method

According to Gripsrud, Olsson and Silkoset (2016) all incoming data can be either qualitative or quantitative. Quantitative data are data that can be expressed in numbers or units, and all other data are qualitative. In this thesis there will be used quantitative methods, and this requires accuracy because the main goal is to use statistical methods to generalize.

3.2 Research design

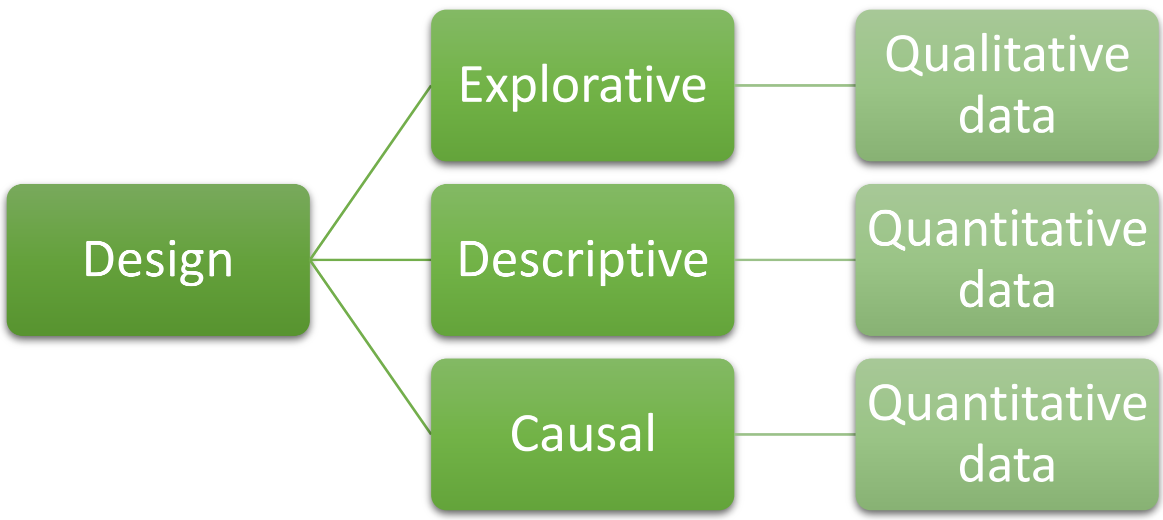

Figure 3. *Research design.*

(Gripsrud, Olsson, & Silkoset, 2016).

The design of a research can be compared to the architect's drawings and specifications of how a building should be constructed. The choice of design is dependent on how much we know about the given area of research and what kind of ambitions we have in regard to analyzing and explaining the context. We usually distinguish between three main categories of design; *explorative*, *descriptive* and *causal* design (Gripsrud, Olsson, & Silkoset, 2016, s. 47)

Explorative design uses, as figure 3 shows, qualitative data and is therefore not relevant for this thesis. *Descriptive* design uses quantitative data, but mostly in the form of questionnaires. Even though there have been used some form of questionnaire for this thesis to get background information about the participants, the main part was the experiment itself. Hence, the chosen design for this thesis is *causal*.

3.2.1 Causal design

According to Gripsrud, Olsson and Silkoset (Gripsrud, Olsson, & Silkoset, ss. 54-56) the meaning of *causal* design is that there has been used some form of experiment. To be able to state that an event (*X*) is the reason for another event (*Y*) under certain conditions (*Z*), we must show that:

- there is correlation between *X* and *Y*
- *X* comes before *Y* in time
- other possible causes for correlation do not exist (isolation)

In this thesis this means that I want to test if this treatment (*X*), i.e. taking risk on behalf of people in close relation, result in betting more or less (*Y*) than people betting on behalf of an unknown participant, given certain conditions (*Z*). The main reason for doing experiments is to manipulate the independent variables to determine if they have any effect on the dependent variable.

3.2.1.1 True controlled laboratory experiment

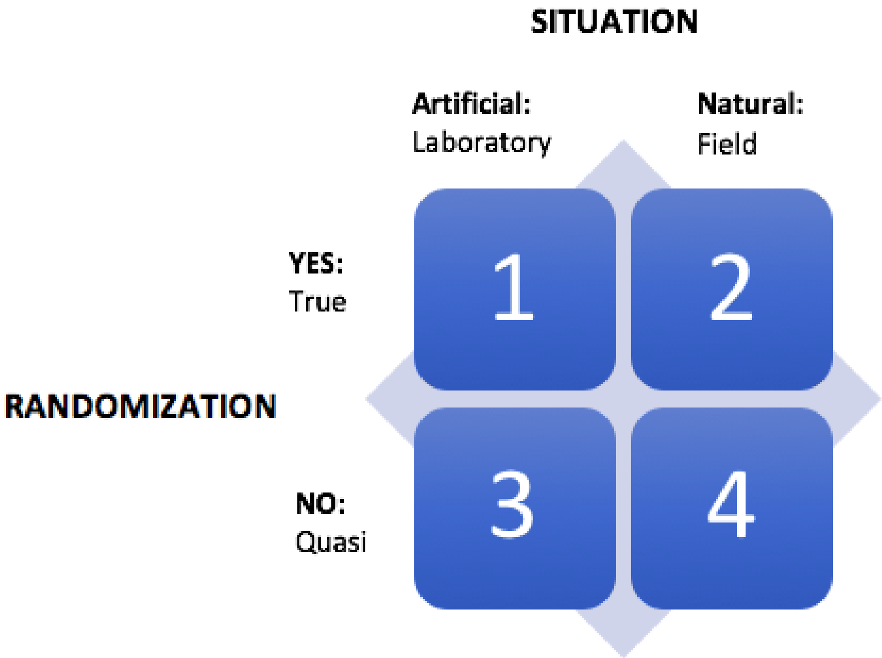

Figure 4. Types of experiments

(Gripsrud, Olsson, & Silkoset, 2016, s. 55)

As we can see from figure 4, a causal experimental design is either true or quasi and either laboratory or field. A true experiment is given by the following criterias (Gripsrud, Olsson, & Silkoset, 2016, s. 56):

- random distribution of the participants in the control group and the treatment group (randomization)
- manipulation of the treatment group
- post testing of both groups (*T1*)
- sometimes also pretesting (*T0*)

An experiment is also laboratory or field, and a laboratory experiment can be described by the following criterias (Gripsrud, Olsson, & Silkoset, 2016, s. 57):

- takes place in an artificially created environment
- makes it possible to isolate the effect of stimuli because the circumstances can be controlled
- can get results that are not valid in a natural environment

I chose to do a true controlled lab experiment, and this was how that was done:

- The distribution of the participants was random. They signed up for a time that suited them, and I chose group 2 and 3 to be the control group, and 1 and 4 to be the treatment group based on the number of participants that signed up for each. This to try and make the groups equally sized.
- I manipulated a variable, *relation*, in the treatment group by letting them bet money on behalf of someone in close relation, rather than a random participant in which the control group did.
- I post-tested both groups (*T1*), whereas the control group bet on behalf of a random participant and the treatment group on behalf of a close relation.
- I pretested (*T0*) both groups where they both had to bet on behalf of themselves.
- The experiment took place in an artificially created environment, in a classroom where I set the rules.
- Because I set the rules I was able to isolate the effect of stimuli because the circumstances were controlled.
- I do not know if the results are valid in a natural environment, but it is possible.

In addition to this I have also gathered background information of the participants using a questionnaire at the end of the experiment, where I got to know gender, age, income and more, to determine if these variables had an effect on the result.

3.3 Primary and secondary data

Secondary data is a very effective way of gathering information of a narrow subject. This kind of data is collected by others for other purposes and is therefore used secondarily. Opposite of this we have primary data, that is gathered specifically to answer one's own research questions. Even though gathering these types of data is different, there is little reason two distinguish between them. We have to consider reliability and validity in both types regardless if it is primary or secondary (Gripsrud, Olsson, & Silkoset, 2016, ss. 68-69). In this thesis, the primary data will be what is collected through the experiment, and I will use this do discuss with basis in the secondary data. All other data is consequently secondary.

For the structure of the thesis I have found help from two similar experiments done at the University of Stavanger; Høvring & Pham (2014) and Haavik & Zeiler (2010). I chose to use Gneezy & Potters' (1997) design for the experiment, because it is a well-known and well tested experiment that works well with the experimental design that is chosen for this thesis. For the questionnaire in the second part of the experiment I found some inspiration from the work of Falk et al. (2016).

4.0 Data collection

This chapter focuses on how the design of the experiment led to getting the relevant data for the thesis. It includes a detailed description of how the experiment was conducted.

4.1 Experimental design

The experiment was done four times, whereas group 1 and 4 were the Treatment Group and group 2 and 3 were the Control Group. When the participants arrived, they were all given two envelopes; the first with the number one on it and the second with the number two on it.

Part 1 was the same for both the Control Group and the Treatment Group. They were told that they had a guaranteed payout from that part of the experiment of NOK 50. However, they all had the opportunity to bet some or all of the money they were given. The lottery was as follows:

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet. You lose if the dice shows 1, 2, 3 or 4, and win if the dice shows 5 or 6.

They were told that I would roll a dice for each and every one of them after the experiment was done, and they were asked to make their decision by filling out the form that was in the envelope with the number one on it (see Appendix A. Part 1: Decision sheet). When they were done they had to put the paper back in to the envelope and were not allowed to open it until the experiment was done.

To help the students with an overview of the possible payouts, I provided them with the following table both in part 1 and part 2.

Bet	Payout if dice shows 5-6	Payout if dice shows 1-4
0	50	50
5	57,5	45
10	65	40
15	72,5	35
20	80	30
25	87,5	25
30	95	20
35	102,5	15
40	110	10
45	117,5	5
50	125	0

Table 1. *Payout table.*

(Amounts are in NOK)

In part 2 the Control Group were told that someone else in the room had a guaranteed payout from that part of the experiment of NOK 50. However, they had the opportunity to bet some or all of the money on behalf of that person. The lottery was as follows:

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet. You lose if the dice shows 1, 2, 3 or 4, and win if the dice shows 5 or 6.

They were told that they would never learn the identity of the person they made the decision on behalf of, and they had to make their decision by filling out the form that was in the envelope with the number two on it (see Appendix A. Part 2: Decision sheet). When they were done they had to put the paper back in to the envelope and were not allowed to open it until the experiment was done.

At the very end of the experiment I rolled a dice for each and every one of the participants. If the dice showed 1, 2, 3 or 4 they lost the amount they bet on behalf of the other person, but that person kept the amount they did not bet, and if the dice showed 5 or 6 they won two and a half times the amount they bet on behalf of that person and also kept the money they did not bet.

Part 2 was almost the same for the Treatment Group, except they were told that someone in close relation to them had a guaranteed payout from that part of the experiment of NOK 50. Who that person was, was up to them and I told them I would make sure that that person would be paid by me after the experiment. I did not say how I would do this and ended up paying the participant, not the person they chose as their close relation. The important factor was that they believed in the moment of making the decision that the person in relation to them would receive this money.

Both groups also had some additional questions in part 2 of the experiment, so that I could get some more information about the participants to back up information that the experiment might not catch.

5.0 Data analysis and results

In this chapter the data collected from the experiment will be presented. The results will then be tested and analyzed using statistical methods. This will be used to answer which of the hypotheses presented in chapter 1 are true. Other significant findings will also be presented.

5.1 Sample

To recruit students to take part in the experiment, the administration sent out e-mails to students at Handelshøyskolen at UiS, which meant that 22 of the participants came from these fields of studies. The rest of the participants was recruited through the University page on Facebook. As mentioned earlier, the experiment was done in four groups, two control groups and two treatment groups. A slight difference in number between the two groups is caused by registered participants not showing, even though there was overbooking in all four experimental rounds.

The experiment consisted of 44 participants, where 25 were placed in the control group (CG) and 19 were placed in the treatment group (TG). For reasons I will come back to in chapter 5.4, this number was reduced to 37, with 21 participants in the Control Group and 16 participants in the Treatment Group.

Variables		% of sample	Mean	Median	Range	N
Participants	**Overall**					**37**
	CG	56,76 %				21
	TG	43,24 %				16
Gender	**Overall**					**37**
	Female	59,46 %				22
	Male	40,54 %				15
Age	**Overall**		**26,46**	**26**	**20-39**	**37**
	Female		25,82	26	20-39	22
	Male		27,40	24	20-36	15
Income	**Overall**		**128378,38**	**150000**	**Less than 100.000-more than 500.000**	**37**
	CG		130952,38	150000	Less than 100.000-between 200.000-300.000	21
	TG		125000,00	150000	Less than 100.000-more than 500.000	16
Nationality						**37**
	Norwegian	51,35 %				19
	Other	48,65 %				18
Studies						**37**
	BA	54,05 %				20
	Other	45,95 %				17
Bet part 1	**Overall**	**52,44 %**	**26,22**	**25**	**5-50**	**37**
	CG	58,10 %	29,05	25	10-50	21
	TG	45,00 %	22,50	22,5	5-50	16
Bet part 2	**Overall**	**43,52 %**	**21,76**	**25**	**0-50**	**37**
	CG	52,86 %	26,43	25	0-50	21
	TG	31,26 %	15,63	17,5	0-40	16

Table 2. *Sample.*

From table 2 we can see that 22 of the participants were female and 15 participants male, meaning women made up 59 % of the subject pool, and men made up 42 %. Even though I would have like to have seen this number more even, I argue that this is a fair distribution of genders. When it comes to age, the average overall was 26,46 years, whereas 25,82 years for women and 27,4 years for men. This means that there is no distinct difference between the two genders when it comes to age. Regarding the variables studies and nationality, they are both almost split in half between the participants; Norwegians and other nationalities, and students in Business Administration and other fields of study. This also give the variables equal power to each other, meaning that there is good comparability.

It is worth mentioning that the sample size is quite small, and this along with other limitations will be discussed further in chapter 6.3. Other than that, I will conclude that the sample is representative because of the distribution between the given variables. It is however not possible to determine whether or not this is transferrable to the field, but I believe that similar results would be recreated in the lab given samples from the same population.

5.2 Tests

I have used two different tests for the analysis. In this thesis there have been used a level of significance of 5 % to determine whether the variables are significant.

5.2.1 Mann-Whitney test

The Mann-Whitney test is a non-parametric test, that can determine if there are significant differences in the two groups. It is an alternative to the independent sample t-test. There are some assumptions to the Mann-Whitney U test:

- The sample that is drawn from the population has to be random.
- Within the sample there has to be independence, meaning that the observation is in one group or the other, not both.
- Ordinal measurement scale is assumed.

(Statistic Solutions: Advancement Through Clarity, 2018).

The test can be conducted in several ways, but in this thesis the SPSS Statistics have been used. When using this software, we do not have to use the z-value and a table with standard normal probabilities to find the p-value, because the output will provide this directly.

5.2.2 Regression analysis

A multiple regression is a parametric test. This analysis allows us to explicitly control for many factors that simultaneously affect the dependent variable. Because multiple regression test for many explanatory variables, we can get results where a simple regression would be misleading. The more variables we add to the regression, the more of the variation in y can be explained (Wooldridge, 2014, s. 57). A simple example of a regression model can be shown as follows:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u, \quad \text{where}$$

β_0 is the intercept.

β_1 measures the change in y with respect to x_1, ceteris paribus

β_2 measures the change in y with respect to x_2, ceteris paribus

u is the *error term* or *disturbance* in the relationship and it represents other factors than x that affect y (Wooldridge, 2014, s. 19). The regressions for this thesis have been done in Microsoft Excel.

5.3 Mann-Whitney output

First, we want to determine whether there are significant differences between the groups. To conclude with that, the p-value has to be smaller than 0,05 when using a confidence 95 %. If this is the case, we can reject the null hypotheses, and conclude with differences between the two groups.

	Bet part 1	Bet part 2
Mann-Whitney U	218,5	194,5
Wilcoxon W	408,5	384,5
Z-value	-0,454	-1,03
P-value	0,65	0,303
Standard deviation	14,803	16,795
Observations	44	
Groups	Control group vs. Treatment group	

Table 3. *Mann-Whitney test*

As we can see from table 3 the Mann-Whitney test shows that there is *no* significant difference between the two groups in the first part, as the p-value is 0,65. This is important because we can then state that both groups had the same basis for the decision made in part 2. Only then can I conclude with different behavior in the second part. However, as we can see, the p-value in for the bet in part 2 is 0,303 and therefore not significant either. This means that there is no significant difference between the two groups in part 2 either.

For reasons I will come back to in the next chapter, I therefore decided to exclude some variables that might have created noise to the results. The remaining number of participants was now 37, and the new Mann-Whitney test gave the following results:

	Bet part 1	Bet part 2
Mann-Whitney U	116,5	99,5
Wilcoxon W	252,5	235,5
Z-value	-1,593	-2,124
P-value	0,111	0,034
Standard deviation	12,157	14,348
Observations	37	
Groups	Control group vs. Treatment group	

Table 4. *Mann-Whitney test, n=36*

Now we can see that the p-value for the bets in part 2 is 0,034 and therefore significant. We can keep the null hypotheses for no differences in part 1, because the p-value is still greater than 0,05 and we can still state that they had the same basis for decisions made in part 2. Also, we can reject the null hypotheses for no differences in part 2, and state that there is a significant change in behavior from the Control Group to the Treatment Group.

5.4 Regression output

In this chapter I will look to see if there are any significant differences between the Control Group and the Treatment Group using regression. By the help of a regression analysis, we can test to see if this is true and which of the hypotheses to keep. The function that has been used is the following:

$$Bet\ part\ 2 = \beta_0 + \beta_1 \text{ x } bet\ part\ 1 + \beta_2 \text{ x } relation + \beta_3 \text{ x } gender + \beta_4 \text{ x } age + \beta_5 \text{ x } income + \beta_6 \text{ x } nationality + \beta_7 \text{ x } studies$$

- Dependent variable y = amount bet in part 2
- Independent variables:
    - X_1 – *Bet part 1*: The amount the participants bet in part 1
    - X_2 – *Relation:* Dummy variable. Take the value 1 if the participants bet on behalf of a close relation, or 0 if the participant bet on behalf of an unknown participant in the room.
    - X_3 – *Gender:* Dummy variable. Take the value 1 if the participant is male, or 0 if the participant is female.
    - X_4 – *Age*
    - X_5 – *Income*
    - X_6 – *Nationality:* Dummy variable. Take the value 1 if the participant is Norwegian, or 0 if the participant is of any other nationality.
    - X_2 – *Studies:* Dummy variable. Take the value 1 if the participant is study Business Administration, or 0 if the participants study something else.

Dependent variable	Bet part 2		
Independent variables	Unstandardized B	Std. Error	P-value
Intercept	21,674	15,324	0,166
Bet part 1	0,720	0,143	0,000
Relation	-3,298	4,042	0,420
Gender	-3,626	4,292	0,404
Age	-0,704	0,510	0,176
Income	0,000	0,000	0,048
Nationality	-6,738	5,038	0,189
Studies	0,485	4,696	0,918
Observations		44	
R2		0,518	

***Table 5**. Regression analysis*

For my hypotheses to be true, then the variable *Relation* needs to have a p-value lower than 0,05 for it to be considered statistically significant. As we can see from table 5, this is not the case here, because the p-value is 0,503, ten times larger than it needed to be. This means that it is not possible to say that that the Treatment Group took less risk than the Control group in part 2.

After getting these results, I decided to exclude the participants that bet NOK 50 in both part 1 and part 2 or bet NOK 0 in both part 1 and part 2. These participants all stated that they were doing it for the fun of it, that they did not already have this money at hand, or that they would not have behaved the same with their own money. If it were not for the reasons they had for doing so, I would not exclude them. I therefore assumed that the experiment did not affect them in any way, they had a predetermined mind about their decision regardless of what it meant to bet on behalf of another person. Because of the statements they did about their behavior, one could assume that they would behave differently with their own money. The remaining number of participants after excluding these participants was 37.

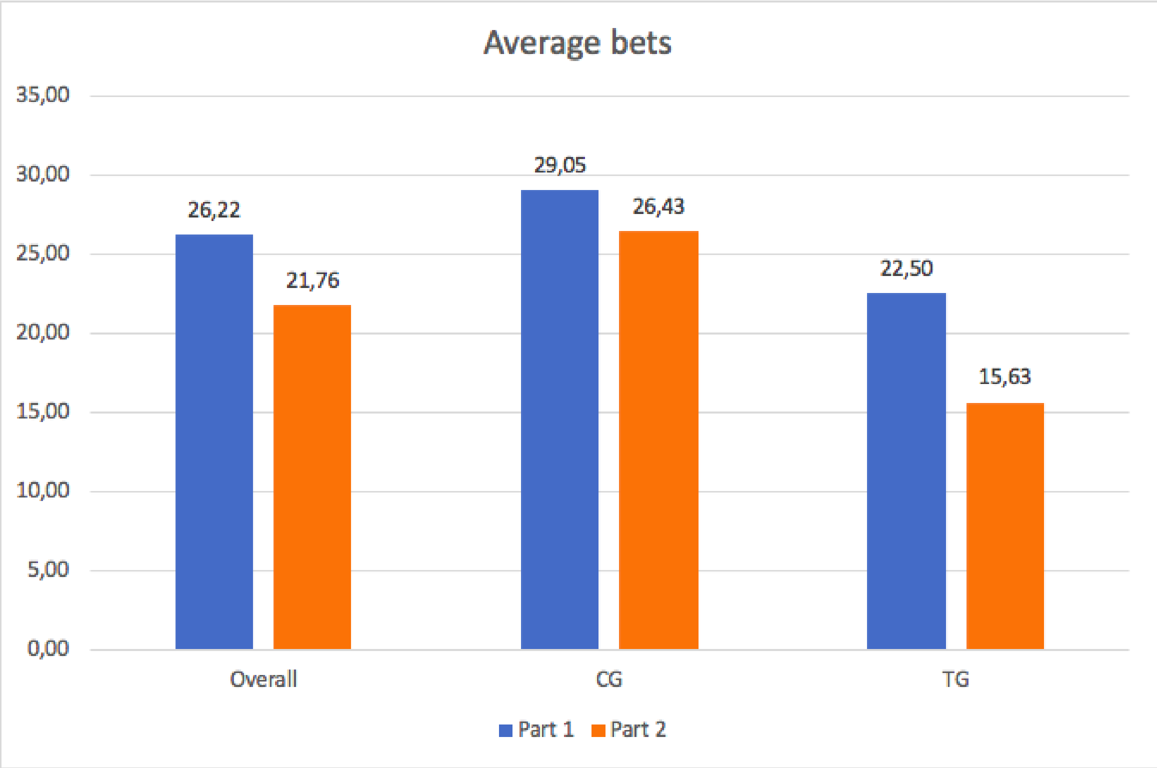

Figure 5. *Average bets*

Figure 5 shows the average bet by the 37 participants in the two groups and overall in part 1 and part 2. There is no doubt that the average indicates a decrease in bets in both the Control Group and the Treatment Group. More importantly, it is necessary to figure out if there are any significant difference in the behavior of the two groups. I therefore did the regression again, with 37 participants, and the new regression output gave the following results:

Dependent variable	Bet part 2		
Independent variables	Unstandardized B	Std. Error	P-value
Intercept	44,020	14,163	0,004
Bet part 1	0,233	0,170	0,182
Relation	-9,671	3,956	0,021
Gender	-8,447	3,975	0,042
Age	-0,972	0,448	0,038
Income	0,000	0,000	0,002
Nationality	-10,798	4,684	0,029
Studies	-0,582	4,202	0,891
Observations	37		
R2	0,550		

Table 6. *Regression analysis, n=37*

As we can see from table 6, the dummy variable *Relation* is now significant with a p-value of 0,036. It has a negative coefficient value of -9,01, meaning that when the variable takes the value 1, i.e. for those in the Treatment Group, it has a negative effect on the bet in part 2. If we allow this, there is now proof that the people in the Treatment Group had a greater decrease in bet from part 1 to part 2 than the Control group and we can reject the null hypotheses; *H_{01}: People tend to take the same amount of risk on behalf of people in close relation to them, as they do to people they do not know*. Not only is *Relation* significant, but five of the other independent variables do also have a significant effect on the bet in part 2.

5.5 Other results

In this chapter I will present other significant findings. As the research within the question of this thesis is very limited, I also decided to look at the effect of betting on behalf of others as this has been more researched. I did a regression to determine whether there was a significant difference between the bets in part 1 and 2. I set *Bet part 2* as the dependent variable, and instead of the independent variable *Bet part 1* I added a variable with the difference in the bets from part 1 to part 2 called *Difference in bet.*

Dependent variable	Bet part 2		
Independent variables	Unstandardized B	Std. Error	P-value
Intercept	33,386	16,513	0,051
Difference in bet	-0,658	0,175	0,001
Relation	-1,562	4,507	0,731
Gender	-1,151	4,794	0,812
Age	-0,177	0,579	0,762
Income	0,000	0,000	0,420
Nationality	0,197	5,713	0,973
Studies	-9,063	4,974	0,077
Observations	44		
R2	0,409		

***Table 7**. Regression, difference in bet*

As we can see I have done the regression with all the 44 participants and the p-value is 0,002 and therefore significant. I also did the same regression with 37 participants (not included in appendix), and the p-value was also here 0,001. The value of the variable *Difference in* bet is negative. Because the variable is *Bet part 1* minus *Bet part 2*, it means that the participants on average bet less in part 2 and the result is statistically significant.

As we have seen from figure 6, both of the groups actually bet less in part 1 than in part 2. The difference in bet is of course larger for the Treatment Group, which corresponds to the regression results in chapter 5.4. Because the results showed a significant difference in decrease between the two groups I wanted to look at what the participants believed about other participant's bets. 36 participants answered the question about beliefs in the questionnaire.

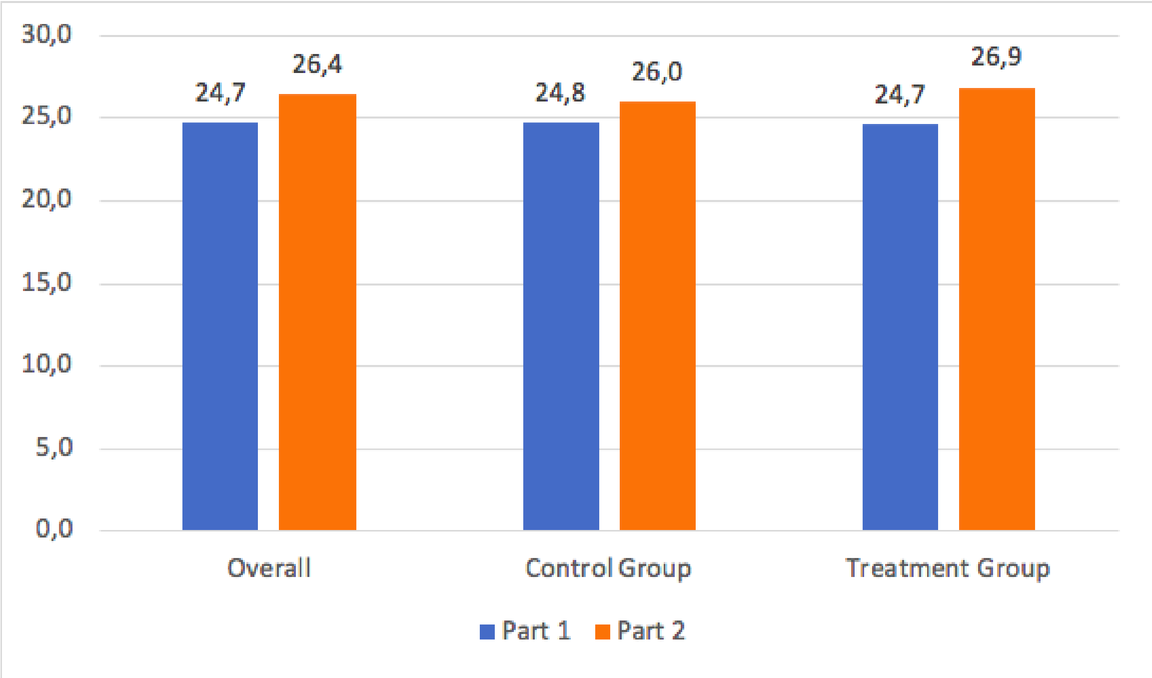

Figure 6. *Participant's belief about other participant's betting behavior.*

From figure 7 we can see that both groups on average believed that the other participants took more risk in part 2 than in part 1. But as shown in figure 5 and table 7, both groups actually on average bet less in the second part. This is also true for 37 observations. The responses among the participant's beliefs are varied, with participants believing others bet everywhere from NOK 25 less in part 2 and NOK 30 more. However, the average belief is that others bet NOK 2,7 more in part 2 than in part 1. 16 out of the 36 participants who answered this question in the questionnaire believed other participants bet more in part 2, whereas 8 believed others bet the same and 12 believed others bet less. To look at the significance the belief had on the bet in part 2, I did a regression where I tested this. Because only 36 of the participants answered this question, the number of observations is here 36. The following regression was done:

$$\textit{Bet part 2} = \beta_0 + \beta_1 \textit{ x bet part 1} + \beta_2 \textit{ x difference in belief}$$

where X_2 – *difference in belief* is the difference in belief of other participant's bet in part 1 and part 2. It holds a negative value if the participant thought others bet more in part 2, and a positive value if they believed the others bet less in part 2.

Dependent variable	Bet part 2		
Independent variables	Unstandardized B	Std. Error	P-value
Intercept	-0,759	4,303	0,861
Bet part 1	0,811	0,132	0,000
Difference in belief	-0,498	0,145	0,002
Observations		36	
R2		0,568	

Table 8. *Regression, difference in bets*

As we can see from table 8. the participants belief about other participants decisions do have a significant effect, with a p-value of 0,002, on their own behavior towards the bets. This means that people tend to bet more in part 2 if they believe others do the same, and opposite.

6.0 Discussion

In this chapter I will discuss the findings from the analysis in chapter 5, and tie that together with the theory in chapter 2. I will first discuss the findings that directly answer the hypotheses, before I discuss other interesting findings. Because the existing theory behind this theory is very limited, the first part will be shorter. I will therefore spend some time to discuss other findings.

6.1 Hypotheses

One could argue that removing some of the participants from the sample is a violation of the results. I would not have done that, had they not stated that this was money they did not care about and so on, because this indicates that they would not have done the same thing in a natural environment. One thing that makes me think it was right to leave out the participants when doing the second regression, is that so many of the other variables, as well as *Relation*, was significant after doing so. We then see significance in *Gender*, *Age*, *Income* (even though the beta-value is 0,000), and *Nationality*, which proves that these have effect on the bet in part 2. This could indicate that the removed participants behaved randomly and created noise to the results.

I believe that if this research should be duplicated then the sample should be larger, because this could potentially eliminate this possible noise. That is however based on a belief that relation does have an effect on risk taking on behalf of others, which might as well be wrong. Only further research will confirm or deny this subjective belief.

6.2 Other findings

6.2.1 Bet on behalf of others

As we know, research in the field of taking risk on behalf of others have been mixed, whereas some find that individuals tend to take more risk and others find that individuals tend to take less risk. In this experiment I find that people take less risk on behalf of others and this is true when doing a regression with both 37 and 44 participants. The fact that these results are so varied show that there are other factors that also contribute to our decision on what risk level to choose on behalf of others. However, what is interesting is that four other experiments done at the University of Stavanger (Eriksen & Kvaløy, 2010; Eriksen et al., 2017; Høvring & Pham, 2014; Haavik & Zeiler, 2010) have found the same results, which would indicate that, that is the standard for this population; young students with a relatively low income.

Another thing that is interesting with the results is that not only the participants in the Treatment Group on average bet less in part 2, but the Control Group as well. The latter even knew that they would never learn the identity of the person they bet on behalf of, but still decided to do so. As well as that, they knew that the decisions they made would not have an effect on their own bet, so in reality they were able to separate the two decisions completely. This is interesting because it is completely opposite of the results Chakravarty et. al (2011) got. They found that when taking risk on behalf of anonymous others, people show less risk aversion relative to oneself.

6.2.2 Irrationality

In expected utility theory one is expected to choose the alternative that yearns the highest possible payoff given the probability, and that is in accordance with the axioms as mentioned in 2.1.1.1. However, in this experiment the expected payoff for betting is lower than the expected payoff for keeping all of the money. It is therefore never rational to choose to bet. Let's say you do not bet anything, then the guaranteed payout is NOK 50. If you however decide to bet NOK 50, then the expected payoff would be: 125 * 1/3 = 41,67, which is lower than the guaranteed payout for not betting.

One participant actually pointed this out in the questionnaire, but still decided to bet in both rounds. This participant was in the Control Group and bet NOK 40 for himself and NOK 10 on behalf of another person in the room Regarding the decision in part 2, he said he wanted the best for the person he did not know but bet on behalf of, but 10 because he wanted him or her to have a little excitement. He reasoned his decision in part 1 with saying he did it for the fun of it. Also, he stated that he usually almost never bets himself, and the fact that he bet 80 % of what he was given here is an example of mental accounting. This was not money that he already had in his pocket, so he felt that he had nothing to lose from it.

When Gneezy & Potter did the same experiment, they also found that presence of mental accounting. They did it in two groups whereas one of the groups, Treatment L, had to take risks for three rounds at the time before the results were known, and the other group, Treatment H, got to know the results after each round (Gneezy & Potters, 1997, s. 634). What happened was that Treatment L ended up betting more money than Treatment H. The sample in my experiment can be compared to Treatment L, because the participants had to bet for both parts before getting the results. What Gneezy & Potter saw, was an example of mental accounting where the participants ended up betting a larger amount than they would have, because it was money that they did not originally have. Many participants in my experiment reasoned their bets with arguing that they did as they did for the fun of it, or that even though they bet a certain amount they could still afford an ice cream and so on. This means that we do see the same effect of the mental accounting in this experiment as Gneezy & Potter did. It would have been interesting to see if the same thing happened to participants if they had to choose from money they already had in their pocket. The problem with mental accounting could also be solved by doing a similar research in the field.

Another way of describing this irrational behavior is the possible presence of the house money effect. Very few participants stated in the questionnaire that they bet more often than every year. However, the average amount bet per participant would suggest otherwise. The behavior of the participants after receiving NOK 50 can be compared to the behavior of the guy at the casino in chapter 2.4. He was more willing to take a larger risk after winning money than he usually would be, and the students in this example ended up betting more than they stated they would normally have done. This was money that they did not already have, so it was easier to bet. Hence, we may see the house money effect. As a result of this, I believe this is also another example of why this experiment should also be researched in the field, to isolate this effect.

One could argue that not all participants actually understood that the expected payoff was lower for placing bets, and this was confirmed by some of the participants stating that «they felt the odds were good». If this was the case, then we could at least expect from expected utility theory that the students who study Business Administration would behave differently. This because one could assume that those students know how to calculate expected payoff from the assignment. As we know, there was no significant difference between the students in this field of study and the others, so this confirms that people did behave irrationally.

The fact that the participants seemed to change behavior during the experiment, meaning that the average amount bet changed from part 1 to part 2, is a violation of the axioms of rational behavior, and also not allowed according to expected utility theory. If you decide to bet a certain amount on behalf of yourself, you should do the same to the person you are taking risk on behalf of. If this is not the case, as is here, it is a clear example of irrational behavior, and one that the participants are also aware of as they actually did bet less in part 2.

All this being said, if all participants behaved rationally according to the expected utility theory, none of them would have bet anything. The prospect theory however, allows the participants to have a subjective probability weighting on the alternatives and different utility functions for gains and losses. If the utility for the participants was greatly larger for betting than not doing so, one could argue that they actually did not behave irrationally. Even though most of them usually did not bet, one could assume that these two bets actually had a greater value to them because the money did not mean too much to begin with.

6.2.3 Other results

When being given the decision of having to choose whether to bet or not, we know the participants have to argue for and against this in their minds. One side of the mind tells them to go safe and not bet anything, but on the other hand they have the chance of winning more money. They solve the problem with the two minds working together using heuristics to find a solution. One could argue that by offering the participants a bet, they could believe that it is actually rational to bet, and that, that is the reason they decide to bet as much as they did. Because of how many stated that they never usually bet, but actually did this here can be a proof of using heuristics to make their decisions.

We know from chapter 2.5 that decisions can be affected by the wording of the task. From Kahneman and Tversky (1972) we see that our mind can trick us to believe that GBGBBG, is more likely than BGBBBB. In this case the possible wins and losses took up just as much space in the payout table which could trick the participants into believing that the outcomes had the same probability. They got to know the probabilities before looking at this, but when too much information is given at once, our minds can take shortcuts into believing other things.

Whether or not this affected the results is unknown. However, by seeing some of the participants state in the questionnaire that they usually did not bet, but felt the odds were good in this one, makes me believe this is true for this experiment. There is no doubt that the odds for winning were lower than the odds for losing. The fact that so many risk-averse, according to themselves, actually did bet, can be an indication of heuristics being used by the participants.

I got to isolate the effect of overconfidence, because I did not roll the dice before the decision in both rounds was made. Had I chosen to roll the dice directly after part 1, we may have seen that the people who won in part 1 would on average bet more in part 2. This was done intentionally, because I strictly wanted to see the change from part 1 to part 2 when including betting on behalf of someone else, holding all else equal. This is however something that may be relevant if we are looking at this from a natural environmental perspective. In the real world, people that work in situations where they have to take risk on behalf of other people do have past experiences that may influence the choices they make. For example, if a fund manager has had positive previous experiences with investing in a certain way, he may continue to do so because he had good results with this earlier. We know that people that are affected by overconfidence may take larger risk after experiencing a "win". This makes the results of this thesis hard to directly transfer to the real world.

We know that there is evidence of people having an illusion of control when it comes to rolling dices. Even though this has not been tested directly in this task, we know that people showed a tendency of being more risk-seeking in this experiment than they otherwise are. This could indicate that there is a sense of underlying belief that the dice will roll in their favor. However, I do not believe that this was the deciding factor for the decision to bet, even though it may have affected the results in a small insignificant way.

6.2.4 Other results

On average, the participants believed that others bet NOK 2,7 more in part 2 than in part 1, which is quite the opposite of what the results actually show with a decrease in bet of NOK 2,3. This indicates that people think others are less risk averse than themselves. I also find that the belief about others has a significant effect on the bet in part 2. This means that people tend to bet less if they think others bet less, and more if they think other participants bet more. This also corresponds to what Füllbrunn and Luhan (2015) found when taking risk on behalf of clients.

What is interesting is that as much as 11 out of the 13 participants who bet more in part 2 than in part 1, believed that others bet more. *All* of these 11 stated that it was easier to bet with other people's money. This indicates that there is a distinct difference between the participants who bet more, and those who bet less, because the participants who bet less usually argued that they wanted the other person to be left with something.

Harrison & Rutström (2008) found that people tend to be more risk averse in laboratory experiments. However, even though this was not tested for in this experiment, based on the responses of the participants in the questionnaire it seemed that they actually were more risk-seeking than usual. Only a few of the participants responded that they bet more often than every year, which indicates that even those who usually did not bet, were more risk-seeking in this experiment.

6.3 Limitations to the experiment

I have decided to dedicate an own chapter to this, because I believe this area of research should be looked further in to. This experiment has some clear limitations that should be addressed because they may have affected the results. Some limitations are easy to detect, whereas others might just be speculation. For example, several subjects in this experiment stated in the questionnaire that they bet more than they would have done “in the real world” because the stakes were low, and they bet on money they did not already have. Even though we do not know to what extent, we can say that this have affected the results because of the confirmation of the participants themselves.

Another thing that is not as easy to detect, is whether or not I was able to create the feelings that are connected to making a decision on behalf of someone in close relation, and if the distinction between the Control Group and the Treatment Group was as it is in the real world. Here, the participants bet on behalf of someone in relation to them that was completely unaware of the situation and who was not present in the room. Some stated that the person they chose as a close relation did not know about the experiment, so they could bet more. In the real world, when one is taking risk on behalf of someone else, that person is usually aware of it. The participants who bet more because they knew the person in close relation to them was unaware of it, may have done differently if this was not in the laboratory.

The number of participants might also be a limitation. Gneezy & Potter (1997, s. 636), who created the design for the experiment, also state that because of the small stakes involved in the experiment, the effects are likely to be small. I could have chosen to pay the participants less to get more results out of the budget. However, I was afraid that by guaranteeing less than NOK 50 in each part would lead people to take even greater risk, because the amount would have been too little to be significant for the participants. Some participants already state in the questionnaire that the amount was insignificant.

Some of the participants also stated that this was money they did not already have, so that betting them in the lottery did not even matter that much. If they were betting with their own hard-earned money, with a larger amount, we might not have seen that many participants choosing to gamble with it, or if, maybe to a lower degree.

The selection of people may also not be representative for the rest of the population. Students usually do not have as many financial commitments as the general public, like mortgages and a family. This may lead to them taking a higher risk because they do not necessarily need the money for things that are that significant.

7.0 Conclusion

The purpose of this thesis was to find if relation has any effect when taking risk on behalf of others. However, the conclusion to this thesis is somewhat two-sided. On one side one could say that the results show that there is significance to the variable *Relation*, meaning that people do take less risk on behalf of someone in close relation, relative to someone they do not know. On the other hand, one could say that leaving some participants out is a violation of the experiment. I choose to rely on *all* of the data that is collected and will say that the results show no significant difference, and so we should reject *H_1: People tend to take more or less risk on behalf of people in close relation to them, than they do to people they do not know.* However, I do believe that this is caused by limitations to the experiment.

The results from the regression also show that there is significant difference in how people bet on behalf of themselves, relative to others. There is a significant decrease in average bets from part 1 to part 2, meaning that people tend to be more risk-averse with other people's money than their own. This corresponds to similar results found with students at the University of Stavanger. Further, we see that the participants belief about other participant's betting behavior do affect their own bets significantly. This means that participants who believed others bet more in part 2 also bet more, and opposite.

There is also evidence of irrational behavior in this experiment. The participants in this experiment violate the axioms of rational choice and use heuristics to make shortcuts in order to make decisions. This is especially visible when we look at the difference in bets from part 1 to part 2, where this should be zero according to expected utility theory.

The experiment has some clear limitations that should be taken into consideration if this research was to be duplicated. This has probably affected the result, and I strongly believe that the research should be done again to be able to compare, not only as a laboratory experiment, but also in the field.

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APPENDIX

A – Control Group

Introduction: part 1

Welcome to this experimental study on risk preference. The experiment will last about 30 minutes. It is a simple experiment with two parts, plus some additional general questions at the end. Please note that you are not allowed to talk to anyone during the experiment. You will receive payment at the end of the experiment, and the money is yours to keep.

Right now, you have a guaranteed payout from this part of NOK 50. However, you can choose to take part in a lottery in which you can both win or lose this money. The payment you receive is dependent on the decision you make. You can choose freely how much you want to invest out of the NOK 50 you are given in the following lottery:

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet.

At the very end the experiment we will roll a dice with 6 sides on it for each one of you. If the dice lands on 1, 2, 3 or 4 you lose the money invested, but if the dice lands on 5 or 6 you win two and a half times the amount you bet.

You can now open the envelope with the number 1 on it. Choose one out of the options by crossing out the circle next to it. You have 5 minutes to make your decision and when you are done, put the paper back into the envelope. You cannot change this decision after this part is done. The table given to you illustrates the payout you will receive depending on which investment option you choose, whether you win or lose.

Please raise your hand if you have any questions.

Part 1: Decision Sheet

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet. You lose if the dice shows 1, 2, 3 or 4, and win if the dice shows 5 or 6.

The table illustrates the payout options depending on the bet you make

Bet	Payout if dice shows 5-6	Payout if dice shows 1-4
0	50	50
5	57,5	45
10	65	40
15	72,5	35
20	80	30
25	87,5	25
30	95	20
35	102,5	15
40	110	10
45	117,5	5
50	125	0

Which option do you choose?

- Bet 0.
- Bet 5.
- Bet 10.
- Bet 15.
- Bet 20.
- Bet 25.
- Bet 30.
- Bet 35.
- Bet 40.
- Bet 45.
- Bet 50.

Instructions: part 2

Right now, someone else in this room has a guaranteed payout from this part of NOK 50. However, you can choose to take part in a lottery in which he or she can both win or lose this money. You will not learn the identity of each other, and the payment this person receives is dependent on the decision you make. You can choose freely how much you want to invest on behalf of this person out of the NOK 50 you are given in the following lottery:

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet.

At the very end the experiment we will roll a dice with 6 sides on it for each one of you. If the dice land on 1, 2, 3 or 4 that person loses the money invested, but if the dice lands on 5 or 6 that person wins two and a half times the amount you bet.

You can now open the envelope with the number 2 on it. Choose one out of the options by crossing out the circle next to it. You have 10 minutes to make your decision and answer the questions on the back of the paper. When you are done, put the paper back into the envelope. You cannot change this decision after this part is done. The table given to you in the envelope illustrates the payout you will receive depending on which investment option you choose, whether you win or lose.

Please raise your hand if you have any questions.

Part 2: Decision Sheet

You have a chance of 2/3 (67%) to lose the amount you bet on behalf of this person and a chance of 1/3 (33%) to win two and a half times the amount you bet on behalf of this person. He or she loses if the dice shows 1, 2, 3 or 4, and wins if the dice shows 5 or 6.

The table illustrates the payout options depending on the bet you make

Bet	Payout if dice shows 5-6	Payout if dice shows 1-4
0	50	50
5	57,5	45
10	65	40
15	72,5	35
20	80	30
25	87,5	25
30	95	20
35	102,5	15
40	110	10
45	117,5	5
50	125	0

Which option do you choose?

- ○ Bet 0.
- ○ Bet 5.
- ○ Bet 10.
- ○ Bet 15.
- ○ Bet 20.
- ○ Bet 25.
- ○ Bet 30.
- ○ Bet 35.
- ○ Bet 40.
- ○ Bet 45.
- ○ Bet 50.

General questions. Answers are kept strictly confidential.

Please say a few words about the decision you made in part 2. Why did you choose the option you did?

____
____
____
______

How much do you believe the other people in the room bet in part 1:

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50

How much do you believe the other people in the room bet in part 2:

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50

Please tell me, in general, how willing you are to take risks. Please use a scale from 0 to 10, where 0 means you are "completely unwilling to take risks" and a 10 means you are "very willing to take risks". Circle around your answer:

Completely unwilling to take risk									Very willing to take risks	
0	1	2	3	4	5	6	7	8	9	10

What is your annual income (including scholarships/money from Lånekassen)?

- Less than 100.000
- Between 100.000-200.000
- Between 200.000-300.000
- Between 300.000-400.000
- Between 400.000-500.000
- More than 500.000

Gender:

- Male
- Female

Age:

- ________________________

Field of study:

- ________________________

Political preferences

- ________________________
- I do not want to answer this question

Religion

- Christian
- Muslim
- Hindu
- Jew
- Agnostic
- Atheist
- Other:___________________
- I do not want to answer this question

How often do you bet money on sports games/play the lottery etc.?

- Every day
- Every week
- Every month
- Once every 6 months
- Once every year
- Never

Nationality

- Norwegian
- Other (specify): ___________________

Do you have Vipps?

- Yes. Phone number_________________
- No, I want to be paid in cash.

B – Treatment Group

Introduction: part 1

Welcome to this experimental study on risk preference. The experiment will last about 30 minutes. It is a simple experiment with two parts, plus some additional general questions at the end. Please note that you are not allowed to talk to anyone during the experiment. You will receive payment at the end of the experiment, and the money is yours to keep.

Right now, you have a guaranteed payout from this part of NOK 50. However, you can choose to take part in a lottery in which you can both win or lose this money. The payment you receive is dependent on the decision you make. You can choose freely how much you want to invest out of the NOK 50 you are given in the following lottery:

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet.

At the very end the experiment we will roll a dice with 6 sides on it for each one of you. If the dice lands on 1, 2, 3 or 4 you lose the money invested, but if the dice lands on 5 or 6 you win two and a half times the amount you bet.

You can now open the envelope with the number 1 on it. Choose one out of the options by crossing out the circle next to it. You have 5 minutes to make your decision and when you are done, put the paper back into the envelope. You cannot change this decision after this part is done. The table given to you illustrates the payout you will receive depending on which investment option you choose, whether you win or lose.

Please raise your hand if you have any questions.

Part 1: Decision Sheet

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet. You lose if the dice shows 1, 2, 3 or 4, and win if the dice shows 5 or 6.

The table illustrates the payout options depending on the bet you make

Bet	Payout if dice shows 5-6	Payout if dice shows 1-4
0	50	50
5	57,5	45
10	65	40
15	72,5	35
20	80	30
25	87,5	25
30	95	20
35	102,5	15
40	110	10
45	117,5	5
50	125	0

Which option do you choose?

- Bet 0.
- Bet 5.
- Bet 10.
- Bet 15.
- Bet 20.
- Bet 25.
- Bet 30.
- Bet 35.
- Bet 40.
- Bet 45.
- Bet 50.

Instructions: part 2

Right now, someone in close relation to you has a guaranteed payout from this experiment of NOK 50. However, you can choose to take part in a lottery on behalf of this person in which he or she can both win or lose this money. You can choose whether this person is your best friend, a parent or a sibling for example, and we will pay him or her when this experiment is over. We will tell you how this is done when we are finished. You can choose freely how much you want to invest on behalf of this person out of the NOK 50 you are given, in the following lottery:

You have a chance of 2/3 (67%) to lose the amount you bet and a chance of 1/3 (33%) to win two and a half times the amount you bet.

At the very end the experiment we will roll a dice with 6 sides on it for each one of you. If the dice land on 1, 2, 3 or 4 that person loses the money invested, but if the dice lands on 5 or 6 that person wins two and a half times the amount you bet.

You can now open the envelope with the number 2 on it. Choose one out of the options by crossing out the circle next to it. You have 10 minutes to make your decision and when you are done, put the paper back into the envelope. You cannot change this decision after this part is done. The table given to you in the envelope illustrates the payout you will receive depending on which investment option you choose, whether you win or lose.

Please raise your hand if you have any questions.

Part 2: Decision Sheet

You have a chance of 2/3 (67%) to lose the amount you bet on behalf of this person and a chance of 1/3 (33%) to win two and a half times the amount you bet on behalf of this person. He or she loses if the dice shows 1, 2, 3 or 4, and wins if the dice shows 5 or 6.

The table illustrates the payout options depending on the bet you make

Bet	Payout if dice shows 5-6	Payout if dice shows 1-4
0	50	50
5	57,5	45
10	65	40
15	72,5	35
20	80	30
25	87,5	25
30	95	20
35	102,5	15
40	110	10
45	117,5	5
50	125	0

Which option do you choose?

- ○ Bet 0.
- ○ Bet 5.
- ○ Bet 10.
- ○ Bet 15.
- ○ Bet 20.
- ○ Bet 25.
- ○ Bet 30.
- ○ Bet 35.
- ○ Bet 40.
- ○ Bet 45.
- ○ Bet 50.

General questions. Answers are kept strictly confidential.

Please say a few words about the decision you made in part 2. Why did you choose the option you did?

____
____
____
______

What was your relation to the person you chose in part 2:

____

How is that person`s personal finances:

- Very good
- Good
- Poor
- I do not know

How much do you believe the other people in the room bet in part 1:

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50

How much do you believe the other people in the room bet in part 2:

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50

Please tell me, in general, how willing you are to take risks. Please use a scale from 0 to 10, where 0 means you are "completely unwilling to take risks" and a 10 means you are "very willing to take risks". Circle around your answer:

Completely unwilling to take risk									Very willing to take risks	
0	1	2	3	4	5	6	7	8	9	10

What is your annual income (including scholarships/money from Lånekassen)?

- Less than 100.000
- Between 100.000-200.000
- Between 200.000-300.000
- Between 300.000-400.000
- Between 400.000-500.000
- More than 500.000

Gender:

- Male
- Female

Age:

- ________________________

Field of study:

- ________________________

Political preferences

- ________________________
- I do not want to answer this question

Religion

- Christian
- Muslim
- Hindu
- Jew
- Agnostic
- Atheist
- Other:___________________
- I do not want to answer this question

How often do you bet money on sports games/play the lottery etc.?

- Every day
- Every week
- Every month
- Once every 6 months
- Once every year
- Never

Nationality

- Norwegian
- Other (specify): ___________________

Do you have Vipps?

- Yes. Phone number_________________
- No, I want to be paid in cash.

C – Mann-Whitney output

Software used; IBM SPSS Statistics

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Bet part 1	44	27,73	14,803	0	50
Bet part 2	44	23,98	16,795	0	50
Group	44	1,43	,501	1	2

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
Bet part 1	1	25	23,26	581,50
	2	19	21,50	408,50
	Total	44		
Bet part 2	1	25	24,22	605,50
	2	19	20,24	384,50
	Total	44		

Test Statistics[a]

	Bet part 1	Bet part 2
Mann-Whitney U	218,500	194,500
Wilcoxon W	408,500	384,500
Z	-,454	-1,030
Asymp. Sig. (2-tailed)	,650	,303

a. Grouping Variable: Group

Mann Whitney, 44 observations

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Bet part 1	37	26,22	12,157	5	50
Bet part 2	37	21,76	14,348	0	50
Group	37	1,43	,502	1	2

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
Bet part 1	1	21	21,45	450,50
	2	16	15,78	252,50
	Total	37		
Bet part 2	1	21	22,26	467,50
	2	16	14,72	235,50
	Total	37		

Test Statistics[a]

	Bet part 1	Bet part 2
Mann-Whitney U	116,500	99,500
Wilcoxon W	252,500	235,500
Z	-1,593	-2,124
Asymp. Sig. (2-tailed)	,111	,034
Exact Sig. [2*(1-tailed Sig.)]	,115[b]	,035[b]

a. Grouping Variable: Group

b. Not corrected for ties.

Mann Whitney, 37 observations

D – Regression output

Software used: Microsoft Excel

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,720
R Square	0,518
Adjusted R Square	0,424
Standard Error	12,745
Observations	44

ANOVA

	df	SS	MS	F	Significance F
Regression	7	6281,616	897,374	5,525	0,000
Residual	36	5847,361	162,427		
Total	43	12128,977			

	Coefficients	Standard Error	t-Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	21,674	15,324	1,414	0,166	-9,405	52,753	-9,405	52,753
Bet part 1	0,720	0,143	5,031	0,000	0,430	1,011	0,430	1,011
Relation	-3,298	4,042	-0,816	0,420	-11,495	4,900	-11,495	4,900
Gender	-3,626	4,292	-0,845	0,404	-12,332	5,079	-12,332	5,079
Age	-0,704	0,510	-1,380	0,176	-1,739	0,331	-1,739	0,331
Income	0,000	0,000	2,049	0,048	0,000	0,000	0,000	0,000
Nationality	-6,738	5,038	-1,337	0,189	-16,956	3,480	-16,956	3,480
Studies	0,485	4,696	0,103	0,918	-9,039	10,010	-9,039	10,010

Regression, all variables, 44 observations

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,741
R Square	0,550
Adjusted R Square	0,441
Standard Error	10,729
Observations	37

ANOVA

	df	SS	MS	F	Significance F
Regression	7	4072,807	581,830	5,055	0,001
Residual	29	3338,004	115,104		
Total	36	7410,811			

	Coefficients	Standard Error	t-Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	44,020	14,163	3,108	0,004	15,054	72,987	15,054	72,987
Bet part 1	0,233	0,170	1,367	0,182	-0,115	0,581	-0,115	0,581
Relation	-9,671	3,956	-2,445	0,021	-17,761	-1,580	-17,761	-1,580
Gender	-8,447	3,975	-2,125	0,042	-16,577	-0,316	-16,577	-0,316
Age	-0,972	0,448	-2,171	0,038	-1,887	-0,056	-1,887	-0,056
Income	0,000	0,000	3,450	0,002	0,000	0,000	0,000	0,000
Nationality	-10,798	4,684	-2,305	0,029	-20,379	-1,218	-20,379	-1,218
Studies	-0,582	4,202	-0,138	0,891	-9,176	8,012	-9,176	8,012

Regression, all variables, 37 observations

E – Regression, other findings

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,640
R Square	0,409
Adjusted R Square	0,295
Standard Error	14,105
Observations	44

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	4966,569	709,510	3,566	0,005
Residual	36	7162,408	198,956		
Total	43	12128,977			

	Coefficients	*Standard Error*	*t-Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	33,386	16,513	2,022	0,051	-0,104	66,875	-0,104	66,875
Difference in bet	-0,658	0,175	-3,749	0,001	-1,013	-0,302	-1,013	-0,302
Relation	-1,562	4,507	-0,347	0,731	-10,703	7,579	-10,703	7,579
Gender	-1,151	4,794	-0,240	0,812	-10,873	8,570	-10,873	8,570
Age	-0,177	0,579	-0,306	0,762	-1,351	0,997	-1,351	0,997
Income	0,000	0,000	0,815	0,420	0,000	0,000	0,000	0,000
Nationality	0,197	5,713	0,034	0,973	-11,389	11,783	-11,389	11,783
Studies	-9,063	4,974	-1,822	0,077	-19,150	1,025	-19,150	1,025

Regression, difference in bet

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,753
R Square	0,568
Adjusted R Square	0,541
Standard Error	12,121
Observations	36

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	6365,218	3182,609	21,661	0,000
Residual	33	4848,671	146,929		
Total	35	11213,889			

	Coefficients	*Standard Error*	*t-Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	-0,759	4,303	-0,176	0,861	-9,515	7,996	-9,515	7,996
Bet part 1	0,811	0,132	6,129	0,000	0,542	1,081	0,542	1,081
Difference in belief	-0,498	0,145	-3,429	0,002	-0,793	-0,202	-0,793	-0,202

Regression, difference in belief