Norwegian School of Economics

Bergen, Spring 2013

Are Income Tax Preferences a Moral or a Selfish Choice?

- *An Experimental Approach*

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Master thesis in Finance and International Business

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Summary

An understanding of personal preferences and attitudes is crucial in order to design an income tax system that people find fair. We have examined, by means of an economic experiment, how selfishness, risk preferences and concerns for the equality/efficiency trade-off relate to preferences for progressive taxation. Our results indicate that there is no direct link between selfishness and tax preferences. Nevertheless, the degree of selfishness seems to affect the relationship between the other variables. For people who are not very selfish, both risk aversion and a concern for efficiency correspond with a positive attitude towards progressive taxation. As the degree of selfishness increases, risk preferences and concerns for equality and efficiency become less important. At high levels of selfishness, neither selfishness, risk preferences nor concerns for equality and efficiency seem to explain preferences for progressive taxation. In conclusion, income tax preferences are based on both moral and selfish concerns.

Acknowledgements

We wish to thank The Choice Lab and Shachar Kariv for granting us the opportunity to take part in their experiment. We are especially thankful to Bertil Tungodden, our supervisor, for all guidance and encouragement. Furthermore, we wish to acknowledge those who arranged and assisted in the execution of the experiment: Ranveig Falch and Erik Sørensen, and assistants Kasper Fellkjær, John McGregor, Andreas Olden, Ana Beatriz Aguilar Borges Santos and Kristina Øystese. We would also like to thank Ingrid, Lise and Ingvild's father Stig for valuable comments and proofreading. Finally, we express our gratitude to Ulrik and Hjalmar for emotional support and for listening patiently.

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1. Introduction

Income taxation is a matter of great importance. It concerns a large amount of people, and it has a long history. The general income tax as known and used today was first introduced in Europe in 1799, as a means for the British government to fund its war against the French forces under Napoleon (hmrc.gov.uk). Income tax in the earliest known form, however, has existed as far back as ancient Egypt (Ezzamel, 2012). The issue of income taxation has been granted much attention, and many have attempted through numerous approaches to improve the income tax design.

Despite the long history of income taxation and the large amount of related research, agreement has not been reached regarding what an ideal income tax system is or how it can be identified. Today, most countries have implemented some form of personal income tax, which varies with marginal personal income tax rates between 10 percent in certain Eastern European countries and 59 percent in Aruba (KPMG, 2012). There is great diversity in taxation levels and in the degree of redistribution incorporated in the tax system (KPMG, 2012). In order to analyze the attractiveness of the various systems, we must understand how people evaluate different income tax systems and what their evaluation is based on.

In this thesis we will seek to explore the complexity of tax preferences. We aim at establishing whether income tax preferences are mainly a matter of self-interest, moral considerations or both. Income tax preferences will, in our discussion, be limited to redistribution preferences through progressive income taxation. An increased knowledge of the motivation behind such preferences will take us one step further in understanding how to design an income tax system that people find fair.

1.1 Tax as a trade-off

Discussions on tax systems appear in the media frequently, particularly in times of elections. The debate is usually based upon a common agreement of there being a trade-off in income tax between efficiency and equality. A progressive tax system is assumed to promote equality. A proportional tax rate increases with income, such that those who earn more pay a

higher percentage than those who earn less. This is believed to narrow the gap between the net income of the rich and the poor. However, incentives to work more might decrease among the rich, as the monetary return from work decreases more and more for each additional unit of labor. The result may be that the aggregate work effort decreases. In addition, redistribution is thought to be costly in itself due to increased administrative costs. The direct cost and the disincentivizing effect are assumed to decrease efficiency, and a deadweight loss may occur.

A flat tax rate, on the other hand, is often seen as more efficient and less redistributive. The tax cost is proportional, with the same percentage for all regardless of income. Hence, it does not give benefits to those worse off, other than them paying a lower absolute amount. This type of income tax is therefore not as equality promoting as a progressive tax. It ensures, however, the same incentives for everyone to work more, as everyone keeps the same proportion of their salary for personal consumption and saving. It is thus seen as a system that promotes higher efficiency.

Yet another group of systems is based on regressive tax schedules. Such tax systems involve tax rates that diminish with income, and imply redistribution from the less well off to the wealthy.

The concerns for efficiency and equality are conflicting, and the optimal balance has proven hard to agree upon. Still, the issue of income taxation is more complicated than a simple trade-off. There is no way of defining an ideal system without knowing its objective. Who is it supposed to be ideal for? How do we determine what is ideal for the different stakeholders, i.e. the government, the society and the tax payers? And can we really expect there to be one simple answer, one common ideal solution for every situation, every population and every nation? Several approaches attempting to answer these questions have been tested. We will look into the two main approaches to understanding an income tax system, namely optimal tax theory and political economy tax theory.

1.2 Approaches to understanding income tax systems

The first approach is optimal tax theory (Bergson, 1938; Samuelson, 1947; Arrow, 1951). This approach defines an optimal income tax system as a system that maximizes the social welfare. Social welfare is derived from individual utility, illustrated by a social welfare function $W(1,2,\dots,n)$ where W is social welfare and n is the utility of person n. The social welfare function is then used as a point of departure for the development of optimal tax rules. The government is assumed to be benevolent and thus implement the welfare-maximizing solution.

The social welfare function can take many shapes. The classical utilitarians employ a linear function, assuming that the only concern is maximizing the total utility. The distribution of utility is irrelevant and equality in itself is not a concern (Mill, 1863; Harsanyi, 1955). A non-linear welfare function, on the other hand, allows for a preference for equality (Bergson, 1938; Samuelson, 1947). This means that society can derive more welfare from benefits given to a person who currently has little utility than to someone who is better off. A third variation of the social welfare function is John Rawls' maximin approach. According to his work (1971), social welfare is anchored to the primary goods[1], in economics often interpreted as utility, of the least well off individual. Social welfare can therefore only be increased by increasing this individual's primary goods. A social welfare function can also be elitist, and aim at maximizing the utility of the best-off individual.

The second approach to understanding income tax systems is the political economy tax theory. This approach is usually regarded as a means to understanding how a tax system occurs and which mechanisms decide the tax system. The theory recognizes political election processes as a determinant of the income tax system. The modern democracy grants its citizens the right to vote, and thus gives the people the power to indirectly decide what kind of income tax to implement. An important implication of this approach is the median voter theorem. This theorem states that "a majority rule voting system will select the outcome most preferred by the median voter" (Holcombe, 2006, p. 155). In the case of income taxation, the median voter will be the voter with an income representing the median

[1] "Things that every rational man is presumed to want" (Rawls, 1971, p. 9)

income. Consequently, such a political system is assumed to lead to a progressive tax schedule if the mean income is above the median income, all other things kept equal. This is because more than half of the voters will gain from redistribution as long as the resulting efficiency costs are not too large, and their votes will reflect this at elections. Vice versa, the median voter theorem implies a flat, or even regressive, system if the mean income is below the median.

The two approaches are different in many ways, and they coincide only if the median voter has income tax preferences exactly equal to the social welfare function, which is a highly theoretical case. They do, however, share a common feature in that in order to be precise, they rely on an understanding of the human mind. Both to calculate the total social welfare and to predict the behavior of the median voter, knowledge of what humans derive their utility from is necessary. This relies on a deeper understanding of what motivates humans.

1.3 Human motivation

The standard approach in economics is to assume that humans are self-interested. The assumption of self-interest implies that humans will always act in their own interest, as their utility functions are completely independent of everyone else's. As Adam Smith states, "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest" (1776, ch. 2, 2nd paragraph). Self-interest involves both a notion of selfishness related to pecuniary payoff and a notion of personal risk preferences: People are concerned with how much money they get and with the risk involved. The choices such a human makes is the result of a calculation of net payoff to self and the pleasure or displeasure the risk inflicts on him.

This approximation of human behavior, known as Homo Economicus, has been vastly challenged by research in behavioral economics. Behavioral literature can be divided into two separate branches. One branch focuses on irrationality (Camerer, 2003; Ariely, 2008), whilst the other emphases the frequent occurrence of non-selfish behavior (Fehr and Fischbacher, 2002; Charness and Rabin, 2002). The latter includes a concern for other people and for society in general. This approach often involves a notion of right and wrong,

and it suggests that behavior may depend on ethical and moral attitudes in addition to self-interest.

One example of such non-selfish behavior is the concern for equality and efficiency. People differ in their assessment of the equality/efficiency trade-off and in perceptions of which of these concerns will lead to a better and more prosperous society. Some people might be focused on equality, asserting a preference for egalitarian outcomes (Fong, 2001; Ackert, Martinez-Vazquez and Rider, 2007). Others will prioritize efficiency, emphasizing the importance of maximizing the total amount of benefit achieved in society, regardless of distribution (Charness and Rabin, 2002; Engelmann and Strobel, 2004). Irrespective of stance, this aspect reflects a non-selfish, or moral, concern.

Both the self-interested and the moral concerns can have implications for income tax preferences, defined earlier as preferences for redistribution through progressive income taxation. Suppose that we limit the factors that may affect income tax preferences to the three above-mentioned concerns, namely selfishness, risk preferences and the equality/efficiency trade-off. We will then assume the following implications: First of all, selfish concerns will, in a risk-free world where there are no efficiency concerns, lead to a vote for redistribution in the form of progressive income taxation if personal income is below the mean. This is because a person with income below the mean will have to pay less than the average rate in income tax, at the same time as he, by assumption, receives the same social benefits as everyone else. Secondly, in a risky world with no efficiency concerns, risk aversion will lead to a vote for some redistribution. This is because a risk averse person, regardless of where he is in the present, will fear a possible move downwards in society in the future. By voting for a redistributive tax system, he decreases the negative effect of such a move as the decrease in income is lower in a society where the lower share gets tax "rebates". A progressive tax thus acts as an insurance against a worsening of his life situation. The moral concerns, in our thesis limited to the equality/efficiency trade-off, also have implications. A person who is very concerned with efficiency will be motivated to vote for the most efficient income tax system, which is typically considered to be a flat tax rate. A person who cares more about equality, will be more inclined to vote in favor of a progressive tax. This is because progressive tax schedules are assumed to enhance equality.

When combining the effects of selfishness, risk preferences and equality/efficiency concerns, it is hard to predict the corresponding relationship with income tax preferences. While some effects are assumed to lead to a more positive attitude towards progressive taxation, such as risk aversion and equality concerns, other effects work in opposite directions. If, for example, a person is risk averse but also very concerned with efficiency, it is difficult to say whether he is likely to prefer a flat or a progressive system. The aggregate effect depends on the trade-off between selfish and moral concerns. A natural assumption is that the more selfish a person is, the more weight will be assigned to the self-interested concerns. In this thesis, we will investigate whether this assumption holds, and how the combination of different concerns relates to income tax preferences.

1.4 Our contribution

By observing the choices people make in different choice settings in a lab experiment, we measure selfishness, risk preferences and the equality/efficiency trade-off. Further, we study how these concerns are associated with income tax preferences, measured by a questionnaire conducted in the same lab. Through a systematic approach, we examine which concerns come into play when people make judgments of tax systems. If we find relations between the three concerns and tax preferences, this will be an important step further in understanding these preferences and the motivation behind them. Our results will be a contribution in the search for a welfare function that captures people's true preferences. Our research is correlational, meaning that we search for relationships between variables without being able to determine causality. The experimental design does not allow us to conclude in which direction the effects work. We cannot decide whether for example selfishness affects income tax preferences or vice versa, only whether there is a relationship between the two.

Our research question is as follows:
"Are income tax preferences mainly a reflection of moral or self-interested concerns?"

As for self-interested concerns more specifically, we will investigate whether selfishness is negatively related to the level of support for redistribution and whether risk-averse people have a higher willingness to redistribute. Regarding moral concerns, we will examine if a

stronger preference for efficiency than equality go hand in hand with preferences for a flat income tax system.

This paper is organized as follows. Chapter 2 is a literary review, containing a summary of relevant research in the field of tax optimization and redistribution preferences. Chapter 3 presents the design of the research of this thesis, with detailed descriptions of the experiment structure, and chapter 4 specifies the practical execution. In chapter 5 the data set is analyzed and in chapter 6 it is discussed. Chapter 7 concludes.

2. Literature review

This chapter summarizes some of the most important findings from research on tax preferences and redistribution. We start by presenting the two main approaches in tax theory. The first part deals with optimal taxation, and the second with how political processes determine tax systems. The third part contains research on which factors motivate humans when evaluating redistribution and tax systems. The last part presents empirical findings on tax preferences.

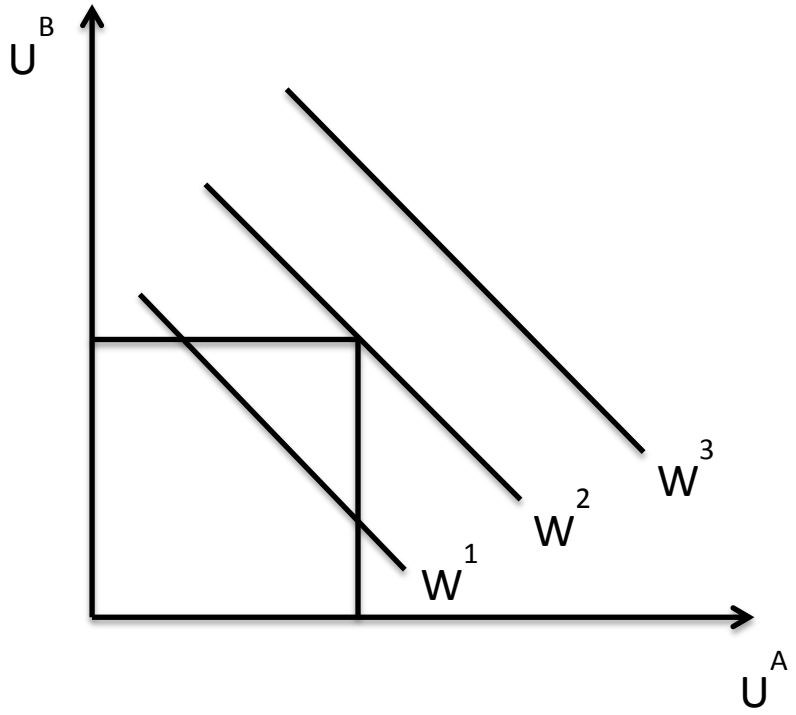
2.1 Optimal tax theory

The basic element in optimal tax theory is the social welfare function. A tax system is optimal only if welfare is maximized according to the welfare function chosen as the basis for the system. This welfare function can take different shapes and thus capture different motifs of taxation and distribution.

The utilitarian social welfare function is probably the social welfare function the most often referred to in discussions of optimal taxation. Utilitarianism was the leading principle of justice for centuries, and it still serves as a basis for many theories on redistribution. Jeremy Bentham (1776) and John Stuart Mill (1863) are considered the founders of modern utilitarianism, and many well-known philosophers and economists, such as Henry Sidgwick (1901) and John Harsanyi (1955), have advocated this view. Utilitarianism builds on the principle of maximizing total utility, and social welfare is maximized when the sum of individual utility in society is maximized. The classical utilitarianism assumes linear indifference curves in the utility space (see figure 1). This implies that the distribution of utility between individuals is irrelevant to the welfare function. The distribution of income, however, is of great importance. Maximum social welfare is achieved only when income is distributed so that the marginal utility of income is the same for all individuals. As Jeremy Bentham (1776, Preface) said, it is “the greatest happiness to the greatest number that is the measure of right and wrong”. One looks to the consequences of any action, weighs its benefits off with its harms and chooses the solution with the highest net benefit. This Benthamite social welfare function is the classical utilitarian $W = \sum_{i=1}^{n} U_i$, where utilities

are unweighted. An income tax system that corresponds with such a welfare function will thus only incorporate redistribution from the wealthy to the less well off when the marginal utility of income for the poor is higher than for the rich, i.e. individual utility is concave in income.

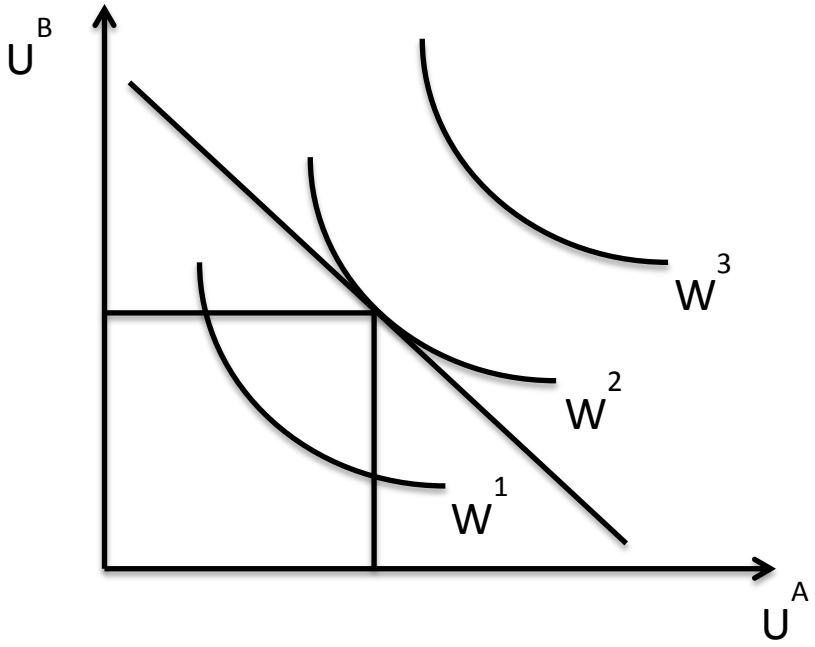
Figure 1. Classical utilitarian social welfare function



Note: Linear social welfare indifference curves for the utility of person A, U^A, and person B, U^B.

In a paper from 1938, Abram Bergson discussed the notion of the social welfare function and introduced the non-linear welfare function $W = W(U^1(x^1), U^2(x^2), \dots, U^H(x^H))$. An illustration can be seen below (figure 2). Samuelson (1947) supported and further developed this theory, now commonly known as the Bergson-Samuelson (B-S) social welfare function. As opposed to the classical utilitarians, the B-S social welfare function is inequality averse in the utility space (Bojer, 2011). One additional unit of utility will lead to a different change in total welfare depending on how much utility the person receiving it already has. Social welfare thus depends not only on aggregate utility, but also on the distribution of utility. Given no change in the total sum of utility, a transfer from a person with high utility to a person with low utility will increase social welfare. For an income tax system based on this function to be optimal, a progressive tax schedule is typically justified.

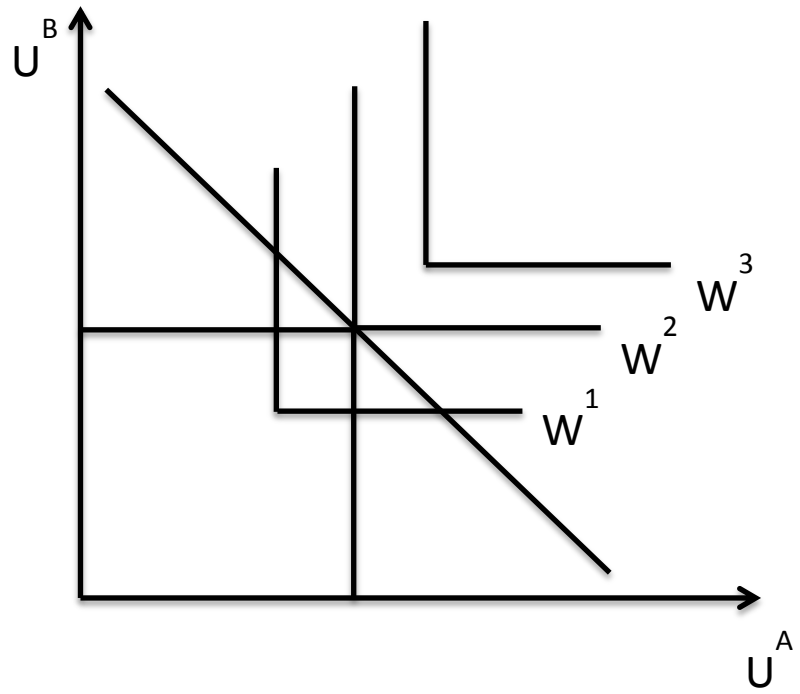
Figure 2. Bergson-Samuelson social welfare function



Note: Convex social welfare indifference curves for the utility of person A, U^A, and person B, U^B.

When John Rawls in 1971 published his "A Theory of Justice", the maximin principle was introduced as the main principle of distributive justice. A maximin social welfare function, $W = \min(U_1, U_2, \dots, U_n)$, implies that welfare is maximized when the utility of the poorest individuals in society is maximized. In a tax system based on this welfare function, a progressive income tax schedule must ensure that all redistribution is channeled towards the least well off. For an illustration of this social welfare function, see figure 3. At the very opposite end of the scale, we find the maximax welfare function in the spirit of the German philosopher Friedrich Nietzsche (Hurka, 2007). This is an elitist welfare function that maximizes the maximum possible result: $W = \max(U_1, U_2, \dots, U_n)$. The alternative with the superior "best case" outcome is chosen, even if this would be at the expense of the expected outcome or the "worst case" outcome. Such a welfare function requires a regressive tax system that redistributes to the individuals with the highest possible maximum utility. An extreme implication of this function is that one person gets everything.

Figure 3. Maximin social welfare function



Note: L-shaped social welfare indifference curves for the utility of person A, U^A, and person B, U^B.

2.2 Political economy tax models

Political economy tax models aim at explaining how voting determines the tax system. In a democratic political economy, it is the government that decides on what tax policies to implement. The government is made up of political parties that have sufficient support among the public. Whether or not a political party receives the necessary support depends on the preferences of the voters. This link between voter preferences and actual tax policies can be described by the median voter theorem (Black, 1948; Downs, 1957).

To illustrate the median voter theorem, imagine a case where an election between two major parties is held. The voters will choose the party whose policies are closest to their preferred policy. Hence the party closest to the preferences of the median voter will get his vote. Since this party is also necessarily closest to the preferences of more than half of the voters, it will

win the election. The party that earns the vote of the median voter will therefore always be the winning party. This is called the weak form of the median voter theorem (Congleton, 2002).

There is also a strong form of the theorem, which states that the median voter's exact preferences will be realized. This relies on the parties being free to choose their own policy position. If so, they will both try to win the median voter by moving their policy positions closer and closer to his preferences. The policy positions will converge towards the median until they coincide and both parties get practically the same number of votes. Assuming that the winning party delivers as promised, the median voter will thus get his exact preferred policy, regardless of who wins the election.

Some assumptions are necessary for the median voter theorem to hold (Black, 1948). The theorem requires that all election alternatives can be placed along a one-dimensional spectrum. In addition, voter preferences must be single-peaked, which means that voters have one preferred outcome and they will choose the alternative that is closest to this outcome. Voters must also always vote for their true preference. Finally, elections must be based on majority election systems.

Although these assumptions are strict, the theorem can to some extent explain how actual tax systems are determined. It can have implications for how the political parties make up their tax policies and which party wins the election. Hotelling noticed this tendency and remarked already in his 1929 article "Stability in Competition" that political platforms seemed to converge during times of elections. The theorem implies for example that a left-wing party will be inclined to moderate its income tax progressivity if it knows that the median voter prefers a flatter system. This is because such moderation will increase its chances of winning. The same inclination to moderate their policy will be seen in a right-wing party. The realized income tax policy will assumably be close to the preferences of the median voter.

2.3 What motivates humans?

Both in identifying the optimal income taxation and in comprehending the mechanisms behind the actual income taxation, an understanding of the factors that motivate human behavior is necessary. Only with this understanding can optimal tax theory and political economy tax models be precise. Thus we need to understand human motivation to create an income tax system that is ideal within the restriction of being politically realizable.

Among others, Fehr and Schmidt (1999), Bolton and Ockenfels (2000) and Charness and Rabin (2002) have developed models that attempt to predict and explain how humans behave in redistributional situations. The hope is "that the insights into the nature of nonself-interested behavior gleaned from experiments can eventually be applied to a variety of economic settings, such as (...) attitudes toward different tax schemes" (Charness and Rabin, 2002, p. 817). In order for this to happen, "the interaction between the distribution of preferences and the economic environment deserves more attention in future research." (Fehr and Schmidt, 1999, p. 856). The usage of the optimal tax theory and the political economy tax models must therefore start with an exploration of the selfish and non-selfish motives that determine individual income tax preferences.

2.3.1 Self-interest motivations

Although the pure Homo Economicus has been challenged as a proxy for human behavior, self-interest is still an important element in modern research on human behavior. There is a large group of researchers who base their models on self-interest (Meltzer and Richard, 1981; Sears and Funk, 1991) and most believe that self-interest is at least one of the main factors when evaluating redistribution and tax systems. In theories of tax preferences, self-interest mainly manifests itself in two ways: payoff and social insurance.

Selfishness

Theoretical work

The payoff aspect of self-interest, here called selfishness, relates to pecuniary payoff and the idea that people will be positive towards tax systems that maximize their own after-tax income. According to Hobbes, humans are motivated first and foremost by selfishness (in

Mansbridge, 1990). In a similar manner, Lord Macaulay (1829) states that acting from selfishness is the only proposition respecting human nature that is absolutely and universally true. Meltzer and Richard (1981) assume exclusively selfish motivation and develop a model based on the following premise: All individuals are fully informed, utility-maximizing individuals who make rational choices based on self-interest. Meltzer and Richard undertake the political economy approach and argue that this way, voters with low income favor higher tax schedules and more redistribution, while voters with higher income prefer lower taxes and less redistribution.

Empirical work

Selfishness as a motivation is supported by several empirical studies. Countless dictator game experiments have established that humans are partly driven by selfishness in economic choice situations (for a review, see Engel, 2011). In addition, research has been conducted on the importance of selfishness when considering redistribution on a societal level. In 2000, Ravaillon and Lokshin conducted a survey gathering opinions about redistribution in Russia. The results showed that support for redistribution was higher among the poor than among the well off. This is coherent with the notion of selfishness in redistribution, as the poor will gain from it, while the rich will suffer the loss. Corneo and Grüner (2002) found supporting evidence from an international survey where they tested the explanatory power of net pecuniary gain on preferences for redistribution. They found that a belief in a personal gain from redistribution had a positive and highly significant impact and strong explanatory power on willingness to redistribute. Similarly, Heinemann and Hennighausen (2010) analyzed data material from the German General Social Survey (ALLBUS) and found that an individual's preferences for progressive taxation are partly determined by selfish concerns.

The papers above all indicate that selfishness matters when making redistributional choices. Pecuniary payoff appears to constitute a non-negligible part of tax preferences and should thus be incorporated into any model of tax preferences. The papers do not, however, exclude that other concerns matter. Using calculations on net pecuniary payoff as the only motivation for human behavior might be practical. However, this is not realistic in all cases and may not always be sufficient to make precise predictions.

Risk

A second implication of self-interest relates to taxation as a means of social insurance. This implication is derived from the fact that progressive tax systems entail redistribution within individuals, from fortunate to unfortunate personal states. This redistribution works as an insurance that guarantees a certain level of welfare regardless of life situation. This way, tax preferences are closely related to risk preferences: A risk averse person will be more in favor of progressivity than a risk neutral or risk seeking person.

Theoretical work

Theoretical work on risk and taxation has generally aimed at examining the societal effects of taxation as social insurance. Diamond, Helms and Mirrlees (1978) study the importance of social insurance benefits in simple taxation cases by using Cobb-Douglas utility functions. In the simple economies they analyze, individuals wish to maximize the expected value of a utility function. Utility is derived from consumption in two periods, period one and period two. In period two, the ability to work and earn an income is uncertain. The authors claim that a risk averse person will want to insure himself against the risk related to labor and consumption in period two. This insurance can be provided by the government through tax and social insurance systems. Varian (1980) identifies an optimal tax that is a trade-off between efficiency, equity and insurance. Insurance, in this regard, means reducing the variance of personal income and thus decreasing the risk. The need for social insurance is derived from the assumption that income contains a random component, which he assumes to be exogenous luck. Varian suspects that "widespread political support of many redistributive programs rests more with the social insurance aspect of the program than with altruistic consideration involving social welfare" (Varian, 1980, p. 51).

Empirical work

The importance of the concern for risk has also been tested empirically. Hörisch (2008) recorded distribution choices in three situations: one dictator game measuring social preferences, one risk game and one Veil Of Ignorance (VOI) game. VOI is a state where the participant decides on a distribution of wealth between two accounts, without knowing which one will be assigned to himself and which one will be assigned to another participant. If the VOI choice coincided with the risk choice, the participant was only concerned with the risk aspect of the VOI, and not with the social aspect. If the VOI choice coincided with the

risk-free dictator choice, only social preferences mattered. Hörisch could thus separate the effect of social preferences and risk preferences when behind the VOI. She found that men's behavior behind the VOI was influenced in large part by a wish to insure themselves against risk. Women were motivated both by risk and by social preferences.

In his paper on motivations for redistribution, Bjerk (2011) similarly found that risk made the subjects modify their behavior. Individuals moving from an environment with certainty regarding their place in the earnings distribution to one with uncertainty changed their redistribution choices dramatically. In the certainty environment, the vast majority seemed to be motivated by their own payoff, while subjects in the uncertainty environment displayed a need to insure themselves against a low income.

The findings above are supported by Carlsson, Gupta and Johansson-Stenman (2003), who had their subjects choose between hypothetical societies with different income distributions, without knowing their own place. They observed that students both in India and in Sweden are mostly risk-averse and prefer societies with more equal incomes.

2.3.2 Moral concerns

Theoretical work

Theorists have disagreed on whether self-interest can adequately explain human behavior. (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002). According to Henrich et al. (2001, p. 73), "one problem appears to lie in economists' canonical assumption that individuals are entirely self-interested". Many models therefore incorporate a possibility for people to care about persons other than themselves. As people do not necessarily behave like the classical Homo Economicus, concerns for other people, for society and for general fairness, are hypothesized to be among the motivational factors that explain behavior. We have named this group of preferences "moral concerns". Fehr and Fischbacher (2002) discuss earlier work on redistributive preferences and find strong indications of people exhibiting social preferences. They argue that without taking social preferences into account, it is not possible to understand fundamental issues in economics, like competition, collaboration and material incentives. They state that "People differ not only in their tastes for chocolate and bananas but also along a more fundamental dimension"

(Fehr and Fischbacher, 2002, p. C30). While some behave in a purely self-interested manner, others "care positively or negatively for the material payoffs of relevant reference agents" (Fehr and Fischbacher, 2002, p. C1).

Empirical work

There is an extensive empirical literature on observed deviations from Homo Economicus. Singhal (2008) analyzed survey data from seven OECD countries and found that the majority of the respondents preferred progressive taxation. The differences in preferences between different income levels were very small. From this, she concluded on "a limited role for self-interest in the determination of preferences for redistribution" (Singhal, 2008, p. 17). Heinemann and Hennighausen's (2010) analysis of the German General Social Survey (ALLBUS) found that people do not necessarily prefer the tax progressivity (or non-progressivity) that benefits themselves. Fairness preferences, which were measured as agreement with all individuals having a "decent income even without achievement", determined a significant part of individual tax preferences (Heinemann and Hennighausen, 2010, p. 8). Hudson and Jones (2002) looked to the role of moral concerns in terms of public interest, and found that moral concerns had substantial influence on policy preferences. They tested not only tax preferences, but also tax-financed spending on health and education. For both, the results indicate a greater role for public interest than self-interest.

The empirical evidence thus suggests that moral concerns should be included in the understanding of tax preferences. When investigating moral concerns, we will focus on the equality/efficiency trade-off. We therefore first provide an overview of empirical work on the equality/efficiency trade-off in general redistribution choices and thereafter in income tax settings. Further, we will examine empirical findings that emphasize the heterogeneity in how people evaluate this trade-off. We will also look at theories that try to explain this observed heterogeneity.

Equality-Efficiency

In the same way as we observe different conceptions and beliefs about the equality/efficiency trade-off at a societal level, it is reasonable to assume that individuals also have personal preferences related to this trade-off (Bittker, 1979; Engelmann and Strobel, 2004). How the concerns for equality and efficiency are weighted against each other

is individual, and there is great heterogeneity among people (Mitchell et al, 1993). A person who is motivated by moral concerns when evaluating tax systems will be more or less positive to redistribution depending on whether he or she prioritizes equality or efficiency.

Empirical work on general redistribution

Numerous empirical studies have been conducted in order to investigate this trade-off. The research has involved different redistributional choice situations and has often been conducted as lab experiments. Charness and Rabin (2002) ran an experiment consisting of a multitude of simple games, each designed to identify specific effects. Their results showed that the subjects had a strong preference for efficiency when choosing how to redistribute, and equality was not a major issue. In a similar manner, Engelmann and Strobel (2004) tested through an experiment of games the relative importance of inequality aversion and efficiency concerns, as well as selfishness and the maximin principle. They found that efficiency concerns and selfishness could explain most of the data. Pure inequality aversion, on the other hand, appeared to be of no importance to redistributional preferences, although maximin seemed to be a concern.

Empirical work on taxation

Some of the empirical research on equality/efficiency has specifically examined the trade-off in a tax setting. Ackert, Martinez-Vazquez and Rider (2007) tested the importance of various social preferences when voting for alternative tax structures. They conducted an experiment where subjects were randomly assigned an income, which was their payment for participating, and were then informed of the average income within the group. Next, the participants were to cast a vote for either a lump-sum (non-redistributive) tax or a progressive (redistributive) tax which came at a cost. The data showed that the subjects were clearly concerned with inequality and thus chose a redistributive tax scheme. The inequality aversion decreased, however, as the deadweight loss resulting from the cost of progressive taxation increased. These results indicate that equality, as well as efficiency, may be important concerns for many people, and that the two are traded off against each other.

Empirical work on heterogeneity

It seems clear that while some individuals prioritize efficiency, equality is the preference of others. Research has confirmed this impression of heterogeneity. Andreoni and Miller (2002)

found that almost half of the subjects in their study showed redistribution preferences that were either perfect substitutes, perfectly selfish or Leontief. Perfect substitutes means giving away all income when the price of giving is less than one, and keeping everything when the price of giving is greater than one. This illustrates efficiency concerns in income distributions. Leontief means dividing the surplus equally, and is thus an expression of equality preferences. Similarly, Fisman, Kariv and Markovits (2007) performed an experiment with a three-person dictator game (the same as the social game we describe later in this paper) to measure the equality/efficiency trade-off in allocations to other participants. They found that "preferences for giving are very heterogeneous, ranging from perfect substitutes to Leontief" (Fisman, Kariv and Markovits, 2007, p. 2).

Theoretical work on heterogeneity

Several theories have been developed on why there is such heterogeneity in the evaluation of this trade-off. One of these theories is the Value-Guided Perspective, a descriptive theory introduced by Mitchell et al (1993). It is based on the idea of McClosky and Zaller (1984), stating that "Equality is an important organizing principle in liberal and social democratic ideology, as are efficiency and economic liberty in conservative and laissez-faire ideology" (Mitchell et al., 1993, p. 629). People, in the course of socialization, "acquire relatively stable preferences for equality and efficiency that serve cognitive appraisal functions" (Mitchell et al, 1993, p. 629). This principle thus says that the political view and ideology you identify yourself with will decide which preferences you have for equality versus efficiency. Almås et al. (2010) studied how fairness considerations and the equality/efficiency assessment develop during adolescence. They observe a large decrease in strict egalitarian fairness and an increase in the importance of meritocratic fairness. In other words, going through adolescence seems to shift fairness views away from believing that everyone should get the same benefits regardless of effort, to that everyone should get benefits corresponding to their achievements. They argue that this development is a result of both cognitive maturation and social experiences.

2.4 Tax preferences

In the same way as there is heterogeneity in the evaluation of the equality/efficiency trade-off, there are differing opinions on what an optimal income tax system looks like. It has long been assumed that there is wide support for redistribution, and the debate has been limited to the degree of progressivity (Atkinson, 1973; Slemrod, 1990). During the 1980s, however, there was a rising interest in flat tax schedules (Roberts, Hite and Bradley, 1994), and in the 1990s, several countries, mainly in Eastern Europe, moved towards a flattening of their income tax systems (Keen, Kim and Varsano, 2006). Today, research reveals very varying preferences regarding income tax schedules (Roberts, Hite and Bradley, 1994). Empirical studies, mainly in the form of surveys, have been undertaken with the aim of mapping income tax preferences. The main focus has been the degree of redistribution within the income tax system.

Singhal (2008) investigated preferences for redistribution in seven OECD countries. She found that "the overall variation in preferred progressivity is substantial" (Singhal, 2008, Abstract). 38.0 percent of the respondents reported preferred schedules that were strictly progressive (average tax rates increased over each income interval), and a further 35.4 percent reported schedules that were weakly progressive. 7.2 percent of the respondents preferred flat schedules, and only 2.1 percent and 0.8 percent of the respondents reported a preference for systems that were weakly regressive or strictly regressive, respectively. Using survey data from several European countries, Fatica (2011) found that the majority of the respondents preferred a progressive system. Regressive tax schedules, on the other hand, had very limited support. In addition, nearly 80 percent of the respondents answered in favor of a progressive system in a large survey conducted in Germany (Heinemann and Hennighausen, 2010). In France, Boarini and Le Clainche (2009) did not explicitly investigate income tax preferences, but rather general redistribution in society. They found that 87 percent supported redistribution, based on data from the survey "Opinions about Welfare State". The indicator of redistribution preferences was built on the basis of three questions: Who should stand by have-not individuals, who should mostly battle with poverty and who should be made responsible for not self-dependent people: public institutions or individuals and private foundations.

Although there seems to be general agreement on the desirability of a progressive income tax schedule, there is also heterogeneity in the survey responses. This has been further investigated by several researchers, whose focus has been the variation in preferences for progressivity among different countries. Alesina and La Ferrara (2001) examined redistribution preferences in the USA, and Alesina and Angeletos (2005) and Alesina and Glaeser (2004) compared redistribution preferences in the USA to redistribution preferences in Europe. They observed that support for redistribution through progressive taxation was substantially lower in the USA than in Europe (Alesina and Angeletos, 2005), and they explain this mainly by different perceptions of fair and unfair inequality and different views on the possibilities of social mobility. These views are thought to be a result of historical and cultural differences. Corneo and Grüner (2002) support these findings. In their sample consisting of people of different nationalities, preferences for redistribution were lowest in the USA and highest in Norway.

As indicated above, some of the heterogeneity in income tax preferences can be explained by differences between countries. Nevertheless, we observe that people differ in their preferences for income taxation also within countries. We therefore hypothesize that these differences can be partly explained by variations in selfish and moral concerns. This is what we investigate in our research.

3. Experiment design

This chapter describes the methodology of the research. The first section gives the main outline and objective of the experiment followed by an illustration of the research model and the corresponding hypotheses. The following sections give detailed descriptions of the game part and the questionnaire part of the experiment, as well as of the corresponding variables.

3.1 Main outline

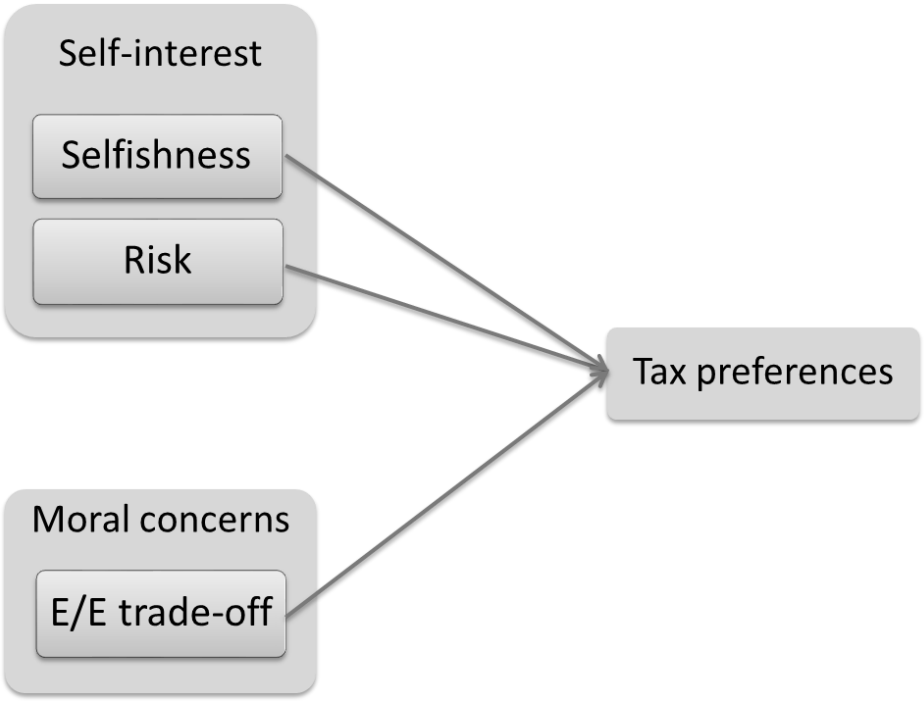
The data for this research were gathered by means of an experiment, which was part of a larger research project run by Shachar Kariv at UC Berkeley. The experiment consisted of four different games and a questionnaire. The games asked the respondents to make choices in 200 decision problems regarding distribution of income, 50 in each game. One of the 50 decisions per game was randomly chosen to be carried out for payoff. Because of this, each decision could potentially determine the net pecuniary payoff for the participant and should therefore prompt considerations similar to real-life distribution situations. The payments were not revealed until the end of the experiment. Each game was designed so as to measure a specific distributional motivation. The games were supplemented by a questionnaire consisting of questions reflecting the respondents' preferences regarding tax progressivity and redistribution. The details of the game designs and the questionnaire are explained shortly.

For each game we obtained observations that constitute one of the independent variables of our research. The tax preferences from the questionnaire constitute the dependent variable. The analysis of the data searches for associations between the dependent and the independent variables without determining causality. More details of the analysis can be found in the analysis chapter of this paper.

3.2 Research model and hypotheses

The research model employed can be illustrated as follows:

Figure 4. Research model



Note: The research model illustrates the three hypotheses, which state that both self-interested concerns and moral concerns relate to tax preferences. Note the distinction between self-interest, defined as all self-regarding concerns, and selfishness, which is solely a concern for pecuniary payoff.

Our research has the following main hypotheses:

H1: For the rich, tax attitudes towards redistribution relate negatively to selfishness

H2: Tax attitudes towards redistribution relate positively to risk aversion

H3: Tax attitudes towards redistribution relate negatively to efficiency preferences

Note that for the purpose of our analysis, we impose the premise that all participants in the experiment expect to be rich, i.e. earn above the mean national income over their lifespan. From this follows that they assume to be less well off with a progressive income tax than

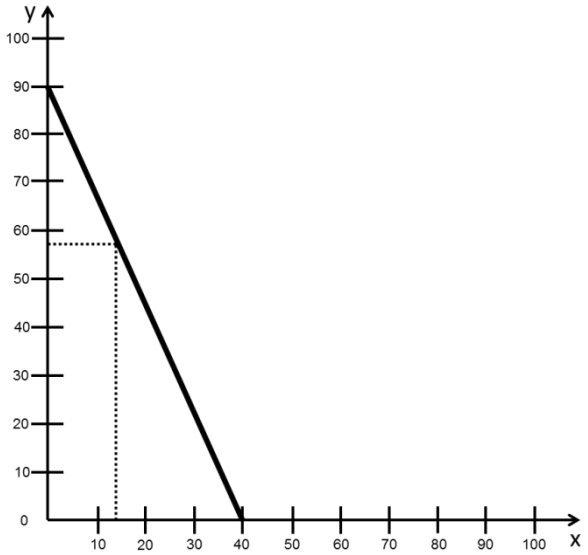
with a flat system. We impose this premise on the analysis as all the participants are university students and have a relatively high expected future income. Research shows that higher education leads to a higher lifespan income, and that lifespan income on average increases with three percent per year of higher education (Kirkebøen, 2010). As only a third of all inhabitants in Norway pursue higher education (SSB, 2010), it is natural to assume that the participants in the experiment expect a lifetime income above the national mean. We investigate this premise further as part of the analysis.

3.3 Detailed description

3.3.1 Games

The first part of the experiment consists of four different games, all of which ask the respondents to decide on an allocation of tokens between two accounts, *x* and *y*. The tokens are each worth a given amount of NOK (see appendix 1). The participants are informed of the conversion rate before the games are commenced. The two accounts correspond to the x and y axis on a two-dimensional graph, see figure 5. The participants must choose each allocation as a point on a line that represents all possible allocations. The line is chosen randomly by a computer from a set of lines which all must intersect one of the axes at 50 or more tokens, and not exceed 100 or be lower than 1 on any of the axes. For example, a straight line that intersects at 100 on both axes represents a situation where tokens can be transferred directly from the *x* account to the *y* account without any cost and the total amount is 100 tokens regardless of the split. If the line, however, intersects the *x* axis at 100 and the *y* axis at 30, the total amount will decrease as more tokens are allocated to the *y* account. This is a situation where transfers from the *x* account to the *y* account come at a cost. Vice versa, transfers from *y* to *x* yield a surplus.

Figure 5. Choice situation



Note: The graph depicts the choice space for allocations in the four games, with an example of a budget line from x=40 to y=90 and an allocation of x=14 and y=57.

All four games are standard designs in experimental economics. Experiments of the same structure, consisting of similar games, instructions and execution have been arranged successfully several times (Fisman, Kariv and Markovits, 2007; Choi et al, 2007). In our analysis, we will only use data from three of the games, so only these three games will be described carefully in the section that follows. We will nonetheless provide a brief description of the fourth game, the moral game.

SELFISH

Decision scenario

The selfishness game is a standard dictator game. Each person is linked with a random, anonymous other person. The dictator is given a line on which to choose an allocation between himself and the other person, the recipient. The recipient is passive and receives whatever the dictator has allocated to him. As all participants will play the role of the dictator, they will also be the passive recipients of another participant's allocation. This

linking is completely independent of the former. The instructions handed to the participants are found in appendix 2.

Variable

The observations from the selfishness game are used to calculate the SELFISH variable, which reflects the participants' level of selfishness. We define the variable as the average share of the total amount of tokens taken to oneself. As the dictator receives the *y* account, the variable SELFISH is found by calculating the mean of $y/(x+y)$ for all decision choices of each participant. A completely selfish person will only be concerned with getting as much as possible and will thus consistently choose to take all the tokens for himself. He will do so by allocating the maximum to the *y* account. Consequently, he will not allocate anything to the *x* account and the variable SELFISH will have a value of 1, which is the highest possible value. The less selfish a person is, the smaller will the SELFISH variable be. As account *x* and *y* on average will be equal, a completely non-selfish person will, on average, divide the tokens equally between the accounts. We therefore assume that the smallest plausible value of SELFISH is ½, or 0.5.

RISK

Decision scenario

In the risk game, the participants' decisions only affect themselves. Each participant allocates to the *x* and *y* account, and one of these accounts will randomly and with equal probability be chosen as payment. The other tokens will be lost. The participant instructions can be found in appendix 3.

Variable

The observations from the risk game are used to calculate the variable RISK, which is to reflect each participant's degree of risk aversion. The variable is defined as the individual mean of the shares of the total allocated amount of tokens that is put in the cheaper asset. The cheaper asset is the asset with the highest maximum value, such that reducing that account with one token will lead to an increase of less than one in the other account. The calculation is $x/(x+y)$ if *x* is the cheaper asset, and $y/(x+y)$ if *y* is the cheaper. A completely risk averse person will want to eliminate all of the risk involved in choosing an allocation, no matter the cost. This is achieved only when the tokens are allocated equally between the *x*

and *y* account. He will do so because the expected utility from getting tokens is less than the displeasure of experiencing risk up until the point where there is no more risk. The extreme is thus a person who chooses an allocation of 1-1 instead of a 0-100 allocation, despite the considerable decrease in expected outcome. As this person will always choose an equal split, RISK will be ½, or 0.5. A person who is risk neutral does not experience any displeasure from risk and is therefore indifferent between different allocations as long as the expected outcome stays the same. He will always choose the option that maximizes the expected amount of tokens. As the accounts have a 50/50 probability and practically all the budget lines involve a trade that is not 1-to-1 between tokens to the *x* and *y* account, the maximum expected amount will only be achieved by choosing a corner solution. The risk neutral person will thus consistently choose to allocate everything to the *y* account if the *y* account has a higher maximum value than the *x* account, and vice versa. The RISK variable will then be 1.

EFFICIENCY

Decision scenario

The game measuring equality/efficiency preferences, named the social game, is a dictator game with an impartial spectator. In this game, the dictator will make decisions on behalf of two other participants, and he will not be affected by the decisions himself. The dictator will randomly be linked to the two other participants, and they will all remain anonymous. These two passive persons will be the receivers, one of the *x* account and one of the *y* account. As all participants are given the role of dictator, they will also be one of the recipients in two other persons' allocation choices. The three situations are completely independent. The instructions for this game are in appendix 4.

Variable

The observations from the social game are used to obtain a measure of the concern for efficiency in a situation where efficiency comes at the cost of reduced equality and vice versa. The variable EFFICIENCY is calculated as the individual mean share of the total amount of tokens the subject puts in the cheaper asset. The calculation is $x/(x+y)$ if *x* is the cheaper asset, and $y/(x+y)$ if *y* is the cheaper. A person who is only concerned with efficiency will always aim at maximizing the total amount of tokens, as this is most efficient. He will not care whether the split is equal or if one of the two gets everything while the other

gets nothing. Since one of the assets in our games is cheaper than the other, the efficient allocation is to put as much as possible in the account with the highest maximum. This is, apart from in the very rare symmetric budget line, a corner solution with the coordinates (max *x*, 0) or (0, max *y*). The mean share allocated to the account with the highest maximum should therefore equal 1. If a subject, on the other hand, is only concerned with equality, he will want to allocate an equal amount of tokens to the *x* and *y* account. The budget line determines the size of the efficiency loss associated with an equal split, but the subject does not care about efficiency and will therefore be consistent in choosing an evenly split allocation. The EFFICIENCY variable will then be ½, or 0.5.

MORAL

This game measures social preferences, defined as preferences behind Rawls' Veil of Ignorance. The participants are, as dictators, to make an allocation between the two accounts. One of the accounts is randomly chosen for the dictator, while another participant receives the other account. The results from this game are not included in our analysis, and therefore not discussed in further detail.

3.3.2 Questionnaire

We developed a questionnaire to survey people's preferences for redistributive tax systems and to collect demographic background information. The details can be found in appendix 5. The questions used to map income tax preferences are mainly derived from Almås, Cappelen and Tungodden (2013), from the European Social Study of 2008/2009 as they appear in Fatica (2011) and from Singhal (2008). Some of the questions have been slightly adjusted and rephrased to fit our purpose.

The part of the questionnaire that relates to tax preferences consists of five items. The first four are statements to which the participants have to answer whether they "disagree completely", "disagree", "neither agree nor disagree", "agree" or "agree completely". A Likert scale of five has been chosen to give the participants the possibility of a neutral answer, and to simplify the process by not providing too many alternatives.

The first two items, "*A society should aim at equalizing incomes*" and "*In the present situation in Norway, we should do more to equalize incomes*" are to reflect a general attitude towards equality and the society's responsibility to equalize incomes. These questions, we believe, will capture redistributive preferences that are not necessarily linked to the tax system. The phrasing is unchanged from Almås, Cappelen and Tungodden (2013). The next two items, "*Imagine two people, one earning twice as much as the other: The person earning twice as much should pay more than double of the other in tax*" and "*The government should spend more of the tax revenues on social services and benefits targeting the poor than the rich*", measure preferences for progressivity in tax payments and in tax spending, respectively. Here, the aim is to capture a more specific preference for redistribution with the income tax system as the means. These two items are derived from the questions that Fatica (2011) employs in her research.

The last item is a concrete, numerical question. It asks "*What total amount of tax per year, if any at all, should in your opinion be paid by a person earning NOK 200,000 a year? By taxes, we mean all personal income taxes. Indicate your answers in NOK*". The participant is free to state any value. Then we repeat the question three times, each time by doubling the yearly earnings, so that the person is earning NOK 400,000, NOK 800,000 and NOK 1,600,000. Singhal (2008) uses this method in her research, and she argues that concrete, numerical questions provide the most accurate answers. With this question, we manage to quantify the preferred degree of progressivity or regressivity.

Variables measuring income tax preferences

The two groups of income tax preference items in the survey, namely the abstract and the numerical, have been used to create two different variables measuring income tax preferences. Analyses are conducted using either as the dependent variable.

TATR

The first four questions have been combined to create a variable named TATR (Tax attitudes towards redistribution). This dependent variable captures the respondents' general attitude towards redistribution and progressive income taxation. The variable is created by simply adding the scores on the first four questions for each respondent. Then we subtract 4 and divide by 16, so that each respondent can be placed on a scale from 0 to 1. A TATR value of

1 represents an exclusively positive attitude towards redistribution, while a score of 0 represents a negative attitude. Let us consider an example: A respondent answers "Agree" (4) to the first question and "Disagree" (2) to the second. He then replies "Neither agree nor disagree" (3) to the third question and "Agree completely" (5) to the fourth question. This gives him a TATR value of 0.625, as (14-4)/16=0.625. A TATR value of 0.625 can be considered in favor of redistribution, but the preference is not very strong.

TATR2

The second dependent variable measuring redistribution preferences is named TATR2. This variable captures the respondents' preferred degree of progressivity or regressivity in the tax system. The variable is based on the responses to the fifth question. This is the question where respondents are asked to "design" their own tax system by indicating how much tax a person earning different amounts of NOK should pay. To construct the variable, we calculate the tax rate (percentage share) corresponding to each tax payment. Then we subtract the tax rate corresponding to the lowest income from the tax rate corresponding to the highest income. This difference in tax rate represents the preferred progressivity and constitutes TATR2.

Preliminary analyses show that TATR2 does not generate any interesting results, see appendix 6. We believe that this measure does not capture people's true redistribution preferences, as the task of designing a tax system does not seem to be well understood. In order to design a tax system that captures the preferred degree of progressivity, a certain understanding of calculation and percentages is required. It may seem that such an understanding is lacking in our sample. For further purpose, we have therefore chosen to focus solely on TATR as our measure of redistribution preferences.

Background variables

Finally, the questionnaire collects background data on the participant's gender, age and political view. It also asks the participants to estimate their total expenditures the previous year and total gross income of their parents. This information makes up the background variables.

GENDER

The variable GENDER reflects the participants' gender. It is constructed as a dummy variable, where the value of 0 represents male and 1 represents female.

AGE

The respondents of the survey are asked to state their age. The variable AGE takes this value.

PARENTALINCOME

This variable contains information on the respondents' financial background, represented by the yearly gross income of their parents. The respondents are asked to estimate their parents' gross income by choosing among five different income brackets. Each bracket is an interval of NOK 250,000, with the lowest bracket being 0-250,000 and the highest >1,500,000. The brackets are assigned a score corresponding to the center value of each bracket, denoted in thousand NOK. An exception is the top bracket, which is given a score of two million, denoted in thousand NOK.

EXPENDITURES

The respondents are also asked to estimate their expenditures the previous calendar year. There are no brackets, so the respondents are free to state any amount. The variable EXPENDITURES takes this amount, denoted in thousand NOK.

POLITICALVIEW

Finally, the respondents have to reply to a question that measures their political view. They are asked to answer where they place themselves on a scale of seven, from "Very left wing" to "Very right wing". For the analysis, each alternative is assigned a score, where 1 represents "Very left wing" and 7 represents "Very right wing". The alternative in the middle, "Moderate", has the score of 4.

4. Execution

This chapter describes the details of the execution, including a description of the sample.

4.1 Recruitment

The experiment was held on April 11, 2013. It was conducted at the University of Bergen (UiB), and the participants were 135 students from UiB. Each experiment session was overbooked by 12 students, which ensured full sessions. 33-34 students participated in each session and there were four sessions in total. The students were recruited through stands at different university faculties and they were informed about the show-up payment of 100 NOK. Further, they were informed about the possibility of earning additional payments through the experiment.

4.2 Sample

The sampling method used is convenience sampling. The participants were recruited because of their proximity and convenient accessibility, and the sample cannot be assumed to be representative of the general population. The participants were aged 19 to 48 years, but the majority was in their early twenties and the average age was 23 years. In total, there were 72 male and 63 female participants.

The average income of the participants' parents is represented by the center income bracket, 750,000-1,000,000, and this is also the median observation. Such a household income corresponds approximately to the national average (SSB, 2013). The average expenditure of the participants the previous year is 123,000. Although responses range from 0 to 400,000, 58 percent of the respondents reported expenditures in the interval 100,000 to 200,000. This can be considered common, as the average for students is 140,000 (SSB, 2006). One person reported expenditures of 3,000,000. A possible explanation is that he has bought an apartment, which makes these expenditures non-representative for the respondent's normal

consumption. This response was therefore removed from the sample. The removal of this observation does not change the results of the analysis.

Regarding the political view of the participants, the mean score was 3.89 on a scale from 1 to 7 where 1 represents “Very left wing” and 7 represents “Very right wing”. The mean is thus slightly to the left of the center. The most common observation, however, is “Slightly right wing”, which was the response indicated by 36 of the respondents. None of the participants indicated that they were “Very right wing”, while two participants indicated “Very left wing”. The median response was “Moderate”, and the distribution is close to the shape of a bell curve. Further information on the participants can be found as appendix 7.

4.3 Location and time spent

The experiment took place in two computer rooms at UiB. The computers were stationed at an arm’s length distance and separated by partition walls. There was a random assignment of seating through blindly picking a numbered ball from a basket. Participants were not allowed to leave and return to the room during the experiment. They could, however, withdraw at any time without payment. None of the participants took advantage of this opportunity.

The experiment was divided into two parts. The first part consisted of the four different games, while the second part was the questionnaire. In total, each session lasted for approximately 100 minutes. On average, the participants spent four seconds on each of the 200 decisions.

4.4 Information in advance

After all the participants had found their assigned computer, they were welcomed by the experiment leader and informed about the rules of conduct. Further, they were ensured full anonymity. Finally, the experiment leader explained the general design of the games and gave instructions to the participants. The script can be found as appendix 8. The general instructions and rules were also to be found in a folder at each desk, so the participants could consult them at any point of the experiment.

4.5 Games, questionnaire and organization of the payments

After having read the general instructions out loud, the experiment leader and the assistant handed out specific instructions for the first game. The participants were given approximately five minutes to read the instructions before the game started (see appendices 2-4). After all the participants had completed the first game, the instructions were collected and instructions for the second games were distributed. This process was repeated until all of the four games were completed. The first game was the moral game for all of the participants. This is the game that is excluded from our analysis. The order of the subsequent three games was randomized.

The participants could raise their hands at any point of the experiment in case they had questions, and the research leader or the assistant would approach their desk and assist. Very few of the participants had questions. This indicates that the instructions were clear and in general well understood.

After the four games were completed, the participants were asked to fill out the questionnaire. In the meantime, the payments were prepared by the assistants in a separate room. The experiment was a double-blind, so neither the experimenters nor the other participants could associate any decisions to other participants. The assistants prepared payments by desk number and were not allowed into the experiment rooms. When the payments had been distributed and the questionnaires were completed, the participants could proceed to the exit. They were asked not to talk to anyone about the details of the experiment, and they were thanked for their participation.

5. Findings and analysis

This chapter will use the data from the experiment to systematically investigate the relationship between the different variables. After a brief data validation, we familiarize the reader with the dataset by examining descriptive statistics. We will then move on to the main analysis and investigate the linkages between the variables by using the OLS method.

5.1 Data validation

The first step of the analysis is to investigate whether our data are meaningful and correct. We have systematically looked for outliers through scatter plots, and for every outlier detected we have carefully discussed what the reason for the extreme value might be and whether this observation should be removed from our data set. Furthermore, we have ensured that all of the data is in the correct format.

Among the independent variables, SELFISH, RISK and EFFICIENCY, we have detected three outliers, one in each variable. Each outlier represented a clear deviation from the rest of the sample, as can be seen in the scatter plots in appendix 9. Participant 427 has a SELFISH score of 0.1729. This score indicates that the participant has on average distributed more tokens to the account belonging to the other participant than to himself. A closer investigation reveals that the participant has consistently distributed the majority of tokens to the x-account, regardless of the budget line, and this behavior can thus not be linked to efficiency concerns. We believe that this participant has misunderstood which account accrues to him. Participant 313 obtained a RISK score of 0.2159. This indicates that the participant has chosen to distribute the majority of the tokens to the most expensive account and thus "thrown money out the window". As this behavior is rather destructive, we believe that it was not intended. A similar interpretation goes for participant 130, who is represented by an EFFICIENCY score of 0.2324. We assume that these observations do not represent actual variation, but rather human misconception of the choice situation. We have removed these three scores and replaced them with "missing value". Removing these outliers has an impact on the significance of the results. Some of the coefficients that would otherwise not be significant are now significant.

As for the dependent variable TATR, we have investigated each of the four items that constitute the variable. Regarding the second item, "In the present situation in Norway, we should do more to equalize incomes", one participant indicated "3.5" and explained "for teachers and health care workers, yes". We have rounded this score to 3 because the professional groups mentioned were rather specific, and this cannot be assumed to represent a general attitude in favor of redistribution. The rounding-down of the score does not change the results significantly.

5.2 Descriptive statistics

The descriptive statistics firstly present a sample and subsample mean table with significance testing of differences across subsamples. The table gives insight into whether respondents of different characteristics differ in responses. Furthermore, we display histograms depicting the distribution of the dependent and independent variables, to give an impression of the heterogeneity in the responses and whether there are any obvious patterns. Lastly, we inspect whether there are any correlations between the independent and background variables. In addition, a summarizing table of the number of observations, mean, median, standard deviation and min and max values for each independent variable can be found as appendix 9.

5.2.1 Means and difference testing

Table 1 below shows the mean of each independent variable for the total sample and for different subsamples. The differences between subsamples, men and women, above and below median age, left-wing and right-wing, high and low parental income and above and below median expenditures, are tested with a Mann-Whitney test. The resulting p-values are displayed with corresponding stars. The Mann-Whitney test, also known as the Wilcoxon rank-sum test (Keller, 2009), tests the null hypothesis that two samples are from populations with the same distribution against the alternative hypothesis that they are not. A low p-value (under 10 percent) leads to rejection of the null hypothesis and acceptance of the alternative hypothesis.

Table 1. Means and difference testing of subsamples

	SELFISH	RISK	EFFICIENCY	TATR
All	0.7749	0.7648	0.7256	0.5389
Women	0.7710	0.7316	0.7127	0.5575
Men	0.7784	0.7943	0.7368	0.5226
Prob > |z|	0.5942	0.0035***	0.3068	0.2495
Below median age, age<=22	0.7823	0.7691	0.7212	0.5482
Above median age, age>22	0.7668	0.7603	0.7304	0.5288
Prob > |z|	0.4239	0.6228	0.5777	0.6577
Left-wing/center	0.7483	0.7639	0.7183	0.5916
Right-wing	0.8227	0.7665	0.7386	0.4464
Prob > |z|	0.0191**	0.9613	0.5250	0.0000***
Low parental income	0.7656	0.7482	0.7209	0.5778
High parental income	0.7939	0.7978	0.7353	0 .4611
Prob > |z|	0.3567	0.0460**	0.5891	0.0008***
Below median expenditures	0.7416	0.7379	0.7018	0.5403
Above median expenditures	0.8213	0.8024	0.7587	0.5368
Prob > |z|	0.0152**	0.0048***	0.0244**	0.9749

*Note: The table displays the means of the variables for different subsamples and Mann-Whitney tests for differences between subsamples. The center/median value is included in the left-wing/center, low parental income and below median subsamples. *** p<0.01, ** p<0.05, * p<0.1.*

In the total sample, the means for SELFISH, RISK and EFFICIENCY are all close to the center value (0.75) of the probable interval (0.5 - 1). The progressivity variable, TATR, is also close to the center value of the possible interval (0 - 1). The RISK mean for women is significantly lower than for men at a 1 percent level, 0.7316 and 0.7943, respectively. This shows that women have on average displayed a higher level of risk aversion than men. Separating the sample by age does not yield any significant results.

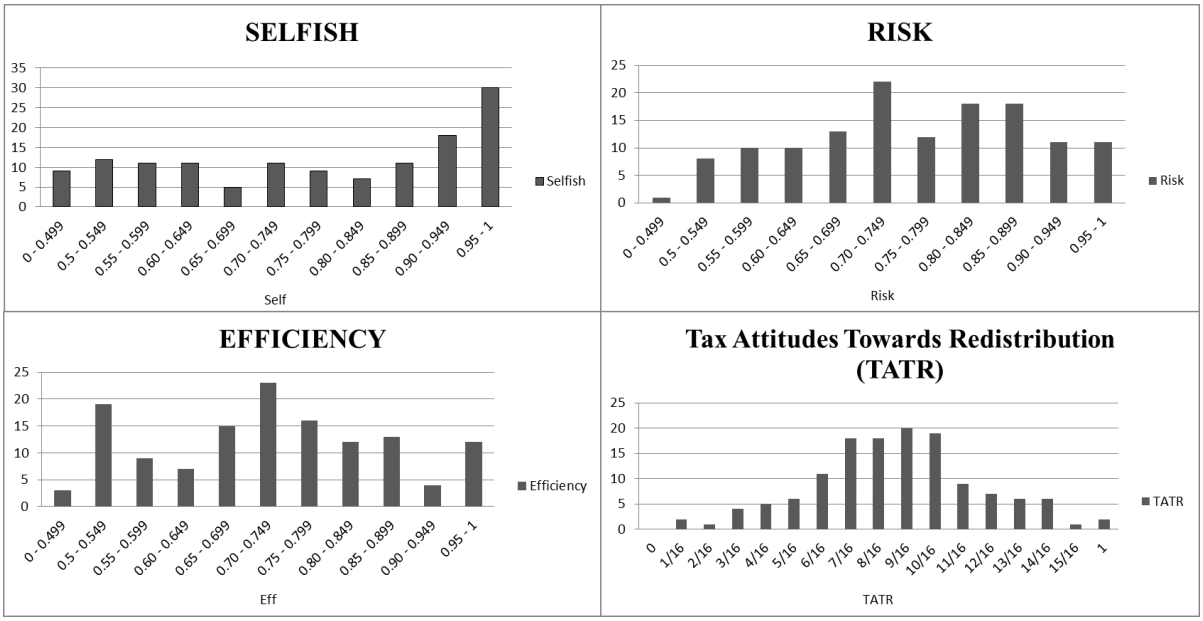
A comparison of left-wing/center and right-wing subjects' SELFISH score shows a difference significant at a 5 percent level, indicating that right-wing subjects are more selfish. The means are 0.7483 and 0.8227, respectively. There is also a significant difference at 1 percent level in the TATR variable between the two groups, with values of 0.5916 and 0.4464, respectively. This shows, as might be expected, that left-wing subjects are more in favor of progressive income taxation than right-wing subjects.

Dividing the sample into high and low (including the middle value) parental income groups shows no significant differences in means in either SELFISH or in EFFICIENCY. There is, however, a highly significant difference in RISK and in TATR. The low parental income group is more risk averse than the high income group, significant at 5 percent. They also support progressivity more strongly than the high group, significant at 1 percent. Separating the sample by expenditures, above and below (including) the median, returns significant differences in all three independent variables, SELFISH and EFFICIENCY at a 5 percent level and RISK at a 1 percent level. This indicates that subjects with above median expenditures are less risk averse, more selfish and more concerned with efficiency, as opposed to equality, than subjects with expenditures below the median.

5.2.2 Histograms

The histograms are arranged so that the x-axis indicates values or intervals of the variable, while the y-axis indicates the percentage of the total sample with that value or a value within that interval. The graphical representation is useful for looking at the spread of the subjects' values.

Figure 6. Histograms



Note: The panels show the distribution of the SELFISH, RISK, EFFICIENCY and TATR scores.

The SELFISH histogram shows a more or less equal spread across the scale. The exception is around value 1, where approximately 30 percent of the subjects are located. A non-negligible share thus consistently chooses selfishly, i.e. allocates close to 100 percent to themselves. This is in line with results from previous studies (Engel, 2011). Around 8 percent chose on average lower than 0.5, which represents choices that favor others over oneself. By examining these observations closer, we see that most of them are only marginally smaller than 0.5. We therefore assume that the deviation from 0.5 is not intended and interpret these choices as non-selfish.

The RISK histogram shows a wide variety of risk attitudes, from allocating efficiently (risk neutral) to equalizing as much as possible (risk averse). Values of around 1 describe the choices of 11 percent of the sample, while 8 percent chose approximate 0.5-distributions on average. There seems to be a peak at 0.7 - 0.75.

The histogram showing EFFICIENCY responses also displays variation across the whole interval. Again, there seems to be a peak at 0.7 - 0.75, which indicates equal weight given to efficiency and equality, and also around 0.5, which is a completely equal distribution. Approximately 12 percent distributed efficiently.

The TATR histogram shows a bell-shaped distribution, with a peak at around 0.5 and diminishing values closer to 0 and 1. Around 2 percent of the subjects have a TATR value of 1, signifying very strong support of progressive taxation. None have 0, signifying very strong opposition.

5.2.3 Correlations

The correlation matrix below displays the correlation coefficients for sets of independent and background variables. Correlation between variables is when their values appear to be related linearly. Perfect positive correlation, with a coefficient of 1, is when one variable consistently increases (decreases) when the other increases (decreases). A coefficient of -1, perfect negative correlation, indicates an opposite pattern. 0 indicates that there is no consistency. We interpret correlation coefficients between 0 and |0.3| as weak, |0.3| to |0.7| as moderate and |0.7| to |1| as strong. The matrix also includes significance stars and the p-

values for each correlation. The 1-3 stars indicate significance at 10, 5 and 1 percent levels, respectively.

Table 2. Correlation matrix

	SELFISH	RISK	EFFICIENCY	GENDER	AGE	EXPENDITURES	PARENTAL INCOME	POLITICAL VIEW
SELFISH	1.0000							
RISK	0.0938 0.2829	1.0000						
EFFICIENCY	-0.0022 0.9802	0.6667*** 0.0000	1.0000					
GENDER	-0.0206 0.8132	-0.2370*** 0.0058	-0.0857 0.3247	1.0000				
AGE	0.0493 0.5715	-0.0410 0.6382	0.0850 0.3290	-0.0332 0.7024	1.0000			
EXPENDITURES	0.2132** 0.0149	0.0498 0.5736	0.1156 0.1903	0.1376 0.1172	0.2427*** 0.0052	1.0000		
PARENTAL INCOME	0.1078 0.2152	0.1397 0.1075	0.0650 0.4555	-0.0039 0.9639	-0.2198** 0.0104	0.0412 0.6404	1.0000	
POLITICAL VIEW	0.1790** 0.0400	-0.0095 0.9138	0.0203 0.8170	-0.1001 0.2517	-0.0834 0.3398	-0.1566* 0.0740	0.2780*** 0.0012	1.0000

*Note: The table shows pairwise correlations between independent and background variables, with p-values. *** p<0.01, ** p<0.05, * p<0.1.*

The SELFISH variable is positively correlated with EXPENDITURES and POLITICALVIEW at 5 percent, but the relationship is weak, 0.2132 and 0.1790, respectively. RISK and EFFICIENCY have a moderate positive linear relationship significant at 1 percent, with a coefficient of 0.6667. RISK is also significantly correlated with GENDER at 1 percent level. The correlation is weak and negative at -0.2370. AGE is weakly correlated with EXPENDITURES. The coefficient of 0.2427 is positive and significant at 1 percent. AGE is also correlated negatively with PARENTALINCOME, with a coefficient of 0.2198. This correlation is weak and significant at 5 percent. EXPENDITURES and POLITICALVIEW are negatively correlated at 10 percent. The coefficient of -0.1566 shows that the negative relationship is weak. Lastly, PARENTALINCOME and POLITICALVIEW are weakly positively correlated with a coefficient of 0.2780, significant at a 1 percent level.

5.3 Analysis

We investigate the relationship between our variables by using the Ordinary Least Squares method (OLS), as we assume linear relationships between our dependent and independent variables. This method minimizes the squared vertical distances between an estimated line, predicted by linear approximation, and the observed responses (Keller, 2009). The assumptions of this method have been tested, and the results can be found as appendix 10.

5.3.1 Regression

We first perform a multiple linear regression analysis with TATR as our dependent variable and SELFISH, RISK and EFFICIENCY as independent variables. The regression returns beta values for a linear regression equation of the following form:

$$TATR = \beta_0 + \beta_1 SELFISH + \beta_2 RISK + \beta_3 EFFICIENCY + \varepsilon$$

Table 3. Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
self	-0.0646	0.0796	-1.074**	-0.152	-0.828	-0.365	
	(0.0909)	(0.0804)	(0.515)	(0.546)	(0.554)	(0.495)	
selfdummy							-0.0642
							(0.186)
risk	-0.213	-0.302**	-1.319**	-0.206	-2.688***	-1.766***	-0.771***
	(0.151)	(0.132)	(0.608)	(0.164)	(0.614)	(0.622)	(0.200)
eff	-0.0242	0.132	0.0413	-0.124	1.715***	1.189**	0.552***
	(0.166)	(0.125)	(0.165)	(0.662)	(0.622)	(0.562)	(0.187)
riskxself			1.365*		2.925***	1.757**	
			(0.715)		(0.724)	(0.761)	
riskxselfdummy							0.651**
							(0.265)
effxself				0.122	-1.968***	-1.218*	
				(0.754)	(0.723)	(0.682)	
effxselfdummy							-0.521**
							(0.237)
gender		0.00350				0.0122	0.00899
		(0.0286)				(0.0282)	(0.0284)
age		-0.0143***				-0.0131**	-0.0128**
		(0.00480)				(0.00508)	(0.00520)
expenditures		-0.000182				-0.000156	-0.000269
		(0.000197)				(0.000199)	(0.000204)
parentalincome		-0.000104***				-0.000106***	-8.53e-05***
		(2.50e-05)				(2.50e-05)	(2.97e-05)
politicalview		-0.0619***				-0.0567***	-0.0576***
		(0.0137)				(0.0139)	(0.0139)
Constant	0.767***	1.302***	1.535***	0.833*	1.356***	1.584***	1.328***
	(0.133)	(0.153)	(0.399)	(0.432)	(0.431)	(0.367)	(0.155)
Observations	132	128	132	132	132	128	129
R-squared	0.032	0.353	0.064	0.033	0.096	0.376	0.345

*Note: Columns (1) through (7) depict regressions with different combinations of variables. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

As can be seen in column (1) in table 3 above, this analysis does not generate any significant results. This might be because we have omitted variables that account for most of the variation. We need to control for background variables that might potentially account for a large part of the variation in the data. We include the background variables GENDER, AGE,

PARENTALINCOME, EXPENDITURES and POLITICALVIEW in our linear regression analysis and regress for the equation below:

$$TATR = \beta_0 + \beta_1 SELFISH + \beta_2 RISK + \beta_3 EFFICIENCY + \beta_4 GENDER + \beta_5 AGE + \beta_6 PARENTALINCOME + \beta_7 EXPENDITURES + \beta_8 POLITICALVIEW + \varepsilon$$

Column (2) shows that RISK is now significant at a 5 percent level. The coefficient is negative, indicating that there is a negative linear relationship. All other variables held constant, an increase in the RISK variable leads to a decrease in TATR. That is, the less risk averse a person is, the less inclined he is to support redistribution. This is in accordance with our hypothesis H2 and the reviewed literature. In addition, we see that both AGE, PARENTALINCOME and POLITICALVIEW are significant, all at a 1 percent level. This implies that the older you are, the less positive towards redistribution. Similarly we find that the higher parental income, the less inclined to support redistribution from the wealthy to the less well off. The negative coefficient of POLITICALVIEW indicates that a move to the right on the political scale is consistent with a weaker support for redistribution through progressive income taxation.

5.3.2 Interaction effects

Further, we investigate whether there are any interaction effects. Such effects arise when the simultaneous influence of two variables on a third variable is not additive. This way, the relationship between the dependent variable and an independent variable relies on the value of another independent variable. For example, it might be interesting to investigate whether the degree of SELFISH is important when interpreting the relationship between TATR and RISK. Is it so that selfish people assign more weight to the RISK variable, as this is assumed to be a self-interested concern? In a similar matter, do selfish people care less about the equality/efficiency trade-off, as this is regarded a moral concern? We create our two interaction variables by simply multiplying the two variables that we suspect to interact. RISKxSELFISH and EFFICIENCYxSELFISH are then included in our linear regression equation, first separately, then combined. Lastly, we add the background variables to obtain the following form:

$$TATR = \beta_0 + \beta_1 SELFISH + \beta_2 RISK + \beta_3 EFFICIENCY + \beta_4 RISKxSELFISH + \beta_5 EFFICIENCYxSELFISH + \beta_6 GENDER + \beta_7 AGE + \beta_8 PARENTALINCOME + \beta_9 EXPENDITURES + \beta_{10} POLITICALVIEW + \varepsilon$$

As can be seen in column (6) in table 3, most of the independent variables are now statistically significant. RISK is still significant and the beta value is negative. However, as we now have added an interaction variable that includes RISK, the RISK variable alone is no longer meaningful. The reason for this is that the RISK variable should now include all participants with a SELFISH value of zero. This is never the case, as our variable theoretically should be between 0.5 and 1 and the lowest observed value is 0.46. The same interpretation goes for SELFISH and EFFICIENCY: The variables alone cannot be interpreted and are therefore not of interest.

We therefore move on to interpreting the interaction variables. Firstly, we analyze the interaction variable RISKxSELFISH. We see that this variable is significant and the beta value is positive. The sum of RISK and RISKxSELFISH is close to zero when SELFISH is equal to 1 and a lincom test verifies that this sum is not significantly different from zero. This result indicates that those who are selfish do not care about their risk preferences when evaluating income tax preferences. Our finding presumably contradicts our assumption that selfishness would lead to an increased concern for personal risk preferences. We then investigate the interaction effect of EFFICIENCY and SELFISH. The combined effect of EFFICIENCY and EFFICIENCYxSELFISH is close to zero. A lincom test confirms that the sum cannot be considered different from zero. This indicates that for people who are selfish, the equality/efficiency concern is irrelevant. This seems plausible, as the equality/efficiency trade-off is a moral, non-selfish concern.

5.3.3 Stepwise interaction effects

We consider, however, the possibility that the effect of SELFISH on RISK's impact on TATR may not be linear across all levels of SELFISH. The RISKxSELFISH variable above includes all subjects, as none of our subjects have a SELFISH value of zero. The RISKxSELFISH variable is thus calculated so as to describe the effect of every level of

SELFISH in our sample. If, however, the subjects with high and low SELFISH values are affected disproportionately, their RISKxSELFISH variables will differ. The regressions in columns (3)-(6) will not catch this stepwise, nonlinear interaction and will attempt to generalize the relationship. The resulting betas can then be misleading in either size or significance. The same argumentation applies to our second interaction variable, EFFICIENCYxSELFISH. Luckily, we can deal with both issues simultaneously.

In order to incorporate the possibility of a stepwise shift in how SELFISH affects RISK's and EFFICIENCY's impact on TATR in different ways, we create a SELFISH dummy.

$$\begin{aligned} TATR = {} & \beta_0 + \beta_1 SELFISHDUMMY + \beta_2 RISK + \beta_3 EFFICIENCY \\ & + \beta_4 RISKxSELFISHDUMMY + \beta_5 EFFICIENCYxSELFISHDUMMY \\ & + \beta_6 GENDER + \beta_7 AGE + \beta_8 PARENTALINCOME + \beta_9 EXPENDITURES \\ & + \beta_{10} POLITICALVIEW + \varepsilon \end{aligned}$$

This allows us to divide the sample in two groups, those with high values of SELFISH and those with low values of SELFISH. We use the median SELFISH value as dividing point, and assign a value of 1 to the group with values of SELFISH above the median and a value of 0 to the other. The median is chosen because it is a natural dividing point as it splits the sample in two groups of equal size.

As the non-SELFISH group is now defined as a *low* SELFISH group, it actually has subjects in it. We are therefore able to interpret the RISK variable by itself in addition to the interaction variable. Column (7) in table 3 shows that the low SELFISH group has a negative and significant RISK beta. This means that for this group, risk neutrality decreases the TATR value and risk aversion increases it. The positive (and significant) RISKxSELFISHDUMMY beta seems to counter the negative RISK beta. This indicates that selfishness decreases the negative effect of risk preferences when considering TATR. It does not, however, seem large enough to invert the total effect of RISK so that it becomes positive. To investigate the total effect of RISK on TATR for the high SELFISH group, we test RISK and RISKxSELFISHDUMMY with lincom. The lincom test verifies that the sum of the two variables is not statistically different from zero. The high SELFISH group seems thus not to be concerned with RISK.

The low SELFISH group has a positive and significant EFFICIENCY beta. The people who are not very selfish thus care about the equality/efficiency trade-off, and a concern for efficiency leads to a preference for redistribution. This is contrary to our hypothesis H3. The EFFICIENCYxSELFISHDUMMY has a negative and significant beta value and hence works in the opposite direction. This indicates that high levels of SELFISH might nullify or even invert the total effect of EFFICIENCY on TATR. We test the total effect with lincom, and the results show that the total effect for the high SELFISH group, EFFICIENCY plus EFFICIENCYxSELFISHDUMMY, is not significantly different from zero. This indicates that the individuals in the high SELFISH group are not concerned with the equality/efficiency trade-off.

Note that the SELFISHDUMMY beta is not significant. It does therefore not add to the explanation of TATR. Selfishness alone does not seem important when explaining the motivations behind income tax preferences. It only has an effect in combination with other variables.

5.3.4 Margin analysis

Having found an indication that the effect of RISK and EFFICIENCY on TATR changes with different levels of SELFISH, we want to explore this relationship further. When we created the SELFISH dummy above, we divided the sample into high and low SELFISH. These two groups can potentially be internally heterogeneous, as the participants within the same group can have very different levels of SELFISH. Using dummies involves simplifying and excluding data, and can thus hide interesting variations in the dataset. In addition, when creating the dummy we chose the median as the dividing point. This might not be the most suitable method, as there might be other ways to create the high/low groups that capture the effects more exactly. We therefore explore further the interaction between risk, efficiency and selfishness with a more nuanced approach.

We want to measure the effect of RISK on TATR for different levels of SELFISH. We compute margin plots and tables that depict the marginal effect of RISK on TATR for SELFISH=0.5, 0.6,...,1, see table 4 and figure 7. This marginal effect thus includes both the

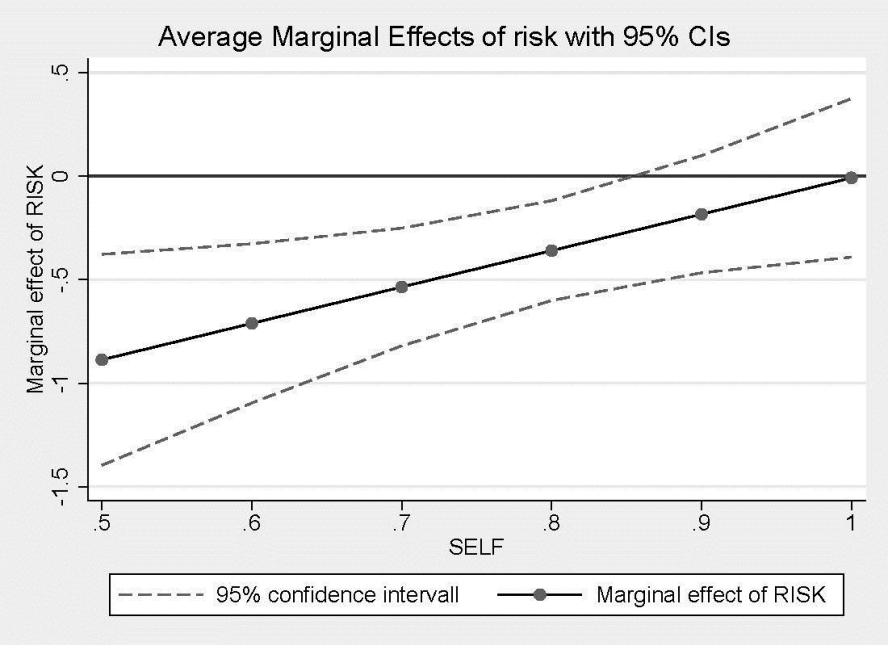
effect of RISK alone and the interaction RISKxSELFISH at each specific level of SELFISH. The same method is employed with EFFICIENCY, as depicted in table 5 and figure 8.

Table 4. Average marginal effects of RISK on TATR

SELF level	dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
0.5	-0.8869	0.2599	-3.41	0.001	-1.3962	-0.3775
0.6	-0.7111	0.1961	-3.63	0.000	-1.0955	-0.3267
0.7	-0.5354	0.1449	-3.69	0.000	-0.8194	-0.2514
0.8	-0.3596	0.1229	-2.93	0.003	-0.6006	-0.1187
0.9	-0.1839	0.1443	-1.27	0.203	-0.4668	0.0989
1	-0.0081	0.1953	-0.04	0.967	-0.3909	0.3746

Note: The dy/dx column shows the marginal effects of RISK on TATR at different levels of SELFISH.

Figure 7. Average marginal effects of RISK on TATR



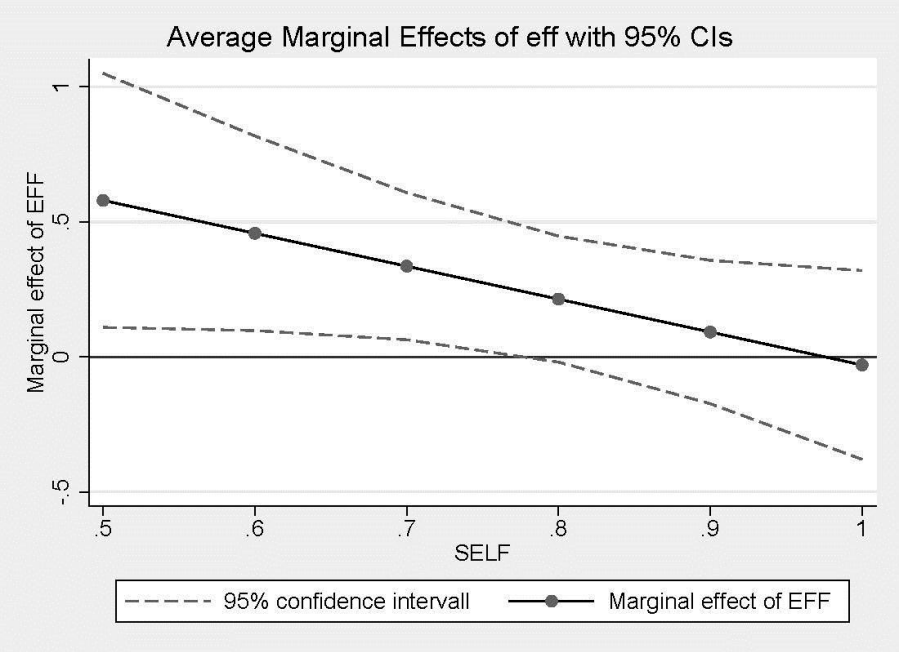
Note: The graph illustrates the marginal effect of RISK on TATR at different levels of SELFISH. The dotted lines mark the upper and lower bounds of the 95% confidence interval.

Table 5. Average marginal effects of EFFICIENCY on TATR

SELF level	dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
0.5	0.5796	0.2399	2.42	0.016	0.1095	1.0497
0.6	0.4578	0.1838	2.49	0.013	0.0976	0.8179
0.7	0.3359	0.1390	2.42	0.016	0.0636	0.6083
0.8	0.2141	0.1190	1.80	0.072	-0.0191	0.4473
0.9	0.0923	0.1354	0.68	0.495	-0.1730	0.3576
1	-0.0296	0.1783	-0.17	0.868	-0.3790	0.3199

Note: The dy/dx column shows the marginal effects of EFFICIENCY on TATR at different levels of SELFISH.

Figure 8. Average marginal effects of EFFICIENCY on TATR



Note: The graph illustrates the marginal effect of RISK on TATR at different levels of SELFISH. The dotted lines mark the upper and lower bounds of the 95% confidence interval.

The tables show that for low and medium levels of SELFISH, RISK effects TATR in a negative direction. The size of this negative effect decreases as the SELFISH value increases. At SELFISH levels of 0.859 and above, RISK is no longer statistically significant at a 5 percent level. As for EFFICIENCY, SELFISH values below 0.783 make EFFICIENCY relate to TATR in a positive direction. This positive relationship decreases as

SELFISH increases. For SELFISH values at 0.783 and above, EFFICIENCY is no longer significant at a 5 percent level.

The non-significance of RISK and EFFICIENCY for very selfish subjects could simply be due to a too small sample, but robustness testing showed that this is not the case. Investigations also show that the RISK and EFFICIENCY values of very selfish subjects do not differ significantly from the rest of the sample. This was also indicated by the lack of correlation between RISK and SELFISH, and EFFICIENCY and SELFISH, as can be seen in table 2.

5.4 Robustness

In order to verify that our model is robust, we have investigated the effect on the results when making slight adjustments to the analysis. We have created the SELFISH dummy using several different dividing points, such as the mean value and the center value of 0.75. This appears to have no impact on our results. The same goes for the choice of making SELFISH a dummy. This choice does not greatly impact the results of the analysis. We have also investigated the inclusion of other dummy variables, but the results generated from these attempts were not, in our eyes, as meaningful as with SELFISH as the only dummy. We have searched for other interaction effects besides RISKxSELFISH and EFFICIENCYxSELFISH. The inclusion of alternative interaction variables was not of any value.

We also performed regressions for subsamples of high and low parental income, and high and low expenditures to check for differences in the SELFISH coefficient. The SELFISH coefficients of all four subsamples were of the same directional effect and not significantly different from zero. Those with richer parents do not have a significant SELFISH coefficient. The same applies to those with poorer parents. We therefore have no reason to believe that they react to selfishness in opposite directions. If selfishness in the “rich parents” subsample related negatively to redistribution preferences, while in the “poor parents” subsample it related positively, this could potentially have explained why SELFISH is not significant by itself. We have no indication of this being the case. Equivalent testing for the high and low expenditures subsamples yielded the same results.

Furthermore, we have investigated whether the four different questions the TATR variable is based on affect the relationships in our analyses differently. By performing separate regressions, we were able to compare the direction and strength of the variables for each question. Although some questions yielded very significant relationships while others did not, the overall pattern of the regression outputs remained unchanged.

Finally, we have performed our analyses with and without the outliers removed. The results did not differ substantially, except for being more significant when outliers are removed. It appears that our model is fairly robust.

6. Discussion

The following discussion will review the findings from the previous chapter. We suggest an interpretation and look at its implications for the different approaches to understanding income tax systems. Furthermore, we offer a critical evaluation of the methodology employed. Lastly, we propose some areas of interest for further research.

Selfishness in itself appears to be of no significance when evaluating income tax systems. A high degree of selfishness does not necessarily lead to a preference for a flat income tax system and a low level of redistribution. This is an interesting finding, because it is contrary to our hypothesis H1. A possible explanation for this is that our premise, stating that all participants expect an income above the national average, is not correct. If some participants expect above average income, and some below, the SELFISH variable can relate to redistribution either positively or negatively.

Another possible explanation is that our premise is irrelevant. It might be the case that when the participants evaluate whether or not they will lose on progressive taxation, they do not take into account their expected lifespan income. Instead of assuming that they will have a lifespan income above the average and therefore lose money on progressive taxation, they rather consider their current relative standing and economic background. If this is the case, the levels of the background variables EXPENDITURES and PARENTALINCOME are relevant for the SELFISH variable. People with high values of EXPENDITURES and PARENTALINCOME should have a negative SELFISH coefficient, while people with low values of EXPENDITURES and PARENTALINCOME should have a positive SELFISH coefficient. However, as we determined in the robustness analysis, we have no indication of such a relationship.

In either case, selfishness has an impact on income tax preferences as it moderates the relationships of the other concerns. The importance of the SELFISH variable should thus not be dismissed. Examination of the other self-interested variable, RISK, and the moral concern will shed light upon this moderating effect.

In general, it looks like RISK affects TATR in a negative direction: The more willing to take risk, the less supportive of progressive taxation and vice versa. This is in line with our hypothesis H2, stating that the more risk averse a person is, the more positive he is to social insurance through redistribution. As a certain degree of risk aversion is found among the majority of individuals in our sample, optimal tax theory implies that the social insurance aspect should be included in the social welfare function. Considering the majority being risk averse, it is also likely that the median voter is somewhat risk averse. The preferred income tax system of the median voter will therefore probably entail a certain degree of progressivity.

However, we find that when the level of selfishness reaches a certain point, risk no longer seems to matter. Selfish people do not appear to be preoccupied with risk concerns. This is surprising. We consider both SELFISH and RISK as self-interested, self-regarding aspects and it seems natural that the two would correlate. One possible interpretation of this finding is that those who are selfish over a certain level tend to act overconfidently. This might be because they do not take their risk preferences into consideration when making distributional choices. The social insurance aspect of redistribution is less relevant to them, as they do not worry about the risk of low income in the future. This is not necessarily because they are less risk averse, but because they assign less weight to their risk preferences.

EFFICIENCY is not significant when SELFISH values are high. This is in line with our assumptions: As the equality/efficiency trade-off is a moral concern, selfish people should not attach any importance to this aspect. On the other hand, at low levels of SELFISH, EFFICIENCY is significant with a positive beta value. The interpretation is that for people who are not particularly selfish (and thus care about moral concerns), a preference for efficiency is connected with a positive attitude towards redistribution. This is not what we would expect. Our hypothesis H3 states that people who are concerned with efficiency should favor a flat income tax system, while people who value equality should be more in favor of a progressive system. The hypothesis is derived from research on the equality/efficiency trade-off. Our finding is just the opposite: As efficiency concerns increase, support of progressivity increases. From a social welfare point of view, this means that the optimal income tax system will be more progressive if those who care about moral concerns value efficiency. With a median voter approach, the resulting income tax system will be more progressive if the median voter is concerned with efficiency than otherwise.

The EFFICIENCY results indicate that many people associate progressive taxation with efficiency. It is not unlikely that this might be the case in Norway, as the Nordic model has a strong position. The Nordic model incorporates a high degree of redistribution, and it is based on a belief that equality enhances efficiency. The Norwegian economist Karl Ove Moene advocates this view. He argues that a more equal distribution of wages and a strong welfare state leads to efficient outcomes (Barth and Moene, 2008; Moene et. al., 2009). A more equal distribution of wealth is seen as fair, and when people perceive the system as fair, work ethics increase and cooperation is higher. It is possible that our results would have been different if the experiment was carried out in a country with another economic model and a different culture.

From the analysis of the independent variables we have thus found that, for low and moderate levels of selfishness, both risk preferences and the equality/efficiency trade-off must be included in the utility functions of the social welfare function and of the median voter. For very selfish people, the results indicate that neither selfishness, risk preferences nor the equality/efficiency trade-off relate to redistribution preferences. Other concerns must therefore be included in the regression to make it suitable to describe the TATR of selfish people. Implications for the optimal tax theory are that risk preferences and efficiency concerns should only be included in the utility function of people who are not very selfish. As for the median voter, his degree of selfishness will be crucial for the resulting income tax system.

The findings related to the background variables are also of interest. The analysis shows that AGE is significant and negatively related to TATR. Growing older thus seems to lessen the support of progressive taxation. One explanation might be that the economic situation of the older participants differs from the younger. If the older participants have more money at disposal, they can lose more on a redistributive tax than the young. The positive correlation between expenditures and age supports this explanation, as high expenditures assume more money at disposal. It might also be that the older participants share some preferences that our research does not capture directly. The older students might have spent more time and effort on their studies, and consequently feel more entitled to their earnings and thereby less positive towards redistribution.

Similarly, we see that people with high parental income are less positive to redistribution. This attitude seems motivated by concerns for themselves. Our SELFISH variable is not significant, even when we do not control for background variables. Nevertheless, these findings indicate that a concern for pecuniary payoff might still be of relevance. It is also possible that the "high income" group share certain traits that make them less positive towards progressive taxation. For example, PARENTALINCOME is positively correlated with POLITICALVIEW, indicating that the higher the income of the parents, the further to the right in the political landscape. POLITICALVIEW is significant and suggests that the further to the right, the less positive towards progressive taxation. This is in line with the classical left-right conception. In both optimal tax theory and political economy tax models, age, economic background and political view should thus be taken into consideration, as these factors are relevant for income tax preferences.

All in all, our model explains approximately 38 percent of the variation in our data. Selfishness, risk and efficiency matter, and these variables certainly deserve a place in the model. However, other factors might be just as, or even more, important. One aspect that could potentially influence income tax preferences is status quo bias (Samuelson and Zeckhauser, 1988; Sheffrin, 1994). Such a bias would make people inclined to favor an income tax system that is similar to the one already in place. Although all participants face the same actual tax system, their perceptions of its degree of progressivity might differ (Sheffrin, 1993). Those who believe that the current tax system is very progressive will also tend to be in favor of a progressive system. The importance of effort versus luck is another concern that maybe ought to be included in the analysis (Fong, 2001; Alesina and Angeletos, 2005; Cappelen et. al., 2010). People tend to find differences in income due to differences in effort as fair, while differences due to luck are unfair and should be corrected for. Hence, support for redistribution will increase when people believe that income differences mainly are a consequence of luck. A final suggestion of possible alternative variables is the aspect of optimism and pessimism towards the future and the degree of social mobility (Piketty, 1995; Alesina and La Ferrara, 2001). People who are very pessimistic regarding possibilities of future income will probably be more supportive of progressive taxation and vice versa.

Besides having left out potentially important variables, there are possible weaknesses concerning the method employed. This might have modified some of the results. One possible weakness is related to the questions measuring tax attitudes towards redistribution

(TATR). The questions can have been difficult to understand, or people might not have a strong attitude towards and a reflective opinion about these issues. The questions might be insufficient or simply not suited to measure income tax preferences accurately. Previous research has also shown that people tend to indicate different answers when questions are framed in an abstract versus a concrete manner (Roberts, Hite and Bradley, 1994) and that people might not answer in line with their true preferences when faced with a questionnaire (Donaldson and Grant-Vallone, 2002). Nevertheless, we aimed at using questions as simple and unambiguous as possible, and we believe that the majority of the participants understood the meaning of them. In addition, we have tried to diversify by including questions that measure different aspects of redistribution preferences.

Other questions that might have been hard to answer were the questions where the participants were asked to estimate their expenditures the previous year and the annual gross income of their parents. Although some might have struggled with this task, it looks as if most participants indicated reasonable levels.

Further critique relates to the use of an experiment as a method for measuring the relationship between tax preferences towards redistribution, selfishness, risk and equality/efficiency. A laboratory experiment is a rather artificial setting, and the choices people make here can thus differ from the choices they would make in real world situations. For instance, the risk of not gaining 100 NOK in an experiment setting might trigger other behavior than the real world scenario of risking losing the social security net. Consequently, we cannot blindly extend the results from the experiment to the real world. In addition, the generalizability of the results can be questioned as a result of the sample. The subjects were all students at the University of Bergen and hence unlikely to represent the characteristics of the population as a whole. We do however see a wide spread in responses in all independent variables and most background variables, which indicates that the sample is not homogeneous. Also, the setting of the lab experiment has the advantages of being an isolated, controlled environment. This allows for precise, robust, non-polluted measures. As the experimenters are in control of everything that happens, they can exclude all factors they do not wish to include and create clean concepts and settings. This increases internal validity.

Although this analysis has generated interesting results, further research is needed in order to establish what motivates income tax preferences. Other independent variables must be considered, and different methods should be employed to try to establish causality. In addition, it would be interesting to investigate further why efficiency concerns lead to a greater support for redistribution and why risk preferences are irrelevant to the very selfish. It would also be of interest to explore whether different ways of measuring progressivity preferences lead to similar results, both regarding the type of questions asked and the method of self-reporting preferences through a questionnaire.

7. Concluding remarks

In the search for an ideal and realizable tax system, an understanding of human motivation is vital. Theory suggests that both selfish and non-selfish concerns can lie behind preferences for redistribution, in the form of progressive income taxation. By means of an experiment, we have tested hypotheses regarding the relationship between selfishness, risk preferences and the equality/efficiency trade-off, and preferences for redistribution.

Our results indicate that income tax preferences result from both self-interest and moral concerns. Selfishness in itself does not seem to have any direct link to redistribution preferences. This is contrary to our hypothesis. It does however affect how the remaining variables relate to tax attitudes towards redistribution. For very selfish people, the results cannot confirm any relationship between either risk or efficiency concerns and attitudes towards progressive taxation. On the other hand, for people with low or moderate levels of selfishness, risk aversion is associated with a positive attitude towards redistribution. This is in accordance with our hypothesis, supporting the view of progressive taxation as social insurance. People with low or moderate levels of selfishness also display a tendency to support redistribution if they are concerned with efficiency. This is contrary to our hypothesis and may be explained by confidence in the Nordic model. Finally, the further to the right on the political scale, the more negative the attitudes towards redistribution. The same relationship is found regarding parental income and age: The wealthier the parents and the higher the age of the participants, the lower the support for progressive taxation.

If these findings can be generalized, they can have important implications for public support of tax policies. Our findings are a contribution in the search for a welfare function that captures people's true preferences. This is imperative in order to create an ideal tax system. Our findings also augment the understanding of the median voter, facilitating the design of a tax system that gains majority support. Although these results are interesting, we need supplemental research on additional variables and causal relationships in order to fully benefit from them. As we progress in obtaining a more detailed and profound understanding of tax preferences, hopefully our knowledge will help us advance towards a well-functioning and well-understood tax system.

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INSTRUCTIONS

Introduction

This is an experiment in decision-making. Your payoffs will depend partly on your decisions, the decisions of other participants, and partly on chance. Funding for this experiment has been provided by public and private research foundations. Please pay careful attention to the instructions as a considerable amount of money is (potentially) at stake.

Your participation in the experiment and any information about your payoffs will be kept strictly confidential. Each participant is assigned a participant ID number. This number will be used to record all data. Neither the experimenters nor the other participants will be able to link you to any of your decisions. Neither your name nor any other identifying information about you will be used in any final reports of the study.

The entire experiment should be complete within 1-1/2 – 2 hours. Your earnings in the experiment will be 100 NOK as a participation fee (simply for showing up on time) plus whatever you earn in the experiment. You will be paid privately according to your participant ID number at the end of the experiment. Details of how you will make decisions and receive payments will be provided below.

During the experiment we will speak in terms of experimental tokens instead of NOK. Your earnings will be calculated in terms of tokens and then translated at the end of the experiment into NOK at the following rate:

5 Tokens = 1.20 NOK

The instructions will be read aloud by the experimenter. If you have any questions, please raise your hand and a research assistant will approach your desk.

Once the experiment begins, we ask everyone to remain silent. In order to keep your decisions private, please do not reveal your choices to any other participant.

The computer program

The experiment has four parts. In each part of the experiment, you will participate in 50 independent decision problems that share a common form. This section describes in detail the process that will be repeated in all decision problems and the computer program that you will use to make your decisions. An example of the computer dialog window is shown in Attachment 1.

In each decision problem, you will be asked to allocate tokens between two accounts, labeled ***x*** and ***y***. The ***x*** account corresponds to the ***x***-axis (the horizontal axis) and the ***y*** account corresponds to the ***y***-axis (the vertical axis) on a two-dimensional graph. Each choice will involve choosing a point on a line representing possible token allocations. The instructions for each part will describe in detail how the payoff for each part of the experiment will be determined.

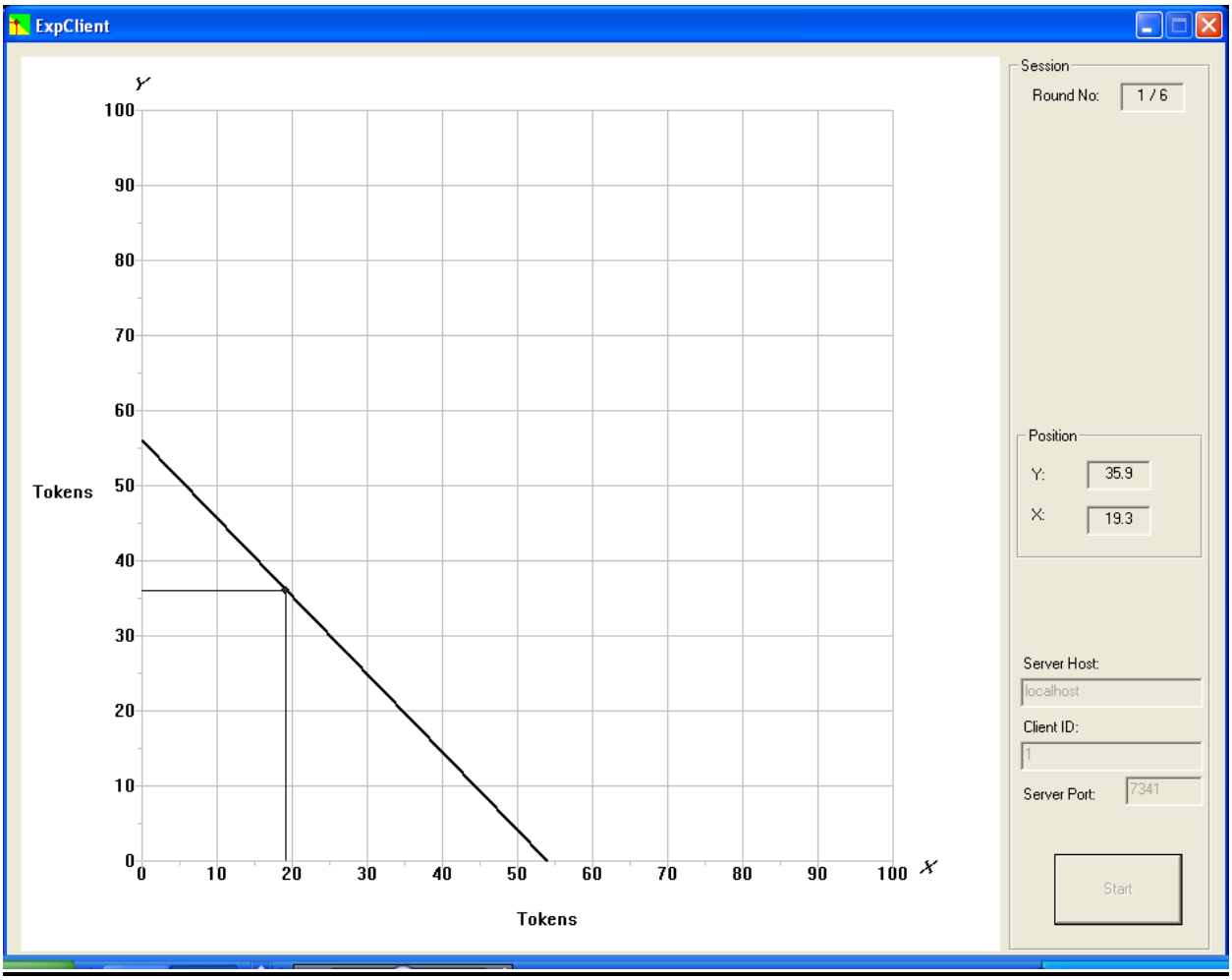
Each decision problem will start by having the computer select such a line randomly from the set of lines that intersect with at least one of the axes at 50 or more tokens but with no intercept exceeding 100 tokens. Examples of lines that you might face are shown in Attachment 2. In each part of the experiment, the lines selected for you in different decision problems are independent of each other and of the lines selected for any of the other participants in their decision problems, and will not depend on your choices in any of the earlier decision problems.

In each choice, you may choose any ***x*** and ***y*** pair that is on the line. For example, as illustrated in Attachment 3, choice ***A*** represents a decision to allocate ***q*** tokens to the ***x*** account and ***r*** tokens to the ***y*** account. Similarly, choice ***B*** represents a decision to allocate ***w*** tokens to the ***x*** account and ***z*** tokens to the ***y*** account.

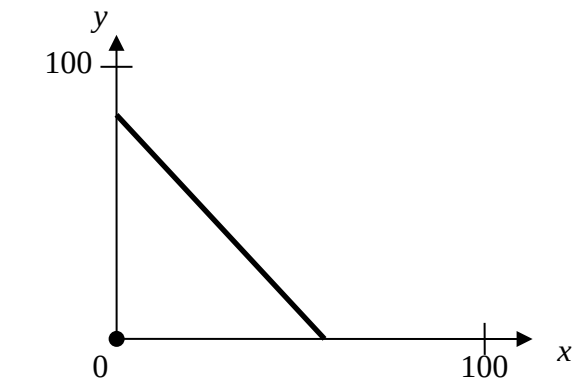
To choose an allocation, use the mouse to move the pointer on the computer screen to the allocation that you desire. The computer will only allow you to choose ***x*** and ***y*** combinations that are on the line. When you are ready to make your decision, left-click to enter your chosen allocation. After that, confirm your decision by clicking on the Submit button. To move on to the next round, click the OK button. Once you have clicked the OK button, your decision cannot be revised.

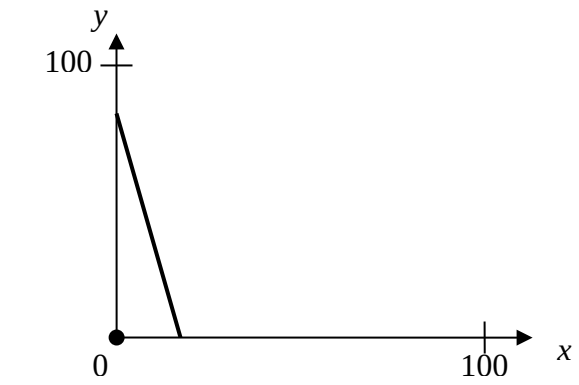
Next, you will be asked to make a decision in another independent decision. This process will be repeated until all 50 decision problems in each part of the experiment are completed. At that point, you may have to wait for other participants to finish. Each part of the experiment will end after all participants have made all their decisions. At the end of each part of the experiment, you will receive further instructions. At the end the experiment, the computer will randomly select one of the 50 decision rounds from each of the four parts of the experiment to carry out for payoffs. The round selected from each part depends solely upon chance.

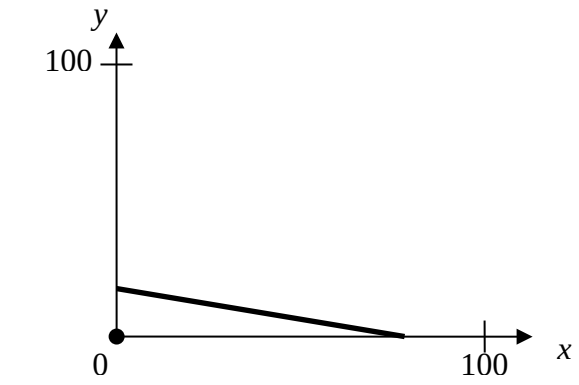
Attachment 1



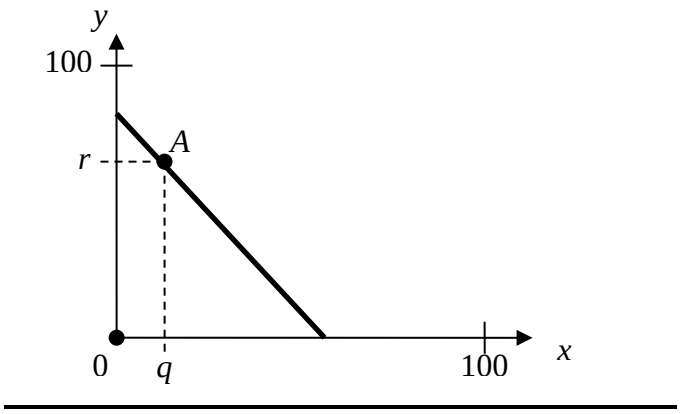
Attachment 2







Attachment 3



INSTRUCTIONS FOR PART D

For each allocation of tokens to the ***x*** account and the ***y*** account that you make in this part of the experiment, you will receive the number of tokens in your ***y*** account. Another person, who will be chosen at random (entirely dependent upon chance) from the group of participants in the experiment, will receive the number of tokens in your ***x*** account.

You will also receive the tokens allocated to the ***x*** account by a third person, where the third person is chosen at random from the group of participants in the experiment. The computer will make sure that the participant to whom you allocate tokens does not allocate tokens to you as a third person (and vice versa). Neither you nor any other participant will observe who allocated tokens to whom in any decision round, that is, the choices of all participants are anonymous in the experiment.

Your earnings for this part of the experiment will be determined as follows. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. The round selected depends solely upon chance. You will then be paid the tokens you allocated to the ***y*** account in this round. In addition, you will also be paid the tokens that the randomly chosen third person allocated to her or his ***x*** account in this round. You will therefore be paid two groups of tokens: one based on your own decision to allocate tokens and one based on the decision of another random participant to allocate tokens.

For example, suppose that in the round the computer chose to carry out for payoffs, you chose allocation ***A***, as illustrated in Attachment 3. In that case you would be paid ***r*** tokens from your own ***y*** account and the recipient will be paid ***q*** tokens from the ***x*** account. The payment to you from the choice paid by the third person in the selected round is determined in the same way.

At the end of the experiment, the tokens paid to you from the selected round will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

INSTRUCTIONS FOR PART R

For each allocation that you make in this part of the experiment in the ***x*** account and the ***y*** account, the computer will randomly (entirely dependent upon chance) select one of the accounts, ***x*** or ***y***. It is equally likely that account ***x*** or account ***y*** will be chosen. You will only receive the number of tokens you allocated to the account that was chosen. The tokens you allocated to the other account will be lost (not allocated to anyone).

Your earnings for this part of the experiment will be determined as follows. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. The round selected depends solely upon chance. You will only be paid the number of tokens you allocated to the account that was chosen in this round. These are the only tokens you will be paid from this part of the experiment. Recall that it is equally likely that account ***x*** or account ***y*** will be chosen.

For example, suppose that in the round the computer chose to carry out for payoffs, you chose allocation ***A***, as illustrated in Attachment 3, and that the computer chose account ***x*** for you in that round. In that case you would be paid ***q*** tokens in total. Similarly, if the computer chose the account ***y*** for you in that round then you would be paid ***r*** tokens in total.

At the end of the experiment, the tokens will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

INSTRUCTIONS FOR PART O

For each allocation that you make in this part of the experiment to the ***x*** account and the ***y*** account, two other participants chosen at random (entirely dependent upon chance) from the group of participants in the experiment will receive tokens. One participant will receive the tokens you allocated to the ***x*** account; another participant will receive the tokens you allocated to the ***y*** account.

You will receive the tokens a third person allocated to the ***x*** account and a fourth person allocated to the ***y*** account. These persons will also be chosen at random from the group of participants in the experiment. The computer will make sure that the participant to whom you allocate tokens does not allocate tokens to you as a third or fourth person (and vice versa). Neither you nor any other participants will observe who allocated tokens to whom, that is, the choices of all participants are anonymous in the experiment.

In this part of the experiment, your earnings are not determined by your own choices, but by the choices made by the randomly chosen third and fourth person. Your choices, however, will determine the earnings of two other randomly chosen participants. At the end of the experiment, the computer will randomly select one of the 50 decision rounds to carry out for payoffs. You will then be paid the tokens that the randomly chosen third person allocated to the ***x*** account and the randomly chosen fourth person allocated to the ***y*** accounts in this round. In the same way, two other randomly chosen participants will be paid what you allocated to the ***x*** account and ***y*** account in this round, respectively.

For example, suppose that in the round the computer chose to carry out for payoffs, you chose allocation ***A***, as illustrated in Attachment 3. In that case, two other participants will be paid ***r*** tokens and ***q*** tokens, respectively. The payment to you from the choices made by the third person and the fourth person in the selected round is determined in the same way.

At the end of the experiment, the tokens will be converted into money. Recall that each token will be worth 1.20 NOK. At the end of this part of the experiment, you will receive further instructions.

Small survey

1. What is your age in years? _____

2. What is your gender? (M/F) _____

3. What is your best estimate of your total expenditures the previous calendar year (2012)?

   _____

4. What is the total (gross) income of your parents? Please make your best guess and tick off the corresponding circle.

   - O 0 to less than 250 000 NOK
   - O 250 000 to less than 500 000 NOK
   - O 500 000 to less than 750 000 NOK
   - O 750 000 to less than 1 000 000 NOK
   - O 1 000 000 to less than 1 250 000 NOK
   - O 1 250 000 to less than 1 500 000 NOK
   - O 1 500 000 NOK or more

Please indicate how much you agree or disagree with the following statements by circling the corresponding number.

5. A society should aim at equalizing incomes.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

6. In the present situation in Norway, we should do more to equalize incomes.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

7. Imagine two people, one earning twice as much as the other:

   The person earning twice as much should pay more than double of the other in tax.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

8. The government should spend more of the tax revenues on social services and benefits targeting the poor than the rich.

Disagree completely	Disagree	Neither agree nor disagree	Agree	Agree completely
1	2	3	4	5

9. What total amount of tax per year, if any at all, should in your opinion be paid by a person earning NOK 200,000 a year? By taxes, we mean all personal income taxes. Indicate your answers in NOK.

   And what total amount of tax should be paid by a person earning NOK 400,000?

   And what total amount of tax should be paid by a person earning NOK 800,000?

   And what total amount of tax should be paid by a person earning NOK 1,600,000?

10. Below is a seven-point scale on which the political views that people might hold are arranged from very left-wing to very right-wing. Where would you place yourself on this scale?

Very left-wing	Left-wing	Slightly left-wing	Moderate	Slightly right-wing	Right-wing	Very right-wing
O	O	O	O	O	O	O

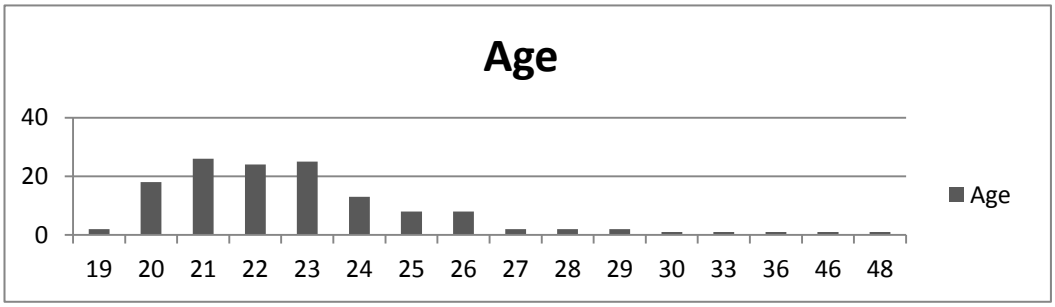
Appendix 6. TATR2 preliminary testing

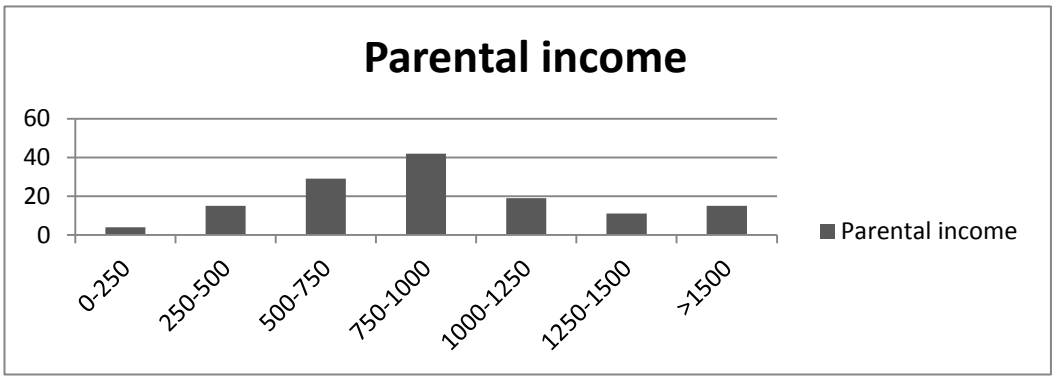
TATR2 VARIABLES	(1)	(2)	(3)	(4)
self	0.0223	0.0513	-0.102	
	(0.0602)	(0.0586)	(0.338)	
selfdummy				-0.0507
				(0.128)
risk	0.0248	-0.0364	0.0945	-0.00668
	(0.0903)	(0.0904)	(0.400)	(0.151)
eff	-0.0288	0.0411	-0.257	-0.0262
	(0.0865)	(0.0839)	(0.386)	(0.164)
riskxself			-0.140	
			(0.498)	
riskxselfdummy				-0.0137
				(0.197)
effxself			0.363	
			(0.461)	
effxselfdummy				0.112
				(0.196)
gender		-0.0424**	-0.0441**	-0.0434**
		(0.0206)	(0.0208)	(0.0210)
age		-0.00506**	-0.00503**	-0.00493**
		(0.00243)	(0.00245)	(0.00242)
expenditures		-0.000306*	-0.000306*	-0.000321*
		(0.000177)	(0.000177)	(0.000174)
parentalincome		1.03e-05	9.66e-06	1.46e-05
		(2.14e-05)	(2.15e-05)	(2.12e-05)
politicalview		-0.0122	-0.0126	-0.0117
		(0.00851)	(0.00882)	(0.00896)
Constant	0.0870	0.272***	0.389	0.322***
	(0.0770)	(0.0940)	(0.241)	(0.0895)
Observations	124	123	123	124
R-squared	0.002	0.085	0.088	0.094

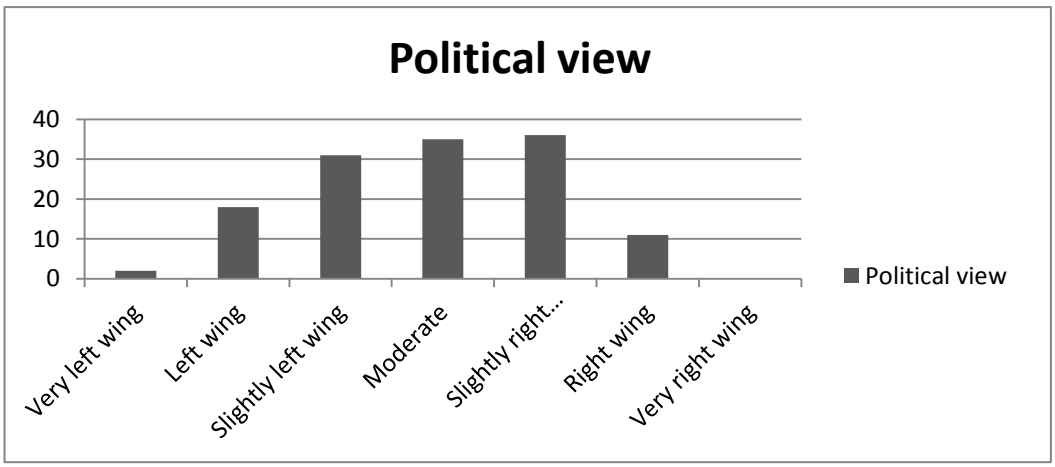
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

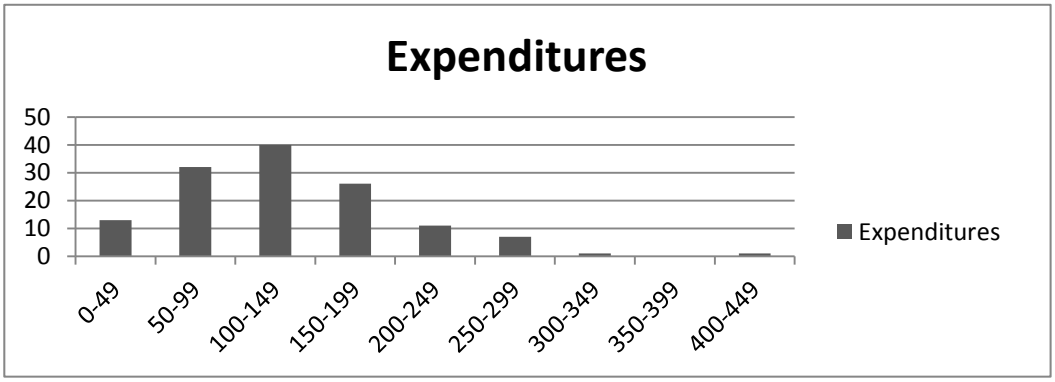
Appendix 7. Descriptive pool

	Mean	SD	Median	Min	Max
Age	23,17	3,92	22	19	48
Parental Income	944,444	473,817	875		
Expenditures	122,938	65,545	120	0	400
Political view	3,89	1,23	4	1	6









9 Instructions

SA1 informs the leader about the number of participants present when all participants are seated.

9.1 General introduction

Leader reads on signal.

Welcome. My name is ... and I will lead this session. Since the results from this experiment will be used in a research project, we ask you to follow the rules of conduct that you have on your desk:

- Please do not communicate with other participants during the experiment.
- If you have questions, raise your hand and we will assist you.
- Visiting websites during the experiment is not allowed.
- Using you mobile phone is not allowed during the experiment.
- Visiting websites during the experiment is not allowed.
- If you fail to comply with these rules, you might be asked to leave the experiment without compensation.

This is an experiment in decision-making. Your payoffs will depend partly on your decisions, the decisions of other participants, and partly on chance. Funding for this experiment has been provided by public and private research foundations. Please pay careful attention to the instructions as a considerable amount of money is (potentially) at stake.

Your participation in the experiment and any information about your payoffs will be kept strictly confidential. Each participant is assigned a participant ID number. This number will be used to record all data. Neither the experimenters nor the other participants will be able to link you to any of your decisions. Neither your name nor any other identifying information about you will be used in any final reports of the study.

The entire experiment should be complete within one and a half to two hours. Your earnings in the experiment will be 100 NOK as a participation fee (simply for showing up on time) plus whatever you earn in the experiment. You will be paid privately according to your participant ID number at the end of the

experiment. Details of how you will make decisions and receive payments will be provided below.

During the experiment we will speak in terms of experimental tokens instead of NOK. Your earnings will be calculated in terms of tokens and then translated at the end of the experiment into NOK at the following rate:

1 Token = 1.20 NOK

The instructions will be read aloud by the experimenter. If you have any questions, please raise your hand and a research assistant will approach your desk.

Once the experiment begins, we ask everyone to remain silent. In order to keep your decisions private, please do not reveal your choices to any other participant. Also, make sure to not close the program window at any time during the experiment.

9.2 The computer program

The experiment has four parts. In each part of the experiment, you will participate in 50 independent decision problems that share a common form. This section describes in detail the process that will be repeated in all decision problems and the computer program that you will use to make your decisions. An example of the computer dialog window is shown in Attachment 1.

Leader waits till everyone has found Attachment 1.

In each decision problem, you will be asked to allocate tokens between two accounts, labeled x and y. The x account corresponds to the x-axis (the horizontal axis) and the y account corresponds to the y-axis (the vertical axis) on a two-dimensional graph. Each choice will involve choosing a point on a line representing possible token allocations. The instructions for each part will describe in detail how the payoff for each part of the experiment will be determined.

Each decision problem will start by having the computer select such a line randomly from the set of lines that intersect with at least one of the axes at 50 or more tokens but with no intercept exceeding 100 tokens. Examples of lines that you might face are shown in Attachment 2. In each part of the experiment, the lines selected for you in different decision problems are independent of each other and of the lines selected for any of the other participants in their decision problems, and will not depend on your choices in any of the earlier decision problems.

In each choice, you may choose any x and y pair that is on the line. For example, as illustrated in Attachment 3, choice A represents a decision to allocate q tokens to the x account and r tokens to the y account. Similarly, choice B represents a decision to allocate w tokens to the x account and z tokens to the y account.

To choose an allocation, use the mouse to move the pointer on the computer screen to the allocation that you desire. The computer will only allow you to choose x and y combinations that are on the line. When you are ready to make your decision, left-click to enter your chosen allocation. After that, confirm your decision by clicking on the Submit button. To move on to the next round, click the OK button. Once you have clicked the OK button, your decision cannot be revised.

Next, you will be asked to make a decision in another independent decision. This process will be repeated until all 50 decision problems in each part of the experiment are completed. At that point, you may have to wait for other participants to finish. Each part of the experiment will end after all participants have made all their decisions. At the end of each part of the experiment, you will receive further instructions. At the end the experiment, the computer will randomly select one of the 50 decision rounds from each of the four parts of the experiment to carry out for payoffs. The round selected from each part depends solely upon chance.

Leader continues when both rooms are ready.

9.3 Part 1

You will now be given the instructions for part 1. Please raise your hand if you have any questions.

SA1 hands out Part 1 instructions

Anne-Mari gives a sign to Ranveig when the participants have finished reading the Part 1 instructions, and when nobody has more questions. Ranveig will then start Part 1.

Ranveig gives a sign when all of the participants are finished with Part 1, and the leaders continue reading

You have now finished Part 1 of the experiment. We will now collect the instructions for Part 1.

SA1 collects the papers for Part 1. Leader waits till SA1 has finished collecting the Part 1 instructions

9.4 Part 2

You will now be given the instructions for part 2. Please raise your hand if you have any questions.

SA1 hands out Part 2 instructions

Anne-Mari gives a sign to Ranveig when the participants have finished reading the Part 2 instructions, and when nobody has more questions. Ranveig will then start Part 2.

Ranveig gives a sign when all of the participants are finished with Part 2, and the leaders continue reading

You have now finished Part 2 of the experiment. We will now collect the instructions for Part 2.

SA1 collects the papers for Part 2. Leader waits till SA1 has finished collecting the Part 2 instructions

9.5 Part 3

You will now be given the instructions for part 3. Please raise your hand if you have any questions.

SA1 hands out Part 3 instructions

Anne-Mari gives a sign to Ranveig when the participants have finished reading the Part 3 instructions, and when nobody has more questions. Ranveig will then start Part 3.

Ranveig gives a sign when all of the participants are finished with Part 3, and the leaders continue reading

You have now finished Part 3 of the experiment. We will now collect the instructions for Part 3.

SA1 collects the papers for Part 3. Leader waits till SA1 has finished collecting the Part 3 instructions

9.6 Part 4

You will now be given the instructions for part 4. Please raise your hand if you have any questions.

SA1 hands out Part 4 instructions

Anne-Mari gives a sign to Ranveig when the participants have finished reading the Part 4 instructions, and when nobody has more questions. Ranveig will then start Part 4.

Ranveig gives a sign when all of the participants are finished with Part 4, and the leaders continue reading

You have now finished Part 4 of the experiment. We will now collect the instructions for Part 4.

SA1 collects the papers for Part 4. Leader waits till SA1 has finished collecting the Part 4 instructions

10 Questionnaire and payment

Short intro when the status page shows that everyone has completed Part 4

All of you have now completed the last part of the experiment. The computer will now calculate your payment from the experiment. While we wait for the payments to be prepared, we should like to ask you to answer some questions. Your answers to these questions will not in any way affect your payment. When you have answered the questions, please remain seated for further instructions. Please note that there are questions on both sides of the questionnaire.

SA1 hands out the questionnaire.

Leader waits until everyone has finished the questionnaire before reading. Ranveig and Anne-Mari have to communicate here, so both rooms are ready before starting at the same time.

Everyone has now answered all the questions. You will soon be given your payments. You will also be given an overview of what you have earned in the experiment. Please raise your hand if you have any questions regarding this the overview or the payment. Again, while we wait, we ask you to remain quiet and seated at your desk.

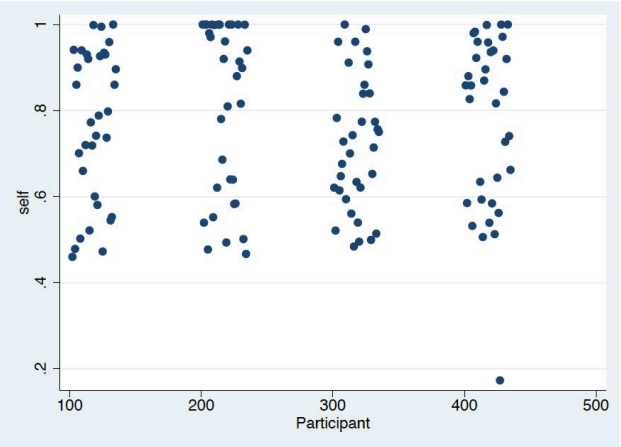
LEADER WAITS UNTIL THE ENVELOPES ARRIVES AND THE SA2 WHO HAS PREPARED THEM HAS LEFT THE ROOM.

My assistant will now hand over the envelopes to you. He will do so by approaching your working stations one by one.

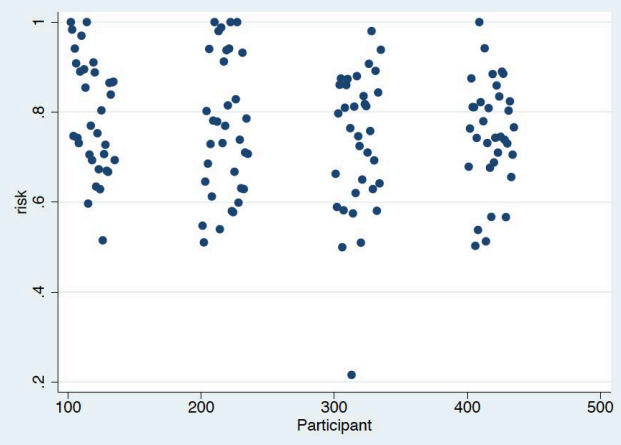
Before we proceed with the payments, let me take the opportunity to thank you all for participating in this experiment. Your participation is valuable to the research that we do. May we also ask you not to talk to anyone about the experiment before the end of today, since we will conduct more session later today. Thank you!

Appendix 9. Summarizing table and scatterplots of independent variables

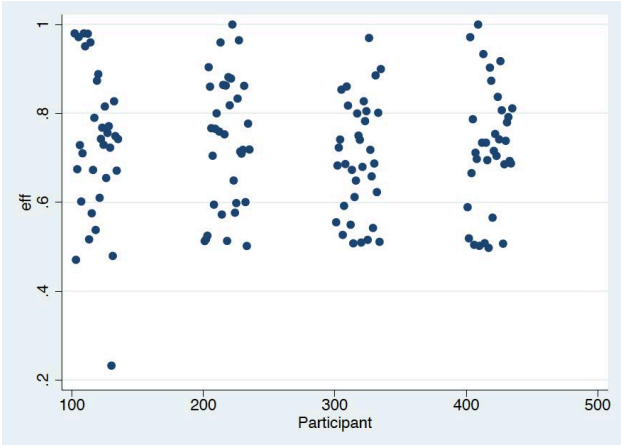
	Obs	Mean	SD	Median	Min	Max
TATR	135	.539	.188	.5625	.0625	1
SELFISH	134	.775	.178	.7932105	.4599966	1
RISK	134	.765	.133	.763805	.4997005	1
EFFICIENCY	134	.726	.141	.7289553	.4705028	1



Scatterplot SELFISH by participant ID



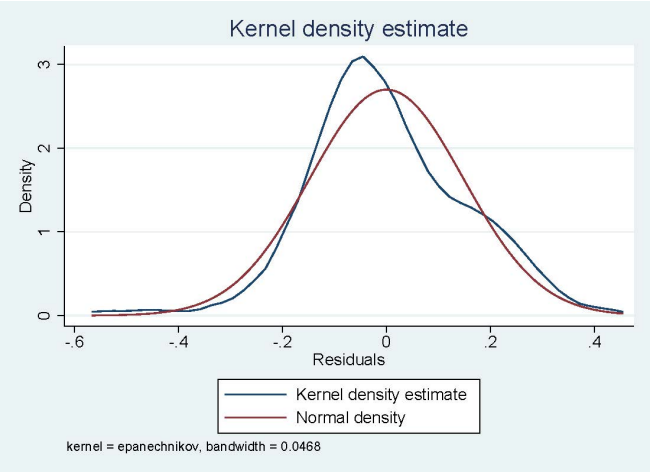
Scatterplot RISK by participant ID

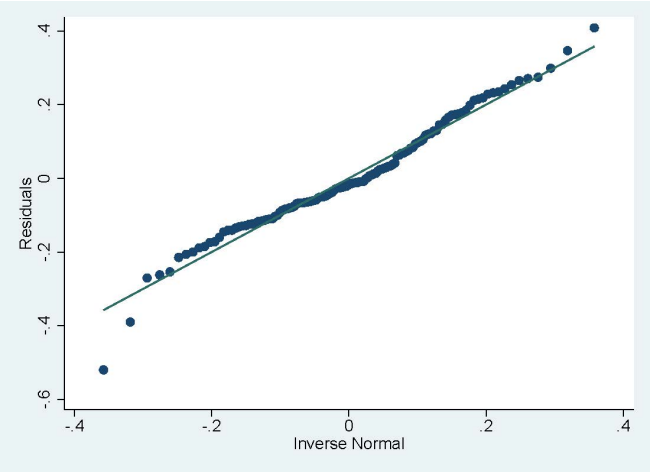


Scatterplot EFFICIENCY by participant ID

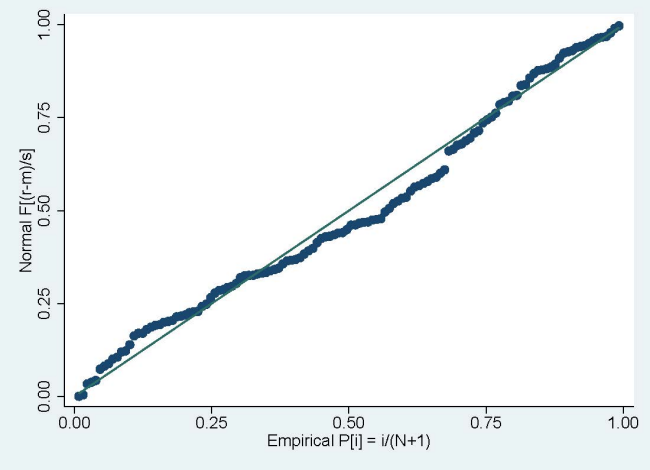
Appendix 10. OLS assumption testing

Normality





Distributional diagnostic plot
Quantiles of residuals against quantiles of normal distribution



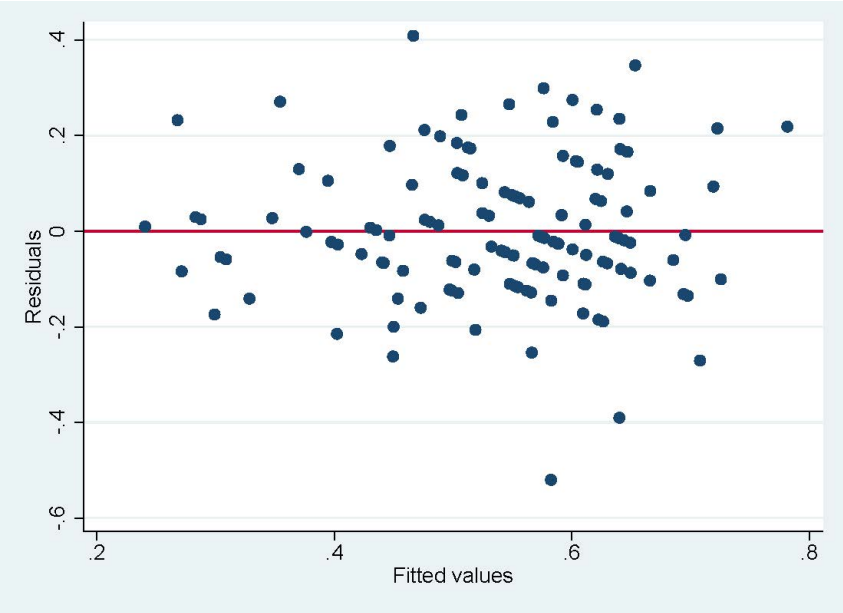
Distributional diagnostic plot
Standardized normal probability plot

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
r	128	0.97980	2.053	1.617	0.05290

Appendix 10. OLS assumption testing

Heteroscedasticity



Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	78.01	43	0.0009
Skewness	14.28	8	0.0748
Kurtosis	1.07	1	0.3010
Total	93.36	52	0.0004

Multicollinearity

Variable	VIF	1/VIF
risk	2.01	0.496339
eff	1.91	0.523314
expenditures	1.21	0.826725
parentalincome	1.17	0.852880
politicalview	1.17	0.856911
age	1.16	0.860109
self	1.14	0.877554
gender	1.10	0.905273
Mean VIF	1.36	

Appendix 10. OLS assumption testing

Linearity