POWER OF GOD & LEVEL OF RISK

The impact of religiosity on individual’s risk preferences

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# Master's Thesis

**Study Program:**
Master i økonomi og administrasjon

**Thesis is Written in the Following Specialization/Subject:**
Anvendt finans

**Is the Assignment Confidential?**
(NB! Use the red form for confidential theses)

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**Title:**
Power of God & Level of Risk; The impact of religiosity on individual’s risk preferences

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Stavanger, …../….. 2016

Signature administration:…………………………
This master thesis marches the ending of my master’s degree program in Business & Administration at University of Stavanger (UIS). It also marches my 12 years of nonstop studying, since I came to Norway as a 14 years old boy. When I first started school in Norway, the only language I spoke was my mother’s tongue. However, today I have managed to write a research paper in English. I am so happy and I express my gratitude to father God, and to my mom and my sisters.

I would also like thank my supervisor, Ingeborg Foldøy Solli, for the great support given to me during the whole period. Words cannot express how thankful I am, and I give all the credit to her.

I’m blessed
ABSTRACT

This research paper examines the impact of religiosity on individual’s risk preferences. The expectation is that higher level of religiosity will lead to less risk averse behaviors (more risk loving). Using religious practice, religious belief and spirituality to measure religiosity, and a lottery task to measure risk aversion, quantitative data are collected from 1000 Norwegian individuals.

The paper observed that religious practice and spirituality have a positive relationship with risk aversion. Religious belief has a negative relationship with risk aversion. However, the results are not significant and the expectation is not supported.

After splitting the sample into different subsample, significant results are observed. For young individuals, religious practice responds negatively on risk aversion, and religious belief responds positively. For female individuals, a negative relationship between religious belief and risk aversion is observed. Holding all else equal, spirituality has a positive relationship with risk aversion.
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1. INTRODUCTION

Risk and uncertainty play a huge role in almost every human behavior, and every important economic decision. Whether we want to buy a house, invest in a stock market, or just simply cross a street, we have to make risky decisions every day. According to Dohmen et al. (2011), understanding individual attitudes toward risk is the ultimate key to predict economic behavior.

Aftenposten\(^1\) in January, 2016 wrote an article about a research survey conducted in Iceland. The result shows that individuals under 25 years old, do not believe that God created the earth, but at the same time 17% of them said that they believe in God. One would naturally assume that a God believer would accept the fact that He created the earth. However, the survey revealed that there is limitation in individual’s religious beliefs, and the world’s view on religion is constantly changing.

The purpose of this paper is to examine whether religiosity has any impact on individual’s risk preferences.

Several economic studies have revealed the existence of a link between religion and economic behavior. Max Weber (1930) in his book, The Protestant Ethic and the Spirit of Capitalism (1930), wrote that the protestant institution in Germany and its ethic was one the main factor for the capitalistic economic growth in the country. In particular, most successful people in the country at that time were Protestants. Moreover, a study from Barro and Mc Cleary (2003), revealed that there is a strong positive relationship between economic growth and religious beliefs (hell & heaven). In fact, countries where there are strong religious beliefs, the GDP is 0,5 higher than the average.

Similarly, there are also several studies on how religious factors affect human behavior. More specifically, Sander and Cohen-Zada (2010) observed that church attendance correlates positively with happiness. Moreover, religious practice responds positively on marriage stability, better quality of marriage, less divorce, and a successful next generation (Waite and Gallagher, 2000).
As for religiosity and risk preferences, a positive relationship between religiosity and risk aversion is observed by several recent studies (Miller and Hoffmann, 1995; Hilary and Hui, 2009; Osoba, 2003). On the other side, Diaz (2000) observed a negative relationship between religiosity and gambling in Las Vegas. The above studies have a common approach for measuring religiosity, and that is religious practice (church attendance, frequency of prayer etc.) and religious beliefs (God, miracles etc.).

Norway offer a good sample arena to study this topic. Norway is a Lutheranism dominated country and 72,9% of the population are Lutherans (SSB,2015)\(^2\) Moreover, very little research of this topic has been conducted in Norway, as well as in Lutheranism dominated country. Previous studies have mainly focused on Catholicism, Protestantism, Judaism and Islamism.

Using the above same approach, and adding “spirituality” as a new measuring factor, I collected a survey data of 1000 individuals. I adapted Eckel and Grossmann (2002) lottery task to measure individual’s level of risk aversion. When testing the whole sample as one, the results are not significant and there are no indications that religiosity has any impact on risk aversion. However, after splitting the sample into different subsamples, significant results are observed.

For young individuals, religious practice responds negatively on risk aversion, and religious belief responds positively. For female individuals, a negative relationship between religious belief and risk aversion is observed. Holding all else equal, spirituality has a positive relationship with risk aversion.

This paper is organized as follows. The next chapter focuses on the relevant theoretical foundations for this study. Existing evidences and some comments on previous findings are discussed in Chapter 3, while Chapter 4 describes the empirical strategy. The dataset is analyzed in Chapter 5, and the results and discussions are presented in Chapter 6. The paper finish off with a short conclusion in Chapter 7.
2. THEORY

An opening question, why should religiosity have any impact on individual’s risk preferences? This chapter focuses on the relevant theories to answer this question, and it begins by defining the two main terms, religion and risk.

2.1 MAIN TERM DEFINITIONS

2.1.1 What is religion?

“If you do not ask me what time is, I know. If you ask me, I do not know”

St. Augustine

Everybody knows the definition of religion before we ask them. But if we ask them, they will have hard time defining it. The definition of the word religion can vary widely, and it is hard to give an exact definition. Oxford Dictionary suggests following definition:

“Religion is the belief in worship of a superhuman controlling power, especially God or gods”

The way Oxford Dictionary defines religion can raise many questions. For example, how and when people become a supernatural believer, and how these beliefs affect their behavior, is something that outsider cannot observe or identify (Harrison, 2006). This definition will also exclude Theravada Buddhism from the definition.

According to religion textbook for VG3, Tro og Tanke, substantive definitions and functional definitions are needed to define religion. This is the concept that I will be adapting to define religion. Substantive definitions explain religion out of what content it has. Exemplary, in form of “beliefs” such as believe in God or in Gods. Functional definitions explain religion out of what it does for the people and society. Exemplary, comfort and hope in the face of death, or all human activities that provide meaning to life (Heiene et al., 2014).
The authors of the book do not come up with an exact definition for religion. However, based on the provided concept, a religion is a combination of:

1) “the belief in worship of a superhuman controlling power, especially God or gods”

2) “a collection of cultural systems, belief systems, and worldviews that relate humanity to spirituality and, sometimes, to moral values”

2.1.2 WHAT IS RISK?

According to Holton (2004), there are two factors needed for a general definition of risk to exist, exposure and uncertainty. Risk is to expose a situation which is uncertain. Holton wrote, if a man jumps out of an airplane without parachute, he faces no risk since he definitely will die (no uncertainty). According Holton, we firstly care about the outcomes. Whenever we have a personal interest in what will occur, we are then exposed. Secondly, we do not know what will happen. The outcome in every situation is uncertain.

For my research paper, risk is simply defined as variability of the outcome of some uncertain activity. If the variability is low, the activity may become more and more certain (Snyder and Nicholson, 2008).

2.2 SOCIAL IDENTITY THEORY

Social identity theory is developed by Tajfel and Turner in 1979, and the theory suggests that part of an individual’s self-concept is influenced by the group he or she belongs to. Moreover, individuals who strongly identify with a group, is willing to adopt the group’s identity as a part of his own (Schneider and Barbera, 2014). By a church or a religious group teaching and providing moral and ethical guidance to its members, it also encourages the members to behave in a certain way. Consequently, religion may directly influence an individual’s economic behavior (Barro and McCleary, 2003).
Exemplary, many Christians accept the Bible as direct words from God. The bible in generally encourages people to take risks. Some verses from the bible says:

*Don't be afraid, for I am with you. Don't be frightened, for I am your God.*

(Isaiah 41:10)

*The Lord is with me; I will not be afraid. What can man do to me? The Lord is with me; He is my helper.* (Psalm 118:6-7)

*I can do all things through Christ.* (Philippians 4:13)

The bible generally promotes risk loving behaviors, as well as many risk taking persons in the book. Exemplary, one of the major stories in the bible is the story of Abraham. Abraham is described as the great example for many Christians, and his story is very often told in church services. In the bible, Abraham took a huge risk by leaving his country, his family and his wealth, and went to search for a new unknown place. Another story is the story of King David, where young David taking risk and fought against Goliath. David at the end killed Goliath.

Abraham is known as Ibrahim in Islam, and the same above story of him is written in Quran 87:19. Quran describes him as the father of the prophets. Just like the Bible, Quran is a central religious text in Islam, and it is believed as a revelation from Allah. For Muslims, Allah is the God, the provider, the commander, and any individual can directly address anything to Allah. According to the Quran, through Allan one has nothing to fear (The Islamic Bulletin)⁵.

Summarizing, neither the Bible or Quran prevents people from taking risks. Instead, they generally encourage the followers to believe in God and to not be afraid of risks. Since religious people are expected to behave accordingly to religious morals and ethical rules, they might tend to be risk loving in economic matters.
2.3 ANXIETY, A CLASSICAL STUDY

Another theory that might explain the existence of a correlation between religiosity and risk preferences, is anxiety (Hilary and Hui, 2009). Classical studies from Malinowski (1925) and Hormans (1941), suggest that individuals who seek religion are anxious and fear of uncertainty. By seeking religion, they are trying to eliminate anxiety about risk and uncertainty in their lives. Consistent with this theory, an empirical study from Rokeach (1968) found out that religious individuals have higher level anxiety than non-religious individuals. On the other side, empirical studies suggest that anxiety leads to more risk aversion behavior (Gasper and Clore, 1998). Summarizing, religious people are more anxious and thus religious people are expected to have a higher level of risk aversion.

2.4 EXPECTED UTILITY THEORY

A traditional Christian and Islam teaching is afterlife, either a person go to hell or to the heaven. Hell is a place for punishment and heaven is a place for reward. The question is which one an individual value the most. If individuals focus only on the punishment, religious behavior can be seen as a form of insurance against hell, and risk averse individuals would find it appealing. However, if one focuses on possibility of reward, religious behavior can be seen as a buying lottery game. To win a big reward, one must be willing to involve in risky situations. Taking chance now for a bigger reward to be claimed later in afterlife, which risk lovers would find it more appealing (Montgomery, 2007). Thus, among people who believe in afterlife, their risk attitudes towards religious behavior and irreligious behavior are very certain.

According to John von Neumann and Oscar Morgenstern, people behave rationally when facing uncertain actions. A classical study from Adam Smith (1776) also suggests that participation in religion can be viewed as a rational action (Anderson, 1988). The rational action theory is called the Expected Utility Theory, and developed by both von Neumann and Morgenstern in 1953.
Suppose an individual can win \( n \) possible prizes by participating in a lottery. Let’s assume the prizes are \( X_1, X_2, \ldots, X_n \), and they have been arranged in order such that \( X_1 \) is the least preferred prize and \( X_n \) is the most preferred prize. Suppose the prizes have following utility numbers:

\[
U(X_1) = 0 \\
U(X_n) = 1
\]

As mentioned, \( X_n \) is the most preferred prize which means individual prefer \( X_n \) to \( X_1 \). Using these two values of utility, one can acquire specific utility numbers for the remaining prizes. Suppose, a new prize \( X_i \), and probability \( \pi_i \). The individual are asked to provide at which \( \pi_i \), she or he would be indifferent between \( X_i \) with certainty, and a lottery offering prize \( X_n \) with probability \( \pi_i \), and \( X_1 \) with probability \( (1- \pi_i) \).

The individual will always be indifferent between a gamble and a sure outcome, as long as there is high enough probability of winning the best prize. (Snyder and Nicholson, 2008)

The von Neumann-Morgenstern technique is to define the utility of a sure outcome \( X_i \), as the expected utility of the gamble which is equally desirable to \( X_i \), for the individual. Thus:

\[
U(X_i) = \pi_i*U(X_n) + (1- \pi)*U(X_1)
\]

### 2.4.1 AXIOMS

The von Neumann & Morgenstern theory comes with four assumptions that individuals behave rationally and take rational decisions.

The first assumption is **completeness**, which means an individual is able to choose between two options, or indifferent between the two options.

The second assumption is **transitivity**, which means the choice of the individual is always consistent. Symbolically, if \( A>B \), and \( B>C \), then \( A>C \).

The third assumption is **continuity**, which means is if \( A \) is preferred to \( B \), then any options close to \( A \) is also preferred to \( B \).
The last assumption is *independence*, which means that the preference for two options do not change if a new third option is presented.

If all the assumptions are met, we can say that the individual behaves rationally, and we can present the individual’s preferences in a utility function. (Von Neumann and Morgenstern, 1953).

### 2.4.2 RISK PREFERENCES

As mentioned, people face decisions involving risks every day, and most people avoid risk in most situations. On the other side, people are willing to take risk if they get high enough compensation. From the expected utility theory perspective, individuals can be divided into three categories, risk adverse, risk neutral and risk seeking.

A risk averse person is uncomfortable with uncertainty, will always refuses fair bets. A fair bet can be, a flipping a coin of winning or losing 1000 kr. As a consequence, a risk averse person will be willing to pay something to avoid taking fair bets (Snyder and Nicholson, 2008). The fact that people buy insurances, provides the evidence of people avoiding risk in most situations.

![Utility function for a risk averse person](image)

Figure 1: Utility function for a risk averse person
There are also people who seem to prefer to take on risk. A person of this type is called risk lover, and he/she will choose an uncertain bet rather than a sure outcome. For example, a risk lover would rather choose a prospect with, 40% chance of KR 50 000 wealth, and 60% chance of KR 1 000 000, versus a sure wealth of KR 620 000 (Ackert and Daves, 2010).

The group between risk averse and risk lover, is people who are risk neutral. A risk neutral person is indifferent between a prospect with, 40% chance of KR 50 000 wealth, and 60% chance of KR 1 000 000, versus a sure wealth of KR 620 000 (Ackert and Daves, 2010).

Summarizing, expected utility theory says that individuals behave rationally in uncertain situations, and that a rational individual will always choose the option that maximize the expected utility. Putting this in religion perspective, individual who face uncertain actions, are expected to behave accordingly to Expected utility theory.
PART 3: EXISTING EVIDENCES

There are a several studies on the impact of religiosity on risk preferences. This part provides a review of studies that have been done so far, along with comments to these studies which is relevant for my hypothesis development.

3.1 PREVIOUS EMPIRICAL STUDIES

Miller and Hoffmann (1995) studied the relationship between gender, risk preferences and religiously. Their study suggests that women are more religious than men, and that gender differences in religiosity are related to differences in risk preferences. They also suggest that men in general involve in risky behaviors more than women. Some of risky behaviors they mentioned are drinking, drug use and adultery. Because of their willingness to take risks, men are expected to be less religious. This leads also to their conclusion that religious people are risk averse (Miller and Stark, 2002). However, taking account on risky behaviors, one would naturally assume men to be always less religious than women.

Osoba (2003) finds that risk averse individuals have higher church attendance than risk loving individuals. Osoba (2003) used risk avoidance indicator to measure individuals risk preferences. The risk avoidance indicator is based on individual’s risky behaviors, such as smoking, car insurance, medical insurance, fasten car seat belts, or whether the individual has a sufficient financially defense. His study finds that individual’s risk aversion and church attendance have positively consistently correlation level of 1%.

Diaz (2000) did a random telephone survey on residents in Las Vegas, and collected data on church attendances, self-reported importance of religion, and frequency of gambling. He finds a strong evidence that individuals with high religious service attendances, gamble less than those with lower attendances. His study also finds a negative relationship between self-reported religion importance and gambling.
Noussair et al. (2012) did similar observation in their discussion paper. Their observation is based on a representative sample of Dutch population in the Netherlands. A lottery experiment is used to measure risk aversion. They find that the religious (measured by church attendance or membership) people are more risk averse.

At last, Hilary and Hui (2009) takes the link between religion and risk to corporate level. Their study shows that firms located divisions with high level of religiosity, take less risk in investment and portfolio decisions. As result, these firms have lower variance of equity & asset returns, lower level of investment and lower level of long term growth. Their data is based on level of membership and participation in religious organizations in USA.

Summarizing, all the above empirical literatures support the existence of the link between religiosity and risk preferences. In fact, the more religious people are the more risk averse they are.

3.2 COMMENT ON PREVIOUS STUDIES

SPIRITUALITY FACTOR

All the above studies use two different approaches to measure religiosity. The first approach is belief, in form self-reported importance of religion, Miller and Hoffmann (1995), Osoba (2003), and Diaz (2000). The second approach is practice, in form of church attendance Miller and Hoffmann (1995), Diaz (2000), and Noussair et al. (2012). Their findings support the idea that religiosity influences individual’s risk preferences. However, less attention has been paid on spirituality factor.

According to Jones and Cox (2010), three factor are needed to measure religiosity. They are religious practice, religious belief and spirituality. Spirituality represents the experience of a person, e.g. having a sense of wonder or a sense of inner peace. A more detailed description of spirituality is described in next chapter.
The suggestion of Jones and Cox (2010), is also consistent with the Bible and Quran interpretation of a human being. According to the Bible and Quran, a human is composed of body, mind and spirit. Body represents practice, mind being the belief, and sprit represents spirituality.

![Diagram of BODY, MIND, and SPIRIT](image)

Figure 4: Bible’s & Quran’s interpretation of a human

### 3.3 RISK PREFERENCES OF NORWEGIAN PEOPLE

Very little research of this topic has been done in Norway, as well as in Lutheranism countries. Norway is a Lutheranism dominated country and 72,9% of the population are Lutherans (SSB,2015). Previous studies have mainly focused on Catholicism, Protestantism, Judaism and Islamism. However, Lutheran is a decedent from Protestantism, and based on this factor and without considering any other factors, one would also expect religious people in Norway to be risk averse. However, this assumption needs a stronger evidence.
4. METHODOLOGY

I begin this chapter by presenting the hypotheses, and describe the empirical strategy and models to test the hypotheses.

4.1 HYPOTHESIS

The purpose of this study is to examine weather religiosity has any impact on individual’s risk preferences. Social Identity Theory argues that religious individuals follow religious norms and ethical rules, and should therefore be more risk loving. Classical studies on anxiety argues that religious people are more anxious, and should therefore be risk averse. On the other side, expected utility theory argues that individuals behave rationally and will always seek after the option that maximizes the expected utility.

Based on the above theories, I then argue that by having God as the ultimate supporter and shelter, higher religiosity will lead to higher level of confidence. Higher level of confidence will lead to higher level of risk (less risk averse in this paper). Thus, following hypothesis is developed:

H1: Individuals with higher level of religiosity are less risk averse

As mentioned, spirituality is a measurement factor that previous studies almost never include. I argue that spirituality is an important factor for religiosity and following hypothesis is developed:

H2: All else equal, individuals with strong level of spirituality are expected to be less risk averse.
4.2 EMPIRICAL STRATEGY

I selected Ordinary Least Squared regression model to test the hypothesis. OLS is a method for estimating the unknown parameters in a linear regression model. OLS minimizes the sum of squared residuals between the observed value and the value predicted by the linear estimation model $\varepsilon$ (Wooldridge, 2009). The study’s approach is expressed as following:

$$Y_i = \beta_0 + \beta_1 i + G_i + Z_i + \varepsilon$$

$i =$ Individual $i$
$Y =$ Risk aversion
$\beta_0 =$ Constant
$\beta_1 =$ Coefficient measuring impact of religiosity
$G =$ Indicator of religiosity
$Z =$ A vector of control variables
$\varepsilon =$ error

In this model, $Y$ represents level of risk aversion, and $Y$ is a linear function of a constant $\beta_0$, and variables of interest, religiosity. $\beta_1$ is the slope coefficient of the variables of interest. $\beta_1$ is the expected change in $Y$, resulting from changing $G$, when holding all other things constant. $Z$ is a vector of control variables, and the error term $\varepsilon$ (Wooldridge, 2009).

4.2.1 THE DEPENDENT VARIABLE, RISK AVERSION

I decided to run a lottery task to measure individuals risk aversion. A recent discussion paper from Ding, Hartog and Sun (2010) validates that we can measure individuals risk attitudes in a lottery task. The lottery task I have chosen to use is an adaption of a model developed by Eckel and Grossmann (2002). The model contains six possible lotteries, with 50/50 chance of a high or low payoff. The participations are asked to choose one of the six possible lotteries.
The payoff values in my lottery task are proposed by Laurila, Eriksen and Kvaløy, and I multiplied the values by 10, to represent a larger amount of money.

Table 1: Adaption of Eckel and Grossman Lottery Task

<table>
<thead>
<tr>
<th>LOTTERY 50/50</th>
<th>LOW PAYOFF</th>
<th>HIGH PAYOFF</th>
<th>EXPECTED PAYOFF</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTTERY 1</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>0</td>
</tr>
<tr>
<td>LOTTERY 2</td>
<td>860</td>
<td>1290</td>
<td>1075</td>
<td>215</td>
</tr>
<tr>
<td>LOTTERY 3</td>
<td>710</td>
<td>1570</td>
<td>1140</td>
<td>430</td>
</tr>
<tr>
<td>LOTTERY 4</td>
<td>570</td>
<td>1860</td>
<td>1215</td>
<td>645</td>
</tr>
<tr>
<td>LOTTERY 5</td>
<td>430</td>
<td>2140</td>
<td>1285</td>
<td>855</td>
</tr>
<tr>
<td>LOTTERY 6</td>
<td>70</td>
<td>2500</td>
<td>1285</td>
<td>1215</td>
</tr>
</tbody>
</table>

Lottery 1 has a sure payoff with expected payoff of kr 1000. The expected payoff and the standard deviation is linearly increasing from Lottery 1 to Lottery 6. The model is structured so that a risk averse person will choose lotteries with a lower standard deviation. A risk neutral person will choose lottery with the highest expected payoff. Lottery 5 and Lottery 6 have the same expected payoff, but Lottery 6 has a higher standard deviation, which means a risk loving person will always choose Lottery 6 (Eckel and Grossmann, 2002).

Table 2: Adaption of Eckel and Grossman Lottery Task with risk preferences

<table>
<thead>
<tr>
<th>LOTTERY 50/50</th>
<th>RISK PREFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTTERY 1</td>
<td>Highly Risk Averse</td>
</tr>
<tr>
<td>LOTTERY 2</td>
<td>Very Risk Averse</td>
</tr>
<tr>
<td>LOTTERY 3</td>
<td>Risk Averse</td>
</tr>
<tr>
<td>LOTTERY 4</td>
<td>Slightly Risk Averse</td>
</tr>
<tr>
<td>LOTTERY 5</td>
<td>Risk Neutral</td>
</tr>
<tr>
<td>LOTTERY 6</td>
<td>Risk Lover</td>
</tr>
</tbody>
</table>

Lottery (L) is the dependent variable in my model. An individual’s level of risk aversion will be exposed by his/her choice of lottery.
The lottery task focuses on the risk aversion behaviours, and does not offer different level of risk seeking behaviours. Therefore, I will be using the terms “less risk averse” vs “more risk averse”, instead of “risk loving” vs “risk averse”.

**4.2.2 THE INDEPENDENT VARIABLE, RELIGIOSITY**

According to Jones and Cox (2010), religiosity has three dimensions. The first dimension is “religious practice”, which represents the actions of a person. Exemplary, church attendance, prayers, reading the scriptures, fasting etc. The second dimension is “religious belief”, which represents the faith of a person. Exemplary, believing in God, believing in miracles and believing in religious features that cannot be seen. The third dimension is “spirituality”, which represents the experiences of a person. Spirituality is having hope, comfort, and inner peace in life.

Many people confuse spirituality with religious beliefs. The difference is that religious beliefs is about both past, present and future. Exemplary, Religious belief offers promises for eternal life and the afterlife. Spirituality is about the present, and experiencing comfort, peace here and now. Exemplary, religious belief is believing in miracles, and miracles is an event that cannot be explained by natural or scientific laws. Spirituality is having a sense of wonder, and wonder is an event within natural laws. [Oxford Dictionaries]
Religious practice, religious belief and spirituality are the independent variables in my research paper.

\[ L = \beta_1 \text{Practice} + \beta_2 \text{Belief} + \beta_3 \text{Spirituality} \]

The questions I used to measure religiosity are direct adaptation of dataset Religion 2008, Norwegian Part of ISSP (2008). The International Social Survey Programme (ISSP) is an international organization that conducts and develops political science and sociology annual surveys. Norske Spørreundersøkelser (NSD) is a member of ISSP and NSD is the one conducting surveys in Norway.

In my research paper, there are three questions to measure religious practice, four questions related to religious belief, and three questions to measure spirituality.

Religious practice related questions

Q1: How often do you attend religious services or other religious meetings?
Q2: Approximately, how often do you pray?
Q3: I follow a religion.

Religious belief related questions

Q4: I am convinced about God’s existence.
Q5: I believe in life after death.
Q6: I believe in heaven and hell.
Q7: I believe in religious miracles

Spirituality related questions

Q8: I am a spiritual person interested in the holy and supernatural
Q9: Practicing religion helps people to find inner peace and happiness
Q10: Practicing religion helps people to meet the right type of people

The questions are ordinal type of questions, where the answers are ordered responses (e.g. Agree-Disagree). Later in this chapter, each group of questions will be summed up into a new variable.
4.2.3 CONTROL VARIABLES

Control variables that I used in this study are both dummy variables and continuous variables. A dummy variable takes value of 0 or 1, while continuous variables have infinite number of different values (Wooldridge 2009).

**Gender:** Several studies shows that females are more religious than males (Miller and Stark, 2002). Therefore, a dummy variable is created for gender. (male=1, female=0)

**Age:** Age is a continuous variable that is controlling for the effect of age on religiosity. Studies shows that older people are more religious than younger people (Deaton, 2009).

**Urban:** According to Peach (2013), people who live in rural areas or in villages are more conservative, and tend to be more religious. A dummy variable for Urban is therefore added to the model. I define urban as areas where the population is at least 50 000. (urban=1, rural=0)

**Occupation:** There are five categories for occupation, student, employed, unemployed, social benefits, and other. A dummy variable is created for each category.

**Education:** Religious people tend to be more successful at education (Muller and Ellison, 1988), and this will be controlled by dummy variables. There are four categories for education. High school for respondents who have education up to high school level, Bachelor, Master or higher, and other.

**Relationship:** Studies suggest that religiosity responds positively to quality of marriage, marriage stability, and less divorce (Waite and Gallagher, 2000). This will be controlled by relationship dummy variables.

**Household Size:** Dummy variables for household size is also created to examine the effect of household sizes. There are three categories for household size, 1 person, 2-4 persons, and 5-more persons.
The complete OLS regression model is now expressed as:

\[ L = \beta_0 + \beta_1 \cdot \text{Practice} + \beta_2 \cdot \text{Belief} + \beta_3 \cdot \text{Spiritual} + \beta_4 \cdot \text{male} + \beta_5 \cdot \text{Age} + \beta_6 \cdot \text{Urban} + \beta_7 \cdot \text{Occupation} + \beta_8 \cdot \text{Education} + \beta_9 \cdot \text{Relationship} + \beta_9 \cdot \text{Householdsize} + \epsilon \]

The OLS regression model has following Gauss-Markov assumptions:

1) The model is linear in parameters, and can be written as
   \[ y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \epsilon \]
   where \( \beta_0, \beta_1, \ldots, \beta_n \) are the unknown parameters of interest and \( \epsilon \) is an unobservable random error.

2) We have a random sample of \( n \) observations

3) No perfect collinearity, none of the independent variables is constant, and there are no exact linear relationships among the independent variables.

4) Zero conditional mean, the error \( \epsilon \) has an expected value of 0, given any values of the independent variables.
\[ E(\epsilon | X_1, X_2, \ldots, X_n) = 0 \]

5) Homoscedasticity, the error \( \epsilon \) has the same variance given any value of the independent variables.
\[ \text{Var}(\epsilon | X_1, X_2, \ldots, X_n) = \sigma^2 \]

Under assumptions 1-4, the OLS coefficient estimators are unbiased, and from assumptions 1-5, the OLS estimators are the best linear unbiased estimators (BLUEs) (Wooldridge, 2009).
4.3 Creating a New Summed Up Variable

As mentioned, there are three questions to measure religious practice, four questions to measure religious belief, and three questions to measure spirituality. Each group of questions will be summed up into a new variable, and one way to create a summed up variable is by taking the average (Leliveld and Wiebenga, 2014).

\[
\text{Practice} = \frac{(Q1+Q2+Q3)}{3} \\
\text{Belief} = \frac{(Q4+Q5+Q6+Q7)}{4} \\
\text{Spiritual} = \frac{(Q8+Q9+Q10)}{3}
\]

In order to analyze whether each group of questions can be summed up to one variable, a reliability test is required (Leliveld and Wiebenga, 2014). The model I have chosen for reliability test is Crobach’s Alpha. Croach’s Alpha is developed by Lee Crobach in 1951, and the test measures internal consistency, which means how well related a set of items are as a group. The test is expressed as a number between 0 and 1, and the minimum acceptable value is 0.7 (Tavakol and Dennick, 2011). I run a Cronbach’s Alpha test in SPSS, and the results are following:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach’s Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice</td>
<td>0.923</td>
<td>3</td>
</tr>
<tr>
<td>Belief</td>
<td>0.815</td>
<td>4</td>
</tr>
<tr>
<td>Spiritual</td>
<td>0.744</td>
<td>3</td>
</tr>
</tbody>
</table>

Table3: Cronbach’s Alpha Test

Cronbach’s Alpha test shows values greater than acceptable value of 0.7, for all the variables. Thus, each group of questions are allowed to sum up into new one variable.
5. DATA ANALYSIS

This chapter focuses on collecting of data and the collected data are analyzed using descriptive statistics. The results are presented by using graphs and tables.

5.1 DATA COLLECTING

Quantitative data are collected to examine weather religiosity has any impact on individual’s risk preferences. An online survey was conducted by Norstat. Norstat is a data collection company with 80,000 active members in Norway, and the survey was sent out to its chosen 1000 members. The participations receive survey points for answering the survey, and the points are convertible to real money. One survey point is equal to 1 Norwegian kroner.

5.2 DESCRIPTIVE STATISTICS

Total 1000 individuals submitted and completed the survey. There are 488 male respondents and 512 female respondents. The age is ranged from 18 to 50 years old, and the average age is 35 years old. Regarding to religion, the majority of the respondents are Christians with 57%, followed by those who don’t belong to any religion with 39%. Muslims are 1%, and the rest 3% belong to other religions. There are total 611 respondents with religion background, and 389 respondents with no religion background.

Figure 6: Religion
Figure 7: Lottery Choice for all the respondents

Figure 7 shows that Lottery 1 is the most chosen lottery with a frequency of 282, which signals highly risk averse. The second most chosen lottery is the risk loving Lottery 6, with a frequency of 216. The majority of the respondents are at least slightly risk averse.

Figure 8: Lottery Choice for religious and non-religious respondents

Figure 8 shows the frequency of lottery choice for religious and non-religious respondents separately.
### Table 4: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>ALL</th>
<th>RELIGIOUS</th>
<th>NON-RELIGIOUS</th>
</tr>
</thead>
<tbody>
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<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>3.45</td>
<td>3.45</td>
<td>3.45</td>
</tr>
<tr>
<td></td>
<td>(1,93)</td>
<td>(1,96)</td>
<td>(1,92)</td>
</tr>
<tr>
<td><strong>Independent Variable</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>1.98</td>
<td>2.47</td>
<td>1.22</td>
</tr>
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<td></td>
<td>(1,09)</td>
<td>(1,11)</td>
<td>(0,37)</td>
</tr>
<tr>
<td>BELIEF</td>
<td>2.52</td>
<td>3.14</td>
<td>1.55</td>
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<td></td>
<td>(1,43)</td>
<td>(1,42)</td>
<td>(0,76)</td>
</tr>
<tr>
<td>SPIRITUAL</td>
<td>2.93</td>
<td>3.32</td>
<td>2.31</td>
</tr>
<tr>
<td></td>
<td>(1,18)</td>
<td>(1,11)</td>
<td>(1,01)</td>
</tr>
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<td><strong>Control Variables</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>0.45</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.49)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>AGE</td>
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<td>35.41</td>
<td>33.30</td>
</tr>
<tr>
<td></td>
<td>(9.67)</td>
<td>(9.97)</td>
<td>(9.05)</td>
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<tr>
<td>URBAN</td>
<td>0.46</td>
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<td>0.55</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.49)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>OCCUPATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>0.18</td>
<td>0.16</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(0.38)</td>
<td>(0.37)</td>
<td>(0.41)</td>
</tr>
<tr>
<td>Employed</td>
<td>0.74</td>
<td>0.78</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.41)</td>
<td>(0.47)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.04</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>(0.19)</td>
<td>(0.15)</td>
<td>(0.23)</td>
</tr>
<tr>
<td>Social</td>
<td>0.04</td>
<td>0.02</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>(0.18)</td>
<td>(0.14)</td>
<td>(0.24)</td>
</tr>
<tr>
<td>Other</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>EDUCATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>0.35</td>
<td>0.35</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>(0.48)</td>
<td>(0.48)</td>
<td>(0.48)</td>
</tr>
<tr>
<td>Bachelor</td>
<td>0.32</td>
<td>0.32</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.47)</td>
<td>(0.46)</td>
</tr>
<tr>
<td>Master</td>
<td>0.32</td>
<td>0.31</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.46)</td>
<td>(0.47)</td>
</tr>
<tr>
<td>Other</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.14)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>RELATIONSHIP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>0.31</td>
<td>0.29</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.45)</td>
<td>(0.47)</td>
</tr>
<tr>
<td>Married</td>
<td>0.58</td>
<td>0.60</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>(0.49)</td>
<td>(0.49)</td>
<td>(0.49)</td>
</tr>
<tr>
<td>With Parents</td>
<td>0.08</td>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(0.26)</td>
<td>(0.27)</td>
</tr>
<tr>
<td>Other</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(0.19)</td>
<td>(0.19)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>HOUSEHOLD SIZE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Person</td>
<td>0.21</td>
<td>0.18</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>(0.41)</td>
<td>(0.39)</td>
<td>(0.43)</td>
</tr>
<tr>
<td>2-4 Persons</td>
<td>0.67</td>
<td>0.67</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.47)</td>
<td>(0.47)</td>
</tr>
<tr>
<td>5- Persons</td>
<td>0.12</td>
<td>0.15</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(0.35)</td>
<td>(0.26)</td>
</tr>
<tr>
<td>N</td>
<td>1000</td>
<td>611</td>
<td>389</td>
</tr>
</tbody>
</table>
Descriptive statistics shows that the dependent variable L has mean value of 3.45, which categorizes the respondents into risk averse or at least slightly risk averse. Based on the mean values of L, there is no clear difference between religious and non-religious respondents on their risk aversion. Moreover, the standard deviations are high which mean most respondents are far from the mean value. This is also supported by figure 7 and figure 8. Lottery 3 and 4 are not the most chosen lotteries, and the majority of respondents chose either Lottery 1 or Lottery 6.

The mean values for independent variables suggest that religious respondents generally have higher religious practices, stronger religious beliefs, and are more spiritual than non-religious respondents. This is expected, however one of the reason can be gender, because previous studies suggest that women are more religious than men. Table 9 shows that the majority of religious respondents are women with 55%, and the majority of non-religious respondents are men.

Moreover, according to Peach (2013), people in villages or rural areas are more together, more conservative and more religious. This is also supported by, variable “Urban” which shows that majority of religious respondents live in villages or rural areas, while non-religious respondents favour urban areas or big cities.

Another factor can be the high marriage rate and low single rate. As I discussed earlier, religiosity responds positively to marriage stability. Relationship variable shows that the majority of the respondents are either married or in partnership, and married rate are greater in religious respondents, as well as lower single rate. However, the differences are not enormous.

The table also suggests that younger people are less religious than older people. Average age for religious respondents is 35-36 years old, and 33 years old for non-religious respondents.
74% of all the respondents are employed. Religious respondents have a higher employment rate than non-religious respondents. As for education, at least 64% of all the respondents have a bachelor degree or higher. There are no high education differences between religious and non-religious respondents.

The standard deviations are generally higher in religious respondents, which indicates relatively higher variation in the answers for religious respondents.
6. RESULTS & DISCUSSION

The results from the regression analysis is presented in this chapter, as well as the results from subsample analysis. The findings will be then discussed.

6.1 MAIN REGRESSION ANALYSIS

Again, the purpose of this research paper is to examine whether religion have any impact on individual’s risk preferences. The result from the regression analysis is presented in table 5, and the standard errors are shown in parenthesis. The significant level is 5%.

<table>
<thead>
<tr>
<th>Dependent Variable: Lottery</th>
<th>MODEL 1</th>
<th>MODEL 2</th>
<th>MODEL 3</th>
<th>MODEL 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta )</td>
<td>( \beta )</td>
<td>( \beta )</td>
<td>( \beta )</td>
<td>( \beta )</td>
</tr>
<tr>
<td>Independent Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice</td>
<td>-0.035</td>
<td>-0.061</td>
<td>-0.055</td>
<td>-0.081</td>
</tr>
<tr>
<td></td>
<td>(0.114)</td>
<td>(0.113)</td>
<td>(0.114)</td>
<td>(0.115)</td>
</tr>
<tr>
<td>Belief</td>
<td>0.065</td>
<td>0.078</td>
<td>0.080</td>
<td>0.096</td>
</tr>
<tr>
<td></td>
<td>(0.095)</td>
<td>(0.094)</td>
<td>(0.094)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Spiritual</td>
<td>-0.127</td>
<td>-0.095</td>
<td>-0.097</td>
<td>-0.098</td>
</tr>
<tr>
<td></td>
<td>(0.079)</td>
<td>(0.078)</td>
<td>(0.078)</td>
<td>(0.079)</td>
</tr>
<tr>
<td>Control Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Occupation</td>
<td>X</td>
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<td>X</td>
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</tr>
<tr>
<td>Education</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship</td>
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<tr>
<td>Household Size</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>R Square</td>
<td>0.001</td>
<td>0.03</td>
<td>0.03</td>
<td>0.026</td>
</tr>
<tr>
<td>N</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
</tbody>
</table>

Table 5: Results from main regression analysis
Model 1 is a simple model which only includes the explanatory variables. The coefficients show that religious practice and spirituality have negative coefficients. A negative sign means choice of a more risk averse lottery. An increase in religious practice and spirituality, increases level of risk aversion.

$\beta < 0 = \text{positive correlation with risk aversion}$
$\beta > 0 = \text{negative correlation with risk aversion}$

Variable belief correlates negatively with the dependent variable. An increase in religious belief decreases level of risk aversion, and the respondent become more risk loving. However, the coefficients are not significant.

Model 2 includes the control variables gender (male=1), and age. There are small changes in the coefficients, but still insignificant. Model 3 is controlling for gender (male=1), age, urban (urban=1) and occupation. The coefficients are increasing from Model 2, but yet insignificant. Model 4 includes all the control variables. The coefficients changed a bit from model 3, however they are not significant.

Summarizing, religious practice and spirituality respond positively on the dependent variable. It indicates that higher religiosity measured by practice and spirituality, leads to higher level of risk aversion. Religious belief is responding negatively on the dependent variable. It indicates that higher religiosity measured by religious belief, leads to lower level of risk aversion. However, the estimated coefficients are not statistically significant. Moreover, the adjusted R-square values are very low. $R^2$ value accounts for percentage of prediction accuracy considering the variables in the model (Neuman, 2009).
6.2 SUBSAMPLE ANALYSIS

One possible reason for insignificant coefficients in the main regression model is that the model coefficients are calculated by taking the overall mean value. Exemplary, women are religious and men are not religious. When taking the overall mean value in calculation, the religiosity cancels out. Therefore, I decided to run subsample regression analysis to examine whether there are any differences among the sample. All the sample are analyzed, but only significant models will be presented.

6.2.1 GENDER

Following figure 9 shows the frequency of lottery choices by male respondents and female respondents separately. Lottery 1, Lottery 5 and Lottery 6 shows relatively clear differences between male and female respondents. Based on figure 9, female respondents tend to be more risk averse.

Figure 9: Lottery choice for gender
Table 6 shows the results from subsample regression analysis for gender. The model is controlled for all the control variables. The coefficients for male respondents show that all the independent variables respond positively to risk aversion \((0,001\approx 0)\). Higher religiosity leads to higher level of risk aversion. However, the coefficients are not significant.

As for female respondents, the model shows for the first time a significant coefficient for an independent variable. Religious belief is negatively correlated to risk aversion, with a coefficient value of \(0,294^*\). An increase in religious belief contributes \(0,294\) increase in Lottery choice. It indicates lower level of risk aversion (more risk loving behavior).
6.2.2 EDUCATION

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>-High School</th>
<th>Bachelor</th>
<th>Master-</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lottery</td>
<td>β</td>
<td>β</td>
<td>β</td>
<td>β</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Practice</th>
<th>-0.432* (0.211)</th>
<th>0.051 (0.226)</th>
<th>0.807 (1.649)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belief</td>
<td>-0.018 (0.154)</td>
<td>0.375* (0.173)</td>
<td>-0.019 (0.182)</td>
<td>3.127 (2.257)</td>
</tr>
<tr>
<td>Spiritual</td>
<td>0.046 (0.130)</td>
<td>-0.262** (0.138)</td>
<td>-0.061 (0.147)</td>
<td>-1.964* (0.777)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Variables</th>
<th>Male</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Occupation</td>
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<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Relationship</td>
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<td>Household Size</td>
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<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
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</table>

<table>
<thead>
<tr>
<th>Adjusted R Square</th>
<th>0.006</th>
<th>0.049</th>
<th>0.025</th>
<th>0.477</th>
</tr>
</thead>
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<tr>
<td>N</td>
<td>348</td>
<td>315</td>
<td>318</td>
<td>19</td>
</tr>
</tbody>
</table>

* significant at 5%, ** significant at 10%

Table 7: Subsample regression analysis for education

Table 7 shows significant coefficients for those who have education level of bachelor degree. The model is controlled for all the control variables. Religious practice and spiritual correlate positively to risk aversion, while religious belief responds negatively. I also noticed that the values are relatively high for all three significant coefficients.
### 6.2.3 AGE GROUP

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>18-25</th>
<th>26-35</th>
<th>36-50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lottery</td>
<td>β</td>
<td>β</td>
<td>β</td>
</tr>
<tr>
<td><strong>Independent Variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice</td>
<td>0.409** (0.230)</td>
<td>-0.350 (0.231)</td>
<td>-0.167 (0.173)</td>
</tr>
<tr>
<td>Belief</td>
<td>-0.351** (0.199)</td>
<td>0.364** (0.186)</td>
<td>0.157 (0.142)</td>
</tr>
<tr>
<td>Spiritual</td>
<td>0.110 (0.165)</td>
<td>-0.296* (0.143)</td>
<td>-0.064 (0.118)</td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Urban</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Occupation</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Education</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Relationship</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Household Size</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Adjusted R Square</strong></td>
<td>0.02</td>
<td>0.018</td>
<td>0.009</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>224</td>
<td>311</td>
<td>465</td>
</tr>
</tbody>
</table>

* significant at 5%, ** significant at 10%

Table 8: Subsample regression analysis for age group

The results from subsample regression analysis for age group show that variable practice is positive in the first interval, and becomes negative in the last two intervals. Similar to variable spiritual. It indicates that as people getting older, higher religiosity will lead to more risk averse behaviors.

On the other side, variable belief shows the opposite. It indicates that older people with stronger religious beliefs, are less risk averse. The model is controlled for all the control variables.
6.3 T-TEST ON SPIRITUALITY

The religiosity factor that previous studies almost never include is spirituality. Holding all other things equal, I run a t-test for spirituality on risk aversion. The result is following:

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lottery</td>
<td></td>
</tr>
<tr>
<td>Independent Variable</td>
<td></td>
</tr>
<tr>
<td>Spiritual</td>
<td>-0.09**</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
</tr>
</tbody>
</table>

** significant at 10%

Table 9: t-test for spirituality

The coefficient negative and significant at 10%. Spirituality is positively correlating to risk aversion. Holding all else equal, an increase in spirituality leads to selection of a higher risk averse lottery.

6.4 DISCUSSION

RELIGIOUSITY ON RISK PREFERENCES

As discussed throughout this paper, the purpose of this research is to examine whether religiosity has any impact on individual’s risk preferences.

H1, hypothesis 1 argues that individuals with higher level of religiosity are less risk averse.

The parameter of interest is $\beta > 0$. A positive coefficient indicates less risk aversion. From the main regression analysis, coefficients for religious practice and spirituality are negative, and coefficient for religion belief is positive. Higher level of religious practice and spirituality leads to more risk averse behavior. Higher level of religious belief leads to less risk averse behavior. However, the coefficients are not significant and the hypothesis is not supported. After splitting the sample into different subsamples and running subsample regressions, the model starts to provide significant results.
Previous studies suggest that women are more religious than men, and they are more risk averse. This is still supported; however, my findings show that religious beliefs are negatively correlating with risk aversion, for women. It is a suggestion that women with higher level of religious beliefs are less risk averse.

Similar result is observed on individuals with education level of bachelor degree.

I further examined all the beta coefficients for religious beliefs. The majority of them are positive, especially the ones that are significant. At macro level, Barro and McCleary (2003) found that stronger religious beliefs lead to economic growth. I find similar result at micro level, that stronger religious beliefs lead to less risk averse behaviors (more risk loving behavior).

Another finding is young people (18-25) acts oppositely. Coefficient for young people are negative while positive for all the other groups, and vice versa. From table 12, there are indications that young individuals with higher level of religious practice are less risk averse.

H2, hypothesis 2 argues that individuals with higher level of spirituality are less risk averse.

The parameter of interest is $\beta>0$. The result from a simple t-test shows a negative coefficient, when holding all other things constant. Thus the hypothesis is not supported. Moreover, the coefficient is significant, which indicates that individuals with higher level of spirituality are more risk averse.
LIMITATIONS

The lottery model, the Eckel and Grossmann lottery task is easy for individuals to understand. However, the lottery task only focuses on risk aversion behaviors, and it does not offer different level of risk loving behaviors. The question is what if the respondents have the options to choose a riskier lottery.

As for survey questions, the questions I used to capture spirituality may not fully serve their functions. Because, there are many individuals who relate to the phase spiritual but not religious. The mean values for spiritual is also relatively higher than other variables.

As for last, the sample is clearly dominated by Christians, and also 64% of the respondent have at least bachelor degree. The numbers are high, and selection bias may influence the estimated values.


7. CONCLUSION

This research paper examines the impact of religiosity on risk preferences. The expectation is that higher level of religiosity will lead to less risk averse behaviors (more risk loving). Using religious practice, religious belief and spirituality to measure religiosity, and a lottery task to measure risk aversion, quantitative data are collected from 1000 Norwegian individuals.

The paper observed that religious practice and spirituality have a positive relationship with risk aversion. Religious belief has a negative relationship with risk aversion. However, the results are not significant and the expectation is rejected.

The above observations are significant for individuals who have an education level of bachelor.

For young individuals, a negative significant coefficient for religious practice, and a positive significant coefficient for religious belief is observed.

For female individuals, a negative significant coefficient for religious belief is observed.

Holding all else equal, spirituality has a positive relationship with risk aversion.
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