ERASMUS UNIVERSITY ROTTERDAM

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"The relationship between an individual's risk attitude and the desire to become an entrepreneur"

Abstract: In this research, we study the influence of someone's risk attitude on his/her desire to become an entrepreneur. This is done by examining the answers given by 150 students to several questions on the topics of risk attitude and entrepreneurial intentions. The method used to conduct these findings is principal component analysis. This combines the multiple questions there are on both risk attitude and entrepreneurial intentions into two new variables, which are then regressed on each other. The results indicated a strong relationship between the two: a one standard deviation increase in risk attitude led to a 0.36 standard deviation increase in entrepreneurial intentions. To add validity to the findings the control variables optimism, age, sex and study field were used. The findings on the influence of risk attitude on entrepreneurial intentions were all significant.

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1. INTRODUCTION

1.1. General introduction

Innovation is an important part of economic growth and contributes greatly to a higher quality of life in general. One of the sources of such innovation is entrepreneurship. Entrepreneurship is valuable for society and for an economy in multiple ways. Entrepreneurs create new businesses, which in turn lead to innovation, job creation, increased competition and potentially increased productivity, stimulating an economy towards growth. Van Praag and Versloot (2007) looked at the relative contribution of entrepreneurs compared to non-entrepreneurs and found that they contribute a disproportionally large share to job creation, innovation and economic growth. Moreover, Benz and Frey (2008) show that self-employed people derive higher satisfaction from work than paid employees. Thus, we can say that entrepreneurs contribute heavily towards economic growth, as well as the fact that being an entrepreneur has a positive impact on someone's work satisfaction. This makes it interesting to look at the things that drive people towards entrepreneurship, and to identify these drivers at an early stage. Therefore, this research looks into the link between risk attitude and the desire to become an entrepreneur.

1.2. The relevance of our work

A lot of research on the relationship between risk attitude and entrepreneurial behaviour has already been done. In previous literature, it is shown that high risk tolerance is associated with entrepreneurship. Cramer, Hartog, Jonker and Van Praag (2002) confirm that high risk aversion has a negative impact on the likelihood of becoming an entrepreneur, but emphasize that having a different measure for risk attitude can lead to different results. Caliendo, Fossen and Kritikos (2009) confirmed that people with lower risk aversion are more likely to become an entrepreneur, adding that his only holds for people that were already employed. This is intuitive, as entrepreneurs have a riskier source of income compared to regular employees that earn a fixed wage. An entrepreneurs' income will vary over time, thus people with high risk aversion will need a risk premium to become an entrepreneur, leaving the people with the lowest risk aversion becoming entrepreneurs. Both these researches use an objective measure for risk attitude, namely the willingness to pay for risky options, being lottery tickets. It is however also interesting to look at a more subjective measure of risk attitude. How does a person see himself fare in certain situations that are seen as highly risky or not at all risky? We look at the answers of respondents to certain questions that give us insight into this. In addition to that we look at how the answers to these questions are related to the desire to

become an entrepreneur? In contrary to most previous research, we look at the desire to become an entrepreneur instead of the employment status of respondents. This is interesting as it says something about our future entrepreneurs and enables us to say something about the personalities of the people that want to become an entrepreneur.

It is the aim of this research to provide more clarity into the influence of risk attitude on the desire to become an entrepreneur. Although a lot of research has been done on this topic, it may provide more external validity to the influence of risk aversion on the desire to become an entrepreneur. Even though the model we use is similar to that of the research done by Segal, Borgia and Schoenfeld (2005), as is shown in section 2, the results for The Netherlands might be different from those in the United States and might indicate some cross-cultural differences. Furthermore, the questions used in this research are different from the ones Segal et al. (2005). used, and are more focused on the personal perception of risky situations, giving us some insight in the influence of a more subjective risk perception on the desire to become an entrepreneur. This is more in line with actual entrepreneurial intentions than a more objective measure for risk attitude (e.g. willingness to pay for lottery tickets) as perceived entrepreneurial opportunities also depend on a subjective valuation of these options and are not clearly visible.

1.3.   Research question and hypotheses

It was shown by Van Praag and Cramer (2001) that an individual will become an entrepreneur if the rewards of self-employment are higher than those of paid employment. In other words, people become an entrepreneur when the expected utility of that option is the highest. Benz and Frey (2008) show that this utility does not depend only on income, but also on other factors. They call this procedural utility, the autonomy of decision making in self-employment yields utility. We also know that the income as an entrepreneur is riskier than in paid employment, as it depends on profits and varies over time, while in paid employment the same wage is earned every month (Rees & Shah, 1986). It follows that someone with low risk aversion reaches a higher utility of self-employment, ceteris paribus. It might be the case however that other factors also influencing risk attitude might negatively influence the desire to become an entrepreneur. We already saw this theory posed by Hsieh, Parker and Van Praag (2017) who showed that people with high risk aversion are more likely to have a balanced skill set, and people with a balanced skill set are more likely to become an entrepreneur. Therefore, although having a high risk tolerance is positively correlated with the ability to deal with the higher income variance, the influence of risk attitude on the decision to become an entrepreneur might be ambiguous.

To investigate the relationship between someone's risk attitude and his or her desire to become an entrepreneur, the following research question is posed:

"How does someone's subjective risk attitude affect his/her desire to become an entrepreneur?"

To come to a conclusive answer on this, the following hypotheses are investigated:

H1: Risk attitude has a significant positive relationship with the desire to become an entrepreneur.

H2: When using control variables a positive relationship between risk tolerance and the desire to become an entrepreneur persists.

The first hypothesis is based on previous research on this topic, as most of these researchers found a significant relationship between risk attitude and entrepreneurship. The dominant findings from these researches were that risk tolerance is positively associated with entrepreneurial behaviour, which explains why we expect a positive relationship. The findings from these previous researches are more clearly explained in section 2. We also want to control for omitted variables by adding in control variables. These were chosen on the basis of relationships between risk attitude and age, sex, optimism and study field found in previous researches. The choice of these control variables is more clearly explained in section 4. In the next part, we will explain more about the previous research that is done on the topic of risk attitude and the link with entrepreneurship. We try to give a complete representation of the literature, in which both positive and negative relationships between risk attitude and entrepreneurial intentions were found. In section 3, we talk about the data that we use to conduct our findings, while in section 4, the methodology to transform the data and the argumentation on which control variables are used is discussed. In section 5 we present the results. Lastly, in section 6 the conclusion is given, as well as a discussion and the recommendations for future research.

2. THEORETICAL FRAMEWORK

2.1. Introduction

Throughout the years, a lot has been written about the effect of an individual's risk attitude on the decision to become an entrepreneur. It was Cantillon (1755) who first saw the entrepreneur as a risk-bearer. He described the entrepreneur as a rational decision maker that assumes risk. Mill (1848) later emphasized this risk-bearing quality of the entrepreneur, saying that this is the most important aspect in which entrepreneurs differ from managers. However, Schumpeter (1934) did not see high risk tolerance as a necessary trait of the entrepreneur. Instead, he focused on the innovative qualities of an entrepreneur, saying that an entrepreneur brings disequilibrium to the market by providing innovative new goods or production measures. In more recent literature, the ambiguity of the influence of risk attitude on the decision to become self-employed still remains. Some authors state that entrepreneurs are more risk averse than non-entrepreneurs, while other authors state the opposite. In this theoretical framework, we try to give a complete representation of the work already done on the topic, giving light to both researches that find evidence for the more risk tolerant entrepreneur, as well as to researches that provide evidence for the more risk averse entrepreneur. This will give the most complete picture possible on everything we know as of now about the topic, while also giving our work a place amongst the researches that are already done.

2.2. Evolving models

Although there are a lot of inconsistent conclusions amongst the different researchers, there are also researchers that build upon each other and use the conclusions of previous researchers to come to their own, more complete conclusions. In 1979 Kihlstrom and Laffont state that there are a lot of different aspects in deciding who becomes an entrepreneur, such as the entrepreneurial ability, the access to capital, and, the primary focus of their research, risk attitude. They find that in equilibrium and with homogeneous entrepreneurial abilities, the more risk-tolerant an individual is, the more likely he is to become an entrepreneur. Moreover, the least risk averse entrepreneurs run the largest firms. Lazear (2004) holds a different view as to who becomes an entrepreneur. According to his model, there are entrepreneurs and specialists. Specialists invest all their time and money in one skill, as it is the only skill necessary for their job. However, entrepreneurs need a more balanced skill set. To be a successful entrepreneur, you have to be good at multiple things, like managing a business, keeping the books of a business and social contact with people. In his model, the people with the biggest differences between those skills become specialists, while the people with the most balanced

set of skills become entrepreneurs, or, as he explains it, entrepreneurs are jacks of all trades. It follows from his model that there are more self-employed people in the accounting business than in the art business, as the required skills to have an art business, both business and creative skills, are much more distinct than in the accounting business, where the skills necessary to be an accountant are somewhat similar to those of running your own accounting business.

Hsieh et al. (2017) combine the models from Kihlstrom and Laffont (1979) and Lazear (2004). They provide an alternative interpretation of the standard stigma that the entrepreneur is risk tolerant. They say that, while entrepreneurship is riskier than paid employment, risk averse people are the most likely people to invest in multiple skills, as they want to have as many options and security as possible. Following the model from Lazear (2004), these people are the most likely people to become entrepreneurs. The authors propose a model wherein risk averse people are likely to become entrepreneurs.

2.3. Capital constraints as the biggest impediment to entrepreneurship

Amongst risk attitude, there are also other factors impacting the decision to become an entrepreneur. Blanchflower and Oswald (1998) find that there is a big gap between the number of individuals that wants to be self-employed and the amount of individuals that actually is self-employed. They think that the biggest cause of this discrepancy is the lack of access to capital to start a business, as was already shown by Evans and Jovanovic (1989). They showed that credit rationing exists if having assets is positively associated with business start-ups. Entrepreneurial opportunities require significant investments, money that the entrepreneur does not always have. For the banker, the likelihood of success of the venture is not clearly visible, so he demands collateral before he gives out a loan. This makes the entrepreneur more reluctant to take the entrepreneurial opportunity, causing a lot of potential entrepreneurs to quit.

To test whether this assumption is true, Blanchflower and Oswald (1998) compare individuals that received a gift or inheritance with individuals that did not and find that those individuals that did are more likely to start a business. However, this test is not yet perfect, as individuals that receive an inheritance might inherently be more likely to start a business. Furthermore, within the family, the child that receives the inheritance might be the most likely to become an entrepreneur. The authors also find that the self-employed report higher job satisfaction than regular employees. It is interesting that there is such a big discrepancy between the number of

individuals that wants to become an entrepreneur and the number of individuals that actually becomes an entrepreneur. Although we will not look at the number of individuals that actually becomes an entrepreneur in our research, and thus will not be able to say anything about the validity of the capital constraint being a big impediment for potential entrepreneurs, this does not necessarily have to be a big limitation for our research. Ajzen (1985) found that intentions are the best predictor of any future behaviour. Intentions can help us to better understand the actual act and serve as a mediating variable between on one hand the act of entrepreneurship and on the other hand the other exogenous variables (Krueger, Reilly & Carsrud, 2000).

Blanchflower and Oswald (1998) are not the only authors who look at the effect of capital constraints on the decision to become an entrepreneur. Cressy (2000) also builds on the model of Evans and Jovanovic, but adds risk attitude to it. However, he took risk aversion as a decreasing function of wealth, in contrary to Khilstrom and Laffont (1979). He found that if the marginal employee was risk averse an increase in their assets would also increase their utility from self-employment, in turn leading them to become an entrepreneur. This further emphasized the importance of financial capital in enabling entrepreneurs. Vereshchagina and Hopenhayn (2009) find that the poorer the entrepreneur, the more likely he is to undertake risky actions, contradicting the earlier findings of Blanchflower and Oswald (1998) and Cressy (2000). Moreover, they link impatience with the tendency to take risks. Furthermore, they provide three possible explanations for why entrepreneurs are willing to act on risky opportunities: they are overoptimistic, they value autonomy and they are risk tolerant. Concluding, having a lack of capital before deciding to become an entrepreneur might restrict this choice, but having little capital during the entrepreneurial activities might actually lead to riskier behaviour.

2.4. Risk tolerance of entrepreneurs versus managers

There are a lot of similarities between managing a firm and being an entrepreneur. Both of these jobs require you to lead a team of people and to make strategic decisions regarding the firm. However, one might argue that being the owner of the firm, an entrepreneur bears more risk than a manager. Namely, the entrepreneur is likely to have invested his own money in the firm and will on average take heavier financial consequences from the firm going bankrupt than a manager will take. Brockhaus (1980) compares entrepreneurs to managers, specifically with relation to their risk attitudes. Brockhaus, for the sake of his research, defines the entrepreneur as someone who is a major owner or manager of a business and is not employed elsewhere. He finds that entrepreneurs

do not have a higher risk-taking propensity than managers. However, this does not imply that entrepreneurs are not risk-takers. The author states that both managers and entrepreneurs alike have a relatively high risk-taking propensity and while they do not like great or extreme risks, they have a preference for moderate risks. Masters and Meier (1988) replicated this research and came to the same conclusions as Brockhaus, but added that there was no difference in the risk-taking propensity of males and females.

Carland, Carland, Carland and Pierce (1995) compare the risk-taking propensity of entrepreneurs with those of small business owners and managers. They found that entrepreneurs have significantly higher risk-taking propensities than both managers and small business owners, while managers and small business owners do not differ significantly in their risk-taking propensities. A possible explanation for this difference lies in the goals of entrepreneurs on one hand, namely profits and growth, and managers and small business owners on the other hand, namely the family needs.

In contrary to Carland et al. (1995) and Brockhaus (1980), Stewart and Roth (2001) find that entrepreneurs, in general, do have a somewhat higher risk-taking propensity than managers. More interesting is however that when they divide entrepreneurs based on their goals, the results become much more significant. They find that entrepreneurs whose goal is to create profits and growth have a much higher risk-taking propensity than those whose goal it is to provide for their family. The lower risk-taking propensity because of the family interest already followed from the research from Carland et al. (1995). Miner and Raju (2004) respond to the study of Stewart and Roth (2001) and conflict their findings. They conducted research based on 14 previous studies that were not included by Stewart and Roth (2001), and meta-analysed the data, coming to the conclusion that entrepreneurs are risk averse. They used the same division in growth- and non-growth-oriented entrepreneurs, and found that even the growth-oriented entrepreneurs were more risk averse than non-entrepreneurs.

Xu and Ruef (2004) comment on the conflicting findings of previous researchers on the topic of risk-taking propensities of managers versus entrepreneurs. They blame the small sample sizes used in these researches and find evidence for the risk averse entrepreneur while using a national dataset. They used a strategic model for risk tolerance as well as a non-strategic model for risk tolerance. They looked at nascent entrepreneurs in the United States and found that for both models

they used, the entrepreneurs were more risk averse than non-entrepreneurs. This also leads them to the conclusion that a lot of the motivation of entrepreneurs is non-pecuniary, but lays in the act of owning a business. The utility of owning a business leads them to be conservative with risks, maximizing the chances of business survival. Some of these non-pecuniary motivations they mention are the need for autonomy and the idea of fulfilment.

2.5. Defining the 'entrepreneur'

Solomon and Winslow (1988) note the problem that throughout the years a lot of different definitions and descriptions for the term entrepreneur have surfaced, making it difficult to make clear-cut statements about the entrepreneur. After all, a different meaning can be given to the term depending on which author you take as your source. To come to a more conclusive condition on what makes an entrepreneur, they interviewed 61 entrepreneurs. They found that what unites them was that they were confident as well as optimistic, they were not reckless nor willing to take great risks, they do not want their performance to be subject to other people's judgment, and they are independent as well as self-reliant. Carland, Hoy, Boulton & Carland (1984) define an entrepreneur as someone who "establishes or manages a business for the principal purpose of profit and growth and is characterized principally by innovative behaviour and will employ strategic management practices". Brockhaus and Horwitz (1986) later state that there is no such thing as a universal entrepreneur, and think that the psychological profile of entrepreneurs is so diverse and versatile, that it is impossible to catch it in one simple psychological archetype. Every entrepreneur is different and at that time they did not have the psychological instruments to find the archetype, being so complicated.

Sexton and Bowman (1985) state something about the requirements to be a successful entrepreneur. Next to the fact that entrepreneurs need to be capable executives, they tend to exhibit a couple of psychological traits, which can be both bad and good. They are mostly self-reliant, non-agreeable, socially capable yet not necessarily very interested in others, they tend to easily adapt to changes, they normally do not need a lot of support, they usually have a high tolerance for ambiguous situations and most of the time they like taking risks. These traits can lead the entrepreneur to be lacking in communication, but also make the entrepreneur good at responding to situations. The traits found in entrepreneurs differ significantly from the traits found in managers. Namely the risk-taking propensity, adaptability to change and desire for autonomy are typical for the entrepreneur. The authors emphasize that the psychological traits can be either a strength or a weakness depending

on how they are used by each individual entrepreneur. McGrath, McMillan and Scheinberg (1992) also try to create a certain profile for the entrepreneur. They interview both entrepreneurs and non-entrepreneurs across eight countries and come to a couple of general characteristics the entrepreneur is likely to possess. An entrepreneur generally will have a higher tolerance for inequality, will be rather individualistic, will be masculine and will be prepared to take risks. These results do not differ significantly across countries.

2.6. The 'trait-approach' versus the 'behavioural-approach'

Gartner (1988) supports the vision that there is no such thing as a definition of the stereotypical entrepreneur and goes against the definition from Carland et al. (1984). This is in line with the earlier findings of Brockhaus and Horwitz (1986) and Sexton and Bowman (1985), who already noted that there is no such thing as the stereotypical entrepreneur. As he assembles all the research done on personality characteristics and traits of the entrepreneur he comes to the conclusion that someone possessing all of these traits and characteristics is someone 'larger than life' and 'full of contradictions'. In other words, so many traits have been found to coincide with entrepreneurship that it is impossible to find all these traits within one individual. Instead, Gartner (1988) states that we should focus on the actual act of entrepreneurship: the creation of organizations. He calls this approach 'the behavioural-approach', which focusses on what the entrepreneur does instead of what he is ('the trait-approach'), as entrepreneurship is not something one is, it is something one does. According to Gartner (1988), the entrepreneurship research should be focused on how organizations come into existence. In his view, individuals are not born with a certain entrepreneurial skill set, but people can 'learn as they go'. This is proven by the fact that entrepreneurs are more likely to be successful with their second business.

In 1988, Carland, Hoy and Carland responded to the critique that Gartner (1988) had on their initial paper about the definition of an entrepreneur and said that the question "who is an entrepreneur?" is a question worth asking. They confirm that there is not yet one single accepted definition of the entrepreneur, and say that they only wanted to bring some clarity by providing a clear, unambiguous definition in a field where multiple definitions were used, and it was unclear when which one to use. Furthermore, they state that we might actually learn something about certain traits an entrepreneur is likely to possess if we use more homogeneous samples and better control groups. The authors think that the organization cannot be seen without the entrepreneur that created it, and therefore both the 'behavioural-approach' and the 'trait-approach' are important.

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Segal et al. (2005) use a similar model for their research as the one we use, and therefore require some extra attention. They leave the route of trying to define the entrepreneur and instead focus on the process-based view that Gartner (1988) initiated. They look at what the motivation is to become an entrepreneur and find that tolerance for risk, together with the perceived feasibility and the desirability of entrepreneurship, is a major factor in deciding who becomes an entrepreneur. As they put it: "entrepreneurs accept the personal financial risks that go with owning a business but also benefit directly from the potential success of the business". This already implicates the risk-taking propensity of the entrepreneur. The authors confirm the earlier findings of Gartner (1988), that it is not useful to look at only the personality traits of the entrepreneur (content-based theories), but at how behaviour is formed (process-based theories), as behaviour results from the interaction between the individual and the situation, and not just from the individual itself. Following this logic, they focus on the behavioural intention to become an entrepreneur by looking at two questions: do respondents want to become an entrepreneur (desirability), and do they think they can become an entrepreneur (feasibility)? They find that there exists a positive relationship between an individual's confidence in his entrepreneurial ability and his intention to become an entrepreneur. This positive relationship also exists for an individual's desirability to become an entrepreneur. However, more interestingly for our research, they also find that there exists a positive relationship between an individual's risk tolerance and his intention to become an entrepreneur. The authors show that, even though it might not be useful to look at single personality traits as to predict who becomes an entrepreneur, the risk-taking propensity of individuals is an important part in the behavioural process of becoming an entrepreneur, thus maintaining the relevance of our research question. Their research is particularly interesting, as they conducted it by asking a set of questions to undergraduate business students regarding their entrepreneurial intention, their confidence in their entrepreneurial skills and their tolerance for risk, leading to a very similar research design as ours.

In line with the process-based approach, Van Praag and Cramer (2001) state that a lot of personal characteristics influencing entrepreneurial success are not known up front, but will surface during the entrepreneurial activities. They find that an individual will become an entrepreneur if the expected rewards of self-employment are higher than those of paid employment. They state that the expected rewards depend both on individual ability and on the risk-bearing tolerance of the individual. They also find that entrepreneurial talent determines the size of the business, while risk attitude determines the decision to either become self-employed or not. This is because

entrepreneurial talent is unknown in advance. Individuals can only get to know their entrepreneurial talent after they decide to start a business. In correspondence with almost all literature on risk attitude and the entrepreneurial choice, they find that risk averse people are less likely to become an entrepreneur. So do Cramer et al. (2002), who find that individuals with a high degree of risk aversion are less likely to select into self-employment. McCarthy and Leavy (1998) also state that a lot of entrepreneurial characteristics are not static and known up front, but rather change over time, and also distance themselves from the trait-based approach, adopting a more process-based approach. The authors try to capture the influence of the entrepreneur on the formation of strategy over time and found that just as strategies vary over time, so do risk-taking propensities.

Rees and Shah (1986) also find evidence for the more risk tolerant entrepreneur, as they find that self-employed people have three times higher variance of their income than regular employees. Moreover, they found that risk tolerance is negatively correlated with age. This is interesting, as our sample of respondents, being students, is relatively young. Following the logic of Rees and Shah (1986), the entrepreneurial intention of our sample should be relatively high. This is the case, as 32 out of the 150 respondents gave themselves a score of 5 or higher for the question 'my professional goal is to become an entrepreneur', rated on a scale of 1-7. Compared to 8.51% of the population in The Netherlands having entrepreneurial intentions (GEM, 2017), this is quite a big proportion of respondents that wants to become an entrepreneur.

Levesque, Shepherd and Douglas (2002) build on the research from Rees and Shah (1986) and find a couple of things: people are risk averse, the higher an individual's ability is, the lower his risk-aversion is, risk is higher in self-employment and risk aversion increases with age. In 2002, Douglas and Shepherd show that people consider both risk, independence and income when deciding between paid employment and self-employment, where the former can be seen as a cost of self-employment, while the last two can be seen as benefits of self-employment. They found that, after independence and the work itself, risk is the most important characteristic in assigning a certain utility level to a job. Like Segal et al. (2005), they looked at entrepreneurial intention rather than the actual occupation and found that entrepreneurial intention is higher amongst those with more positive attitudes to risk, as the additional income required for them to bear the risk is lower than for those who are more risk averse, thus leading to the least risk averse individuals becoming self-employed in equilibrium.

2.7.   More recent approaches

Wu and Knott (2006) divide the risk attitude of an entrepreneur in two categories: demand uncertainty and ability uncertainty. The demand uncertainty relates to the uncertainty of the market in which the individual is active (will the goods get sold?), while the ability uncertainty relates to the entrepreneurial ability of the individual. They propose that for the demand uncertainty, entrepreneurs are risk averse, just like most people. For the ability uncertainty however, entrepreneurs tend to be overconfident. Entrepreneurs overestimate their entrepreneurial ability, leading Wu and Knott (2006) to the conclusion that entrepreneurs are risk averse and overconfident. Janney and Dess (2006) state that entrepreneurs do not necessarily have a different risk attitude from other people, they just perceive risk differently. In their research, they focus on why entrepreneurs have this different risk perception. They pose that asymmetry in knowledge and underestimation of the resources of entrepreneurs, specifically non-monetary resources, lead non-entrepreneurs to have a higher risk perception of the activities of the entrepreneur than the entrepreneur himself. They state that generally, non-entrepreneurs overestimate the risk coming with entrepreneurial activities, while entrepreneurs might actually underestimate the risk involved.

Caliendo et al. (2009) look at the risk attitudes of people at the time they decided to become self-employed. They find that individuals that became self-employed usually had a higher risk tolerance than those who did not. However, when they distinguish between people that move into self-employment from paid employment and people that move into self-employment from unemployment, they find that risk attitude only differs for people that move into self-employment out of paid employment. People that move into self-employment out of unemployment do not have a significantly higher risk tolerance.

2.8.   Summary

To summarize, there are a lot of different findings on the topic of the risk attitude of an entrepreneur. Some authors have found no real differences in the risk attitudes of managers and entrepreneurs (Brockhaus, 1980; Carland et al., 1995; Miner & Raju, 2004 Xu & Ruef, 2004) while others do find that entrepreneurs are more risk tolerant (Stewart & Roth, 2001). Although research has shifted from a more trait-based approach towards a more process based approach (Gartner, 1988; Segal, Borgia & Schoenfeld, 2005), the relevance of risk attitude as a personality trait of the entrepreneur has not yet vanished. In our research, we look at the impact of someone's risk attitude on the desire to become an entrepreneur. Although this desire might not always lead to the actual act of entrepreneurship

(Blachflower & Oswald, 1998), the intention in itself is a good predictor of the future act (Ajzen, 1985; Krueger, Reilly & Carsrud, 2000).

3. DATA

The dataset that is used to conduct our findings is a questionnaire containing 159 questions regarding the age, sex, family, study, personality traits and entrepreneurial ambitions of the participants. This questionnaire was answered by 150 students from 12 different study fields. Although the sample is not really large, it represents a lot of different study fields and consists of an interesting group of people: students. This is a group of people that is still free to choose their future career path and it is interesting to look at what they desire to become. Except for the questions regarding sex, age, family and study field the questions are posed as statements which can either be (very) true or (very) false for the participant according to themselves. Participants rate themselves in different aspects on a scale of 1-5 or 1-7. The categories in which questions are posed are widespread. There are questions regarding a participant's optimism, risk attitude, the ' big five' personality traits as well as questions regarding the entrepreneurial intentions of the participant.

In this research, we look at the influence of someone's risk attitude on his or her desire to become an entrepreneur. There are 8 questions regarding the participant's risk attitude and 32 questions regarding their entrepreneurial intention. The questions regarding risk attitude range from questions such as 'I would like to explore unusual places' to questions as 'I would like to bungee jump sometime'. These are different from the willingness to pay type of question in which participants have to give their willingness to pay for a lottery to find out if they are risk averse or risk tolerant, and are more focused towards the participant's openness to new and possibly risky situations, which has similarities with the situations participants would encounter when starting a business. The questions regarding the entrepreneurial intention are much more specific and directly measure the participant's intention to become an entrepreneur. To look at the questions used, read section 8, the Appendix. All the questions used on entrepreneurial intentions, risk attitude and optimism are given there.

4.METHODOLOGY

In this section, we will present the methods used to transform the data. This was done so by using a method called principal component analysis. We will explain why we chose this method over any other method, as well as explain how this model works. We will also explain why we chose the control variables that we did. To give a better grasp of the data, next, a table with summary statistics of the data we used is presented.

Table 1*: Summary statistics table for the first principal components of entrepreneurial intention, risk attitude and optimism and age sex and study field.*

	Obs.	Mean	Std. Dev.	Min.	Max.
PC entrepreneurial intentions	150	-0.0000000140	3.676704	-7.508932	8.762614
PC risk	150	-0.00000000133	1.804018	-5.193536	4.008269
PC optimism	150	0.0000000173	1.749604	-4.809206	3.983935
Age	150	20.64	2.063684	18	30
Sex	150	0.446666667	Not relevant	0	1
Study field	150	0.433333333	Not relevant	0	1

Note: for sex, a dummy variable with male=1, female=0 was created. For study field a dummy variable with Economics or Business administration=1, another study=0 was created.

To look at the link between the risk attitude of a participant and his or her desire to become an entrepreneur, we have to analyze the answers to multiple questions: 8 questions regarding their risk attitude and 30 questions regarding their desire to become an entrepreneur. To avoid having to do countless regressions of each question regarding risk attitude on the questions regarding the entrepreneurial intention and to avoid having to drop out most of the questions, we had to find a way to combine the questions of each category into one new variable. This is done by principal component analysis. With this method, a dataset consisting of a large number of variables will be cut down to a lesser number of variables, while retaining a lot of its explanatory power. This helps us to simplify the 32-dimensional entrepreneurial intention dataset and the 8-dimensional risk attitude dataset, while also detecting outliers and giving us a good prediction model (Wold, Esbensen & Geladi, 1987).

Principal component analysis was chosen over a weighted average of all the entrepreneurial intention questions and risk attitude questions because this weighted average method neglects that some questions have a bigger impact than other questions and goes over the fact that some questions

have a lot of similarities with other questions, while other questions are more distinct. With principal component analysis, each question gets an appropriate weight in order to display the maximum amount of information from what is available. What principal component analysis does is creating a line amidst all the different data points so that the total variance with all the data points is as large as possible. The next line, the second principal component, is a line that is orthogonal with the first principal component and has the maximum variance under that restriction, catching as much information as possible from the yet unexplained information. This way, the first principal component explains the biggest proportion of the available information and each next component explains less information. These principal components are the new variables that are created by using this method and are able to explain the data in an accurate manner while dropping out a significant amount of the variables. In our research, we use only one principal component for each of the variables. This is done to keep the research simple and easy to read, but also because for all three variables principal component analysis was used on, the first component had significantly higher explanatory power than the rest, as will be shown in section 5.

The scores respondents can achieve on the newly created principal component variable depend on different factors such as the number of variables that are included in the principal component analysis and the weight that is given to each variable. This makes a regression with principal components included difficult to interpret, as it is hard to grasp what a 1 point increase in the principal component of entrepreneurial intention really means. Therefore, the principal components that were used were standardized, so that the influence of each variable on the entrepreneurial intention variable is measured in standard deviations, making the interpretation of the model easier to grasp.

With the two principal components we got from the principal component analysis, we did an ordinary least squares regression with the new entrepreneurial intention variable as the dependent variable and the new risk attitude variable as the independent variable. Although each of the questions is answered on an ordinal scale, we chose an ordinary least squares regression over an ordinal probit regression. This choice was made because with an ordinal probit regression we lose a degree of freedom and therefore some explanatory power of our model. Secondly, because we made each of the variables that are rated on an ordinal scale (optimism, entrepreneurial intention, risk attitude) into a new variable using principal component analysis where all the questions of each category were combined into one new variable, a more continuous scale arises.

To add to the accuracy and validity of the model, we also used control variables, namely sex, age, study field and optimism. Although Masters and Meier (1998) contradict this, it is widely assumed in the literature that males are more risk tolerant than females (Weber, Blais & Betz, 2002; Eckel & Grossman, 2002, 2008). Furthermore, it is assumed that older people are more risk averse (Rees & Shah, 1986). This also might form for a good control variable, however it is important to note that our dataset ranges only from the ages of 18-30, with most of the participants being between the age of 18 and 24, so this effect might not be so persistent. Furthermore, we created a binary variable which takes the value 1 if a participant studies Economics or Business Administration and otherwise takes the value 0. This was done because the study fields of Economics and Business Administration are much more related to the field of entrepreneurship and these students often follow courses on the topic of entrepreneurship, while other students do not. Moreover, these students are much more familiar with the topics of expected utility, risk aversion and rational decision making, making it more likely that they are to some extent more risk tolerant than other students. Lastly, we also added optimism as a control variable. Optimism leads to biased perceptions of personal risks, making it possible that more optimistic people have a lower appreciation of risks than less optimistic people (Weinstein, 1989). Solomon and Winslow (1988) already characterized the entrepreneur as optimistic. Vereshchagina and Hopenhayn (2009) later thought of entrepreneurs as overoptimistic. In 2010, Cassar finds that nascent entrepreneurs are often overly optimistic in estimating the survival chances of their business. Thus, it might be the case that optimism has a positive link with risk tolerance and therefore it makes for a good control variable. To include optimism in the analysis, the same transformation was used as with risk attitude and entrepreneurial intention. The 10 questions on optimism were transformed using principal component analysis, after which a new variable was formed. Lastly, we added the control variables to our ordinary least squares model.

5.RESULTS

In the first part of our results, we will show the principal component analysis for each of the three variables on which this transformation method was used. We will show the tables with the eigenvalues of all the different components, which will explain why only one component was used for all three variables. Next, we will show the weight that was given to all of the different variables in the principal component analysis for each of the three variables. It is interesting for our research that some questions are given more weight than others. Lastly, we will show the OLS-regressions with and without control variables, and show that there is a significant positive link between risk tolerance and the desire to become an entrepreneur.

5.1.   Eigenvalues of components

Table 2: *Eigenvalues of each of the components for the 10 questions on optimism.*

Component	Eigenvalue
1	3.06111
2	1.2103
3	1.07497
4	0.998255
5	0.832183
6	0.704249
7	0.674522
8	0.520899
9	0.515639
10	0.407865

Table 3: *Eigenvalues of each of the components for the 8 questions on risk attitude.*

Component	Eigenvalue
1	3.25448
2	0.999853
3	0.889225
4	0.785171
5	0.727217
6	0.562424
7	0.446913
8	0.334714

Table 4: *Eigenvalues of each of the components for the 32 questions on entrepreneurial intention.*

Component	Eigenvalue	Component	Eigenvalue
1	13.5181	17	0.359454
2	3.09939	18	0.33087
3	2.50327	19	0.305345
4	1.62295	20	0.293114
5	1.363	21	0.252065
6	1.03675	22	0.221182
7	0.821775	23	0.193588
8	0.78064	24	0.173817
9	0.761947	25	0.157291
10	0.632484	26	0.147737
11	0.56818	27	0.12678
12	0.566674	28	0.120612
13	0.494069	29	0.107585
14	0.438594	30	0.0959071
15	0.390101	31	0.0850377
16	0.37193	32	0.0597162

From the tables on the previous two pages, it clearly shows that the first component for each of the three categories has a disproportionally large eigenvalue. The eigenvalue represents the amount of variance that there is in the data for the corresponding component. The more variance there is in the data for a component, the more information is captured by that component and the more of the data can be explained by this component. For optimism, the eigenvalue of the first component is as large as the next three components combined (Table 2). For risk attitude, the eigenvalue of the first component is even larger than that of the next three components combined (Table 3). For entrepreneurial intention, the eigenvalue of the first component is as large as the next 11 components combined (Table 4). The disproportionally large eigenvalues of the first components for each of the three categories can be explained by the fact that there is a lot of similarity between the questions in each category. The questions in the category optimism are interrelated and are correlated with each other, as they are all about optimism. Eigenvalues would be closer to each other if we had totally distinct variables that were not related to each other in each category. For this reason however, we can use only one component for each category, as this keeps the research easy to read and interpret, while still having good explanatory power.

5.2. Weights for each of the questions in the first principal components

In the next part, the weights for each of the questions in the three principal components that we use as new variables are given. The weights determine the importance of each question in the model and depend on the amount of variance in the data that can be explained by each question.

Table 5: *Weights for each of the questions for the first principal component of optimism.*

Question	Weight
1	0.3358
2	0.2992
3	0.2656
4	0.4454
5	0.2811
6	0.2619
7	0.2462
8	0.1559
9	0.3886
10	0.3811

Table 6: *Weights for each of the questions for the first principal component of risk attitude.*

Question	Weight
1	0.3920
2	0.2364
3	0.4501
4	0.2832
5	0.3240
6	0.3568
7	0.3220
8	0.4144

Table 7: *Weights for each of the questions for the first principal component of entrepreneurial intention.*

Question	Weight	Question	Weight
1	0.2143	17	0.2019
2	0.2333	18	0.1368
3	0.2237	19	0.1435
4	0.2315	20	0.1074
5	0.2172	21	0.1531
6	0.2284	22	0.1600
7	0.2057	23	0.1518
8	0.2284	24	0.1913
9	0.2029	25	0.1394
10	0.2217	26	0.1323
11	0.2261	27	0.1716
12	0.1057	28	0.1643
13	0.1062	29	0.0843
14	0.1788	30	0.0600
15	0.1997	31	0.0815
16	0.1704	32	0.1624

From the tables on the previous two pages, we can see that the weights in each category are relatively close to each other. This reflects the similarities we already knew existed between the questions of each category and underlines that there is not necessarily a question that trumps all other questions in significance. For optimism (Table 5), in our first analysis, the weights of questions 3, 7, 8 and 9 were negative. Therefore, we reversed the scale of those questions to include them correctly in our Principal Component Analysis. The same goes for questions 29, 30 and 31 for the entrepreneurial intention (Table 7).

5.3. Ordinary least squares regressions

Table 8: *Ordinary least squares regression with the first principal component of entrepreneurial intention as the dependent variable.*

	Coefficient	Std. error	t-statistic	p-value	95% confidence interval
Risk attitude	0.4331173	0.074094	5.85	0.000	0.2866986 - 0.5795359
Constant	0.0000000000743	0.0738421	0	1.000	-0.1459211 – 0.1459211
Observations					150
R-squared					0.1876

H1: Risk attitude has a significant positive relationship with the desire to become an entrepreneur.

Table 8 shows us an ordinary least squares regression, where the newly created variable for entrepreneurial intention is the dependent variable and the newly created variable for risk attitude is the independent variable. We can clearly see that there is a link. A 1 standard deviation increase in the new variable for risk attitude corresponds with a 0.43 standard deviation increase in the newly created entrepreneurial intention variable. Thus, a higher risk attitude corresponds with a higher desire to become an entrepreneur. We can also see that this is significant, as the p-value is below 0.05. Therefore, we can not reject hypothesis 1.

Table 9: *Ordinary least squares regression with added control variables with the first principal component of entrepreneurial intention as the dependent variable.*

	Coefficient	Std. error	t-statistic	p-value	95% confidence interval
Risk attitude	0.3616598	0.082901	4.36	0.000	0.1977995 – 0.5255201
Optimism	0.2042603	0.088421	2.31	0.022	0.0294896 – 0.379031
Age	0.0395543	0.045356	0.87	0.385	-0.0500946 – 0.1292032
Sex	0.0973618	0.151138	0.64	0.520	-0.2013744 – 0.3960979
Study field	0.0964697	0.1597423	0.60	0.547	-0.2192728 – 0.4122123
Constant	-0.09981623	0.9217885	-1.80	0.281	-2.820146 – 0.8238219
Observations					150
R-squared					0.2456

H2: When using control variables a positive relationship between risk tolerance and the desire to become an entrepreneur persists

In the table above the control variables optimism, age, sex and study field were added. Although some of the correlation between risk attitude and entrepreneurial intentions was explained by omitted variable bias, judging by the lower coefficient in the new model (0.36), there still exists a significant positive relationship between risk tolerance and the desire to become an entrepreneur. To clarify the results, 1 standard deviation corresponds with approximately a 34.1% change from the mean. Therefore, an increase of 0.36 standard deviation per 1 standard deviation increase in risk attitude is quite a considerable increase.

It is interesting that age has a positive relationship with the desire to become an entrepreneur, as Rees and Shah (1986) showed that age has a negative relationship with risk tolerance. However, this might be due to our sample, consisting of only students, ranging from the ages 18 to 30, with most of the students being between 18 and 24. It might be the case that older students have a clearer vision of their future career as they are often in a later stage of their study and therefore have a better idea if they want to become an entrepreneur. Furthermore, being a male increases the entrepreneurial intention with 0.1 standard deviation, confirming the findings of previous researches (Weber, Blais & Betz, 2002; Eckel & Grossman, 2002, 2008). This is quite a big influence, however it is not significant and therefore has to be treated with caution. The same goes

for study field, being an Economics or Business Administration student increases the entrepreneurial intention score with 0.1 standard deviation, however this value is not significant. Lastly, a 1 standard deviation increase in optimism corresponds with a 0.2 standard deviation increase of the entrepreneurial intention, which is in line with our prediction that more risk tolerant people are more optimistic and therefore more optimistic people will also be more likely to want to become an entrepreneur. Summarizing, we can accept the second hypothesis. Even though the relationship between risk attitude and entrepreneurial intention drops from 0.43 to 0.36 when controlling for omitted variables, the relationship still remains highly significant and a large portion of the desire to become an entrepreneur is explained by someone's risk attitude. Although there might be non-pecuniary motivations to become an entrepreneur (Benz & Frey, 2008; Xu & Ruef, 2004) that could explain why risk averse people still want to become an entrepreneur, our research confirms the findings of previous researches that found a positive relationship between risk tolerance and entrepreneurial behaviour (Douglas and Shepherd, 2002; Segal et al., 2005; Stewart and Roth, 2001; Caliendo et al., 2009).

6. CONCLUSION & DISCUSSION

6.1. Conclusion

In this research, we study the influence of someone's risk attitude on his or her desire to become an entrepreneur. This is done so by examining the answers given by 150 students to questions regarding their risk attitude as well as questions regarding their entrepreneurial intentions. To avoid having to perform countless regressions, we combined each of the elements important to our research question that consisted of multiple variables into one new variable using principal component analysis. This way, new variables were created for risk attitude and entrepreneurial intentions, combining the 8 questions of risk attitude and the 32 questions of entrepreneurial intention into two new variables, with an appropriate weight given to each of the questions by the principal component analysis. When performing an ordinary least squares regression with the newly created variables we saw that a significant positive relationship existed between risk attitude and entrepreneurial intention: a 1 standard deviation increase in the principal component of risk attitude resulted in a 0.43 standard deviation increase in entrepreneurial intention. When controlling for omitted variables by using the control variables sex, age, study field and optimism, a positive relationship persisted (0.36). Moreover, these results were highly significant. Thus, we can say that our research question, "how does someone's subjective risk attitude affect his/her desire to become an entrepreneur?", can be answered as follows: when someone perceives themselves as being more risk tolerant, that person is more likely to desire becoming an entrepreneur.

6.2. Limitations

Our research was bound by limitations that somewhat restrain the validity and explanatory power of our results. Firstly, the dataset that was used to conduct our findings consisted of only 150 respondents, which is very little for an empirical research. It is possible that these respondents were not selected completely random but were subject to some sort of self-selection bias. For example, individuals that take the time to participate in questionnaires might be more proactive than the average person, therefore being more suited to desire becoming an entrepreneur, while wanting to fill out a questionnaire might have no significant relation to risk attitude.

Moreover, the research was based on the desire to become an entrepreneur. Although intentions are good predictors of future behaviour (Ajzen, 1985), there is no evidence that people desiring to become an entrepreneur are likely to actually become an entrepreneur. Blanchflower and Oswald (1998) actually found that there is a big discrepancy between the number of individuals that

reports on wanting to become an entrepreneur and the number of individuals that actually becomes an entrepreneur. It might be the case that for a lot of the respondents it is too early to make assumptions about their future career paths.

Lastly, the R-squared of both regression models was not really high, respectively 0.1876 and 0.2456. Therefore the proportion of variance in the dependent variable explained by the dependent variable(s) is not really high, making the results less accurate. However, as we do not want to predict the entrepreneurial intention scores, but want to prove the significance of risk attitude as a predictor of entrepreneurial intention, this limitation does not really limit our findings.

6.3. Recommendations for future research

As was said previously, the small sample size of our research might form an impediment to its accuracy and validity. Although similar research was already conducted on a bigger scale by Segal et al. (2005), this research was done in the United States which might yield different results because of cultural differences. For example, in the United States the percentage of individuals with entrepreneurial intentions was 14.54 in 2017, while this was only 8.51 in The Netherlands (GEM, 2017). Therefore, it might be interesting to conduct our research with Dutch students on a bigger scale than was done in this research.

Furthermore, to have intentions that might align more with future behaviour, it might be interesting to conduct a similar research with only master's students, as they might have a more clear image of what their career path will be. Therefore, the results would be more extrapolatable to real-world entrepreneurial choices. Moreover, if it is the case that a lot of individuals that reported on wanting to become an entrepreneur in our research do not become an entrepreneur in reality, it is interesting to look into the reasons for this. Therefore it might be interesting to track the career paths of the students in our research. If it proves that there is indeed a big discrepancy between the entrepreneurial intentions and entrepreneurial activity, as was already found by Blanchflower and Oswald (1998) the reasons for this can then be investigated.

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8. APPENDIX

Entrepreneurial intention questions (scored on a scale of 1-7):

1. I am willing to do everything it takes to become an entrepreneur.
2. My professional goal is to become an entrepreneur.
3. I am determined to start a company in the future.
4. I seriously contemplated starting a company.
5. I would like to start a company.
6. Being an entrepreneur has more advantages than disadvantages for me.
7. I think a career as an entrepreneur is desirable.
8. If I had the opportunity and means, I would become an entrepreneur.
9. Being an entrepreneur would make me very satisfied.
10. If I had the choice, I would become an entrepreneur.
11. I can normally protect my personal interests quite well.
12. If I make plans, I am fairly certain that I will fulfil them in the future.
13. I can decide for myself what happens in my life.
14. Working for myself would not at all be difficult for me.
15. If I wanted to, I could easily pursue a career as an independent entrepreneur.
16. As an independent entrepreneur I would have complete control over the situation.
17. If I become an independent entrepreneur, the chances of me becoming successful are big.

If you started a career, how would the people in around you respond (1 being very negative, 7 being very positive)

18. Your family?
19. Your friends?
20. Your fellow students?

How good are you at the following things (1 being very bad, 7 being very good)

21. Identifying new (market)opportunities?
22. Creating new products and services?
23. Using your creativity?
24. Innovation and management within a company?
25. Leadership and communication?

26. Building a professional network?

27. Commercialising a new idea or development?

28. Successfully leading a company?

Do you agree with the following statements (1 being "totally disagree", 7 being "totally agree")

29. I think starting my own company is very risky.

30. I think it is bold to lead your own company.

31. I think there are a lot of risks to owning a company.

32. In general, I am someone who is totally willing to take risks.

Risk attitude questions (scored on a scale of 1-5, 1 being "I totally disagree", 5 being "I totally agree"):

1. I like exploring unusual places.

2. I become restless when I spend too much time at home.

3. I like doing things that might be a little frightening.

4. I like wild parties.

5. I like to travel without planning the route and overnight stays up forehand.

6. I prefer to spend time with people that are unpredictable.

7. I would like to bungee jump sometime.

8. I like to experience new and exciting things, even if those things are prohibited.

Optimism questions (scored on a scale of 1-7)

1. At times of insecurity and doubt, I usually still have high expectations.

2. I can easily relax.

3. If something in my life can go wrong, it usually goes wrong.

4. I am always optimistic about my own future.

5. I bring my friends a lot of fun.

6. It is important for me to stay active.

7. I never expect things to go as I want them to go.

8. I do not get easily agitated.

9. I normally do not count on something good happening to me.

10. In general, I expect more good things than bad things to happen to me.