UNIVERSITY OF TWENTE.

Exploring the impact of potential Business Angels' Characteristics on Financial Risk-Taking and Early Stage Investments.

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Introduction

In the ever-evolving world of finance, the decisions made by investors are influenced by numerous factors, ranging from economic indicators to personal beliefs and attitudes. One crucial aspect that shapes investors' behavior is their personal characteristics. These characteristics can significantly affect investment decisions, intentions, or the risk tolerance associated with investments. Therefore, this study aims to explore the influence of investor characteristics on financial risk-taking and investment preferences within different early-stage investments.

Despite some significant advancements in financial research, there remains a notable gap in understanding the relationship between investor characteristics and financial risk-taking within the context of early-stage investments. The problem and gap that this research addresses, lie in the disproportionate emphasis on economic factors in financial research, which prioritizes efficiency and outcome but overlooks the role of social factors in financial decision-making.

If we look at this from a more practical point of view, before making financial decisions, we often talk about 'due diligence'. According to (Camp, 2002) due diligence is denoted as a legal obligation imposed on parties involved with the creation of a prospectus, to use due diligence to ensure that they contain no material misstatements. The book (Camp, 2002) 'A guide to Making Smart Investment Choices and Increasing Your Portfolio' elaborates upon different criteria within Due Diligence. There is attention to the quality of the business plan, legal counsel, accounting firm, market space, and investment amount.

This approach and general trend undermine our understanding of how social factors and individual characteristics shape investor behavior, such as financial risk-taking and the decision to invest.

Behavioral finance studies have provided valuable insights into investor behavior, and how investors make choices. A key part of major developments in this field has been the recognition that financial decision-making involves more than just cognitive activities occurring in the brain, known as the 'cognitive process'. It also encompassed conscious deliberation, where individuals consider various options based on thoughts and reasoning (Brooks & Williams, 2021).

This can be explained by the dual processing model as proposed by (Tversky & Kahneman, 1974). According to this model, individuals have two ways of thinking: The intuitive, automatic system, and the deliberate, analytical system. For example, (Conte et al., 2018) studied the impact of emotions on risk-taking, and (Brooks & Williams, 2021) focused on the impact of personality traits on attitude toward financial risk. However, according to (Brooks & Williams, 2021), it is also clear that the wider set of personality characteristics, such as temporary states or features of an individual has a much more important influence on attitude to risk than The Big Five framework, which is a combination of personality traits: Patterns, thoughts and feelings. (Brooks & Williams, 2021).

Literature in the direction of investor characteristics collectively contributes to the understanding of various factors that influence financial decision-making and financial risk-taking, including financial literacy, age, gender, and wealth. The studies documented that risk aversion increases with age (Brooks et al., 2018), due to a reduction in the dopaminergic reward function in an elderly brain (Weierich & Wright, 2010). However, this could be related to the fact that younger investors have longer investment horizons and more time to make up for losses, leading to higher investment propensity. Furthermore, (Gibson et al., 2013) state that there is a consensus that individuals with higher financial literacy tend to be more tolerant of risk. This observation is further supported by the study conducted by (Hermansson & Jonsson, 2021), reinforcing the association between financial literacy and risk tolerance. Also, a difference between genders was revealed, which indicates that, on average, men exhibit a higher propensity for financial risk-taking as compared to women (Bannier & Neubert, 2016).

Financial risk-taking, investor characteristics, and early-stage investments have been conceptualized in previous empirical studies in recent years, where several studies used investment intentions and risk tolerance separately as dependent variables. Much of the existing evidence has been drawn from foreign countries that, as compared to the Netherlands, have important cultural differences. For example, the study into the link between age and risk tolerance is drawn from US experiments (Brooks et al., 2018) and the negative relationship between market investment intentions and risk aversions was found on the Singapore market, by (Kang Li Lim, 2013). Additionally, (Croce et al., 2020) found that European Business Angels are found to be less patient (in terms of investment intentions, engagement, and exit) than their United States colleagues.

Business Angel investment, henceforth known as BA investments plays a significant role in supporting early-stage ventures. Capital, expertise, and mentorship are provided by high-net-worth individuals to startups and small businesses (Mason, 2015). This BA investors' support also contributes to the entire entrepreneurial ecosystem by fostering innovation, job creation, and economic growth (Mason, 2015). However, there remains a gap in the understanding of how certain investor characteristics influence financial risk-taking and investment preferences within the early-stage.

This research is important because it seeks to fill this aforementioned gap by providing a detailed in-depth examination of various Business Angel characteristics within the setting of early-stage investments to shape an individual's risk-taking and investment preferences. By focusing on a Dutch-oriented sample of potential Business Angel investors, this study adds to the literature by offering insights specific to the Netherlands, a context that has been less explored compared to the US and other regions. This contribution is particularly valuable given the cultural and economic differences that can influence investment behavior and decision-making processes.

This research will adopt a quantitative approach, employing a well-designed survey instrument to collect data from a diverse, Dutch-oriented sample of representative Business Angel investors. The survey will capture relevant information about participants' early-stage investment propensity, financial risk-taking, and individual characteristics.

We aim to expand existing research by examining how different investor characteristics interact within the setting of early-stage investments to shape an individual's financial risk-taking and investment preferences. By studying how various investor characteristics influence financial risk-taking and investment preferences, financial advisors, wealth managers, and policymakers can derive several key insights and practical implications:

Personalized guidance and self-awareness play vital roles for individuals interested in early-stage investments. Before committing their funds, these individuals often seek advice from consultants and tax advisors. This study benefits both parties by providing valuable insights that consultants and advisors can integrate into their discussions and information materials. Moreover, enhancing self-image, particularly in risk perception related to early investments, helps prevent the pitfalls of either overestimating or underestimating risks.

This enhanced self-awareness stimulates growth in the Business Angel market, attracting a larger pool of potential investors. It opens opportunities for more unconventional sectors and individuals whose characteristics align with successful investment profiles. Unlike traditional funding like

bank loans, with high interest rates, the Business Angel market offers a more cost-effective means of injecting capital.

Furthermore, as highlighted by (Mason, 2015), BA investors contribute significantly to job creation and economic growth. In the current economic landscape, characterized by labor market scarcity, their role becomes even more crucial. Factors such as an aging population and a rise in part-time employment accentuate the need for initiatives that spur automation and robotization. Many of these projects require moderate capital injections, precisely the niche where the Business Angel market excels.

Theoretical background

Behavioral finance theory, a descriptive model, opposes the assumption of rational behavior and profit maximization, which is the foundation of classical finance theory. Behavioral finance assumes that individuals are generally irrational and that behavioral biases or cognitive errors are involved in their decision-making processes (Prosad et al., 2015). These biases can lead to irrational and less-than-optimal decisions (Pak & Mahmood 2012). Distinct from theories that assume perfect rationality and optimal behavior, the theory of bounded rationality accounts for human cognitive limitations, decision processes, and environmental adaptations (Simon, 1957). It states that individuals, especially under time pressure, tend to take shortcuts, leading to decisions that are satisfactory rather than most optimal.

The decision-making process of the Business Angels can be considered with the dual processing model (Tversky & Kahneman, 1974) and Prospect Theory (Kahneman & Tversky, 1979) as mentioned in the introduction. These theories contribute to our understanding by providing a solid theoretical foundation for analyzing the decision-making processes of potential Business Angels in early-stage investments. It suggests that individuals often rely on System 1 thinking due to its efficiency and automaticity, especially when facing time constraints or dealing with familiar situations (Kahneman & Tversky, 2000). Due to this automaticity, personal characteristics or qualifications, such as education level; i.e. financial literacy could have a huge impact on the outcome of such decision-making. Nevertheless, this heavy reliance on heuristics and shortcuts can introduce cognitive biases and result in errors in judgment. System 1 thinking, with its tendency to oversimplify complex problems and rely on potentially inaccurate intuitions, can compromise the accuracy and rationality of decision-making, and risk tolerance.

Additionally, the Prospect theory is a psychological theory developed by Daniel Kahneman and Amos Tversky (Kahneman & Tversky, 1979) that describes how individuals make decisions under

conditions of uncertainty and risk. This theory highlights the importance of the setting and conditions under which a potential Business Angel will choose to or not invest in an early-stage company. In general, people tend to undervalue merely probable outcomes and overvalue outcomes that are more certain beforehand. This reflects upon our study in which a potential Business Angel could link risk-rewards ratios to certain outcome values, in this case overvaluing the low-risk opportunity.

Prospect Theory is particularly relevant in early-stage investing, where decision-making is crucial. The theory suggests that if the level of certainty about an investment opportunity increases through explicit knowledge, experience, or 'gut feeling', the perceived outcome value could be enhanced compared to Business Angels without this knowledge. This highlights the importance of the characteristics and qualifications of potential Business Angels in early-stage investments.

Moreover, Prospect Theory is a subgroup of behavioral economics that challenges the traditional economic theory of rational decision-making. It recognizes that an individual dealing with losses tends to be more risk-averse and will choose the option that offers the perceived gains (Chen, 2022), i.e. losses hurt more than gains add satisfaction. This behavior is influenced by the reference point, which serves as a psychological benchmark by which individuals evaluate potential gains and losses (Kahneman & Tversky, 1979).

Behavioral finance theory provides a framework to analyze how investor characteristics interact with financial risk-taking within the early-stage investment process. It acknowledges that individual characteristics, such as age, gender, education, and experience, can influence risk preferences and decision-making processes. These different characteristics could all influence the financial risk tolerance, and investment propensity associated with it.

According to the approach-inhibition theory of power (Keltner et al., 2003), higher power activates the behavioral approach system, leading individuals to focus more on rewards and opportunities rather than threats and risks. A Business Angel who feels confident and in control due to their extensive experience and success in previous investments might have a higher sense of power, leading them to focus more on potentially high returns rather than possible losses, thus making riskier financial decisions (Rodrigues et al., 2023).

Business Angels

A business angel, also known as an angel investor or informal investor, is an individual who provides capital, usually in the form of equity, to early-stage or startup companies, to which there is no existing relationship, i.e. no family connection to the business (Mason & Harrison, 1995). Business Angels are known for their rapid investment decisions, particularly in the early stages of a venture. These individuals are often characterized by their willingness to invest quickly based on an initial entrepreneurial pitch (Maxwell et al., 2011).

Business Angels aim to achieve a financial return on their investment. This return can be a gain or a loss that the investor realizes from an investment over a certain period. Portfolio diversification is an investment strategy that involves spreading investments across different asset classes, sectors, or geographic regions to reduce risk. By diversifying their portfolio, investors aim to minimize the impact of potential losses from any individual investment and improve the likelihood of achieving more consistent returns over time.

Difficulties arise here because the assumption is made that the Business Angel investor has unlimited liquidity and can spread investments across multiple ventures. If some investments fail, successful ones may offset the losses. This also highlights the main difference in the Business Angel investor landscape, as compared to retail investors' allocation of publicly traded stocks. Where retail investors can build a well-spread portfolio of established companies with relatively small amounts of capital, the Business Angel investor often has limited liquidity, especially once the investment is made.

Another big difference between these types of investors arises in terms of involvement and control. The Business Angel invests in start-up companies with growth potential on which they can apply pressure, financially but also in terms of guidance and mentorship towards the initial founders of the company. This emphasizes the importance of the Business Angels' properties, qualifications, and characteristics towards successful decision-making in the investment process.

Business Angels are often patient investors, willing to wait for the right opportunity to exit their investments and realize returns. But, besides aiming for a financial return, or spreading risks, a Non-financial goal refers to objectives that go beyond monetary returns. They may also consider their affinity or preference for the idea or concept behind the venture they are investing in. This personal liking or preference is a non-monetary consideration that BAs take into account when evaluating investment opportunities.

Inherent Characteristics and Their Influence

Age and gender are inherent characteristics that can significantly influence a Business Angel's sense of power, financial risk-taking behavior, and investment propensity. These characteristics are fixed attributes that cannot be altered by the individual, making them crucial factors in understanding investment behavior.

Age

Age is considered a significant factor in the analysis of behavior and financial risk-taking, although it is non-influential in the sense that it cannot be changed. Previous studies have demonstrated that age plays a significant role in financial risk-taking and investment preferences. Younger investors tend to have higher financial risk-taking levels compared to older investors due to a longer investment horizon and the ability to recover from losses over time (Grable & Joo, 2004). Additionally, the life cycle stage, responsibilities, and pension planning significantly impact investor behavior (Johnson, 2019).

Studies have also documented that risk aversion increases with age. This increase is attributed to a reduction in the dopaminergic reward function in the elderly brain, leading to a higher aversion to risk (Weierich & Wright, 2010). Thus, age correlates with experience, which can affect perceived power and decision-making in investments (Brooks & Williams, 2021).

Gender

Gender, considered here as a non-influential physical characteristic, also significantly impacts financial risk-taking and investment behavior. While the possibility of gender change exists, this research focuses on biological sex differences due to their direct implications on financial risk-taking. Understanding how gender influences risk preferences is essential for developing personalized investment strategies.

Previous research consistently finds that women are generally more risk-averse than men, exhibiting more conservative investment behaviors (Barber & Odean, 2001; Halek & Eisenhauer, 2001; Riley & Chow, 1992). On average, men display a higher propensity for financial risk-taking compared to women (Bannier & Neubert, 2016). These gender differences in financial risk-taking highlight the need for inclusive and tailored investment strategies that account for these inherent differences.

Acquired Characteristics and Their Influence

Education and Experience are acquired characteristics that significantly shape financial risk-taking behavior and investment propensity. These characteristics can be influenced and developed over time, making them crucial in understanding the investment behavior of Business Angels.

Education

Education level has been identified as a significant determinant of investor behavior and decision-making. Higher levels of education enhance comprehension of risks and boost confidence in facing them, consequently leading to a positive correlation with heightened financial risk-taking (Grable & Joo, 2004; Sung & Hanna, 1996). A lack of financial knowledge, conversely, causes individuals to avoid investing due to uncertainty and fear of losses (Jureviciene & Jermakova, 2012). Financial literacy, therefore, plays a crucial role in shaping investment intentions and behaviors (Samsuri et al., 2019). Individuals with higher financial literacy and education levels are more likely to engage in riskier investments due to their better understanding of market dynamics and risk management (Pak & Mahmood, 2012).

Experience

Working experience also significantly impacts financial risk-taking and investment decisions. Experienced investors have a better understanding of market dynamics and risk-return trade-offs, leading to more informed and confident decisions (Huang & Kisgen, 2013). However, a higher level of experience might also lead to a more calculated and cautious approach to investing, as seasoned investors are likely to consider more variables and potential risks before making a decision (Chen, 2022). This dual influence of experience highlights its complex role in shaping financial risk-taking behavior and investment propensity.

Methodology

Research Design

Research Question

How do inherent characteristics and acquired characteristics of potential Business Angels influence financial risk-taking behavior and investment propensity?

Sub questions

1. How do Age and Gender influence financial risk-taking behavior?
2. How do the Level of Education- and Experience influence financial risk-taking behavior?
3. How do Age and Gender influence investment propensity?
4. How do the Level of Education- and Experience influence financial investment propensity?

Hypothesis development

Based on the operationalization of the variables, the following hypotheses can be tested:

H1: There is a significant relationship between inherent characteristics (age and gender) and financial risk-taking.

- Null Hypothesis (H0): $\beta 1 = 0$ (There is no significant relationship between inherent characteristics (age and gender) and financial risk-taking.)
- Alternative Hypothesis (H1): $\beta 1 \neq 0$ (There is a significant relationship between inherent characteristics (age and gender) and financial risk-taking.)

H2: There is a significant relationship between inherent characteristics (age and gender) and investment propensity.

- Null Hypothesis (H0): $\beta 2 = 0$ (There is no significant relationship between inherent characteristics (age and gender) and investment propensity.)
- Alternative Hypothesis (H1): $\beta 2 \neq 0$ (There is a significant relationship between inherent characteristics (age and gender) and investment propensity.)

H3: There is a significant relationship between acquired characteristics (level of education and working experience) and financial risk-taking.

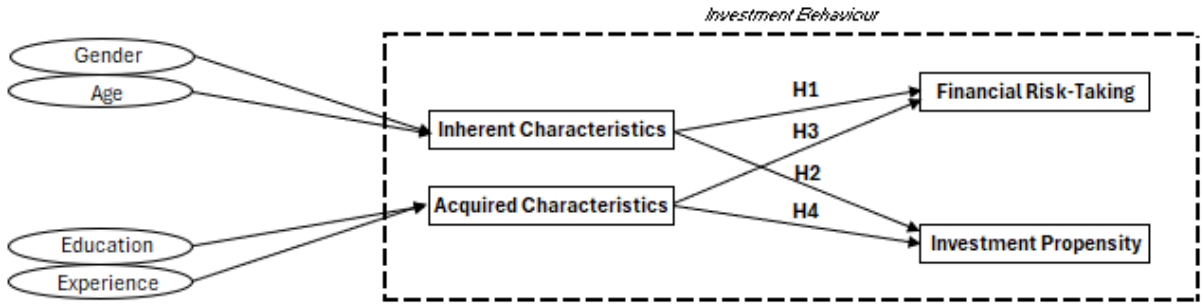
- Null Hypothesis (H0): $\beta 3 = 0$ (There is no significant relationship between acquired characteristics (level of education and working experience) and financial risk-taking.)
- Alternative Hypothesis (H1): $\beta 3 \neq 0$ (There is a significant relationship between acquired characteristics (level of education and working experience) and financial risk-taking.)

H4: There is a significant relationship between acquired characteristics (level of education and working experience) and investment propensity.

- Null Hypothesis (H0): β4 = 0 (There is no significant relationship between acquired characteristics (level of education and working experience) and investment propensity.)
- Alternative Hypothesis (H1): β4 ≠ 0 (There is a significant relationship between acquired characteristics (level of education and working experience) and investment propensity.)

Conceptual Framework

Figure 1: Conceptual model



Model Specification

The regression models to predict Financial Risk and Investment Propensity:

Financial Risk =

$\beta 0+\beta 1(\text{Gender})+\beta 2(\text{Age})+\beta 3(\text{Level of Education})+\beta 4(\text{Working Experience})+\epsilon$

Investment Propensity =

$\beta 0+\beta 1(\text{Gender})+\beta 2(\text{Age})+\beta 3(\text{Level of Education})+\beta 4(\text{Working Experience})+\epsilon$

Operationalization of variables.

Table 1 – Description of the variables.

Description of variables.

Variable	Description	Measurement level	Values
Dependent variables:			
Financial Risk	Measurement of the representative of a Business Angel's self-assessed attitude towards financial Risk. Measured on a five-point Likert scale. Ranging from 'Extremely Risk-Averse' to 'Extremely-Risk-Seeking'. Coded 1 - 5 respectively.	Ordinal	1. Extremely Risk-Averse 2. Risk-Averse 3. Neutral 4. Risk-Seeking 5. Extremely Risk-Seeking
Investment Preference	Measurement of the representative of a Business Angel's preference regarding the stage of investments they are willing to engage in. The stages are ordered based on the increasing risk appetit associated with earlier stages of investment. Coded 1 - 4 respectively.	Ordinal	1. Not willing to invest at all (least risk appetite) 2. Mature Stage (least risky among the stages) 3. Growth Stage (moderate risk) 4. Seed/Development Stage (highest risk appetite)
Investment Stage	Measurement of the representative of a Business Angel's investments preference in terms of the risk and reward associated with the investments. Reflects the trade-off they are willing to accept between risk and potential returns. Coded 1 - 3 respectively.	Ordinal	1. Low-Risk, Low-Reward 2. Moderate Risk, Moderate Reward 3. High Risk, High Reward
Investment Propensity	To create a single measure of Investment Propensity, a composite score is calculated by averaging the values of Investment_Preference and Investment_Stage. This composite score ranges from 1 to 4, where higher values indicate a greater propensity for riskier investments.	Ordinal	1 - 1,49 Lowest level of investment propensity 1,5 - 2,49 Moderate level of investment propensity 2,5 - 3,49 Higher level of investment propensity 3,5 - 4,0 Highest level of investment propensity
Explanatory inherent variables:			
Age	Years of the representative of a Business Angel at the time of the survey.	Continuous	Age in years
Gender	Indicating the gender of the representative of a Business Angel. Selected from predetermined options: Male, Female, Non-Binary / Third gender, and Prefer not to say.	Nominal (to dummy)	Male: 1 if Male, 0 if not Female: 1 if Female, 0 if not Non-Binary/Third gender: n/a Prefer not to say: n/a
Explanatory acquired variables:			
Level of Education	Indicating the highest level of education that the representative of a Business Angel has achieved. Measured on a five-point Likert scale. Coded 1-5 respectively.	Ordinal	1. Primary School 2. High School 3. Secondary Education 4. Higher Secondary Education 5. University Degree
Working Experience	Number of years that the representative of a Business Angel has experience in their working area. Measured on a five-point Likert scale. Coded 1-5 respecively.	Ordinal	1. Less than 2 years 2. 2 to 5 years 3. 6 to 10 years 4. 11 to 20 years 5. More than 20 years

Independent Inherent Variables:

Gender: This nominal variable indicates the gender of the potential Business Angel. Participants are asked to select their gender from predetermined options: Male, Female, Non-Binary / Third gender, and Prefer not to say. Answers were limited to only two of the four possibilities (Male/Female), therefore other categories are distinct and will be excluded from the analysis. Dummy coding will be used to include these as independent variables in de regression analysis.

- Survey Question: "What is your gender?" (Q2)

Age: This continuous variable represents the age of the potential Business Angel. Participants are asked to provide their age in years.

- Survey Question: "What is your age?" (Q1)

Independent Acquired Variables:

Education: This ordinal variable signifies the level of education attained by the potential Business Angel. Participants are asked to select their highest achieved level of education from predetermined options ranging from low to high: Primary School, High School, Secondary Education, Higher Secondary Education, University, or Higher.

- Survey Question: "What is your highest achieved level of education?" (Q4)

Experience: This ordinal variable reflects the level of professional experience the potential Business Angels has measured in years. Ranging from less than two years of experience to more than twenty years of experience. Experience here refers to the total number of years the respondent has worked in their respective sector, indicating their level of expertise and familiarity with financial decision-making.

- Survey Question: "In addition to your previously chosen business area, how experienced are you?" (Q6)

Financial Risk *(Fin_Risk)*: This ordinal variable evaluates the potential Business Angel's risk attitude specifically towards financial investments. Providing insights into their risk-taking behavior in investment contexts. Measurement: Participants indicate their risk attitude regarding financial investments on a five-point Likert scale, ranging from extremely risk-averse to extremely risk-seeking.

- Survey Question: "In terms of risk and financial reward, are you risk-averse or more risk-seeking?" (Q9)

Investment Preferences *(Inv_pref)*: This ordinal* variable explores the potential Business Angel's preference regarding investment stages. Indicating their comfort level with different levels of risk and potential rewards associated with investment opportunities. Measurement: Participants select their willingness to invest in different company stages (seed stage, development stage, growth stage, or mature stage) or choose not to invest at all.

- Survey Question: "Would you be willing to invest in a seed stage/development stage, growth stage, or more mature stage company?" (Q13)

** Justification for Ordinal Operationalization (Reflecting Increasing Risk Appetite)*

The ordinal operationalization of Investment Preferences is justified by the natural ordering based on risk appetite, where earlier stages like Seed/Development are typically associated with higher risk and potential reward, while later stages like Mature are perceived as less risky. This approach ensures consistency with the Financial Risk variable, which is also coded to reflect increasing risk appetite from risk-averse to risk-seeking. By aligning the coding of Investment Preferences with Financial Risk, we maintain a coherent framework that accurately represents the varying levels of risk and potential reward across different investment stages.

Investment Stage *(Inv_stage)*: This ordinal variable examines the potential Business Angel's prioritization of risk and reward in investment decision-making. Revealing their willingness to accept varying levels of risk for potential returns. Measurement: Participants prioritize their preference between risk and reward in investment decisions by selecting from options: low risk, low reward; moderate risk, moderate reward; or high risk, high reward.

- Survey Question: "Please prioritize your preference between risk and reward in making an investment decision: Low Risk, Low Reward; Moderate Risk, Moderate Reward; or High Risk, High Reward." (Case Scenario)

Investment Propensity (Inv_Pref * Inv_Stage): To create a single measure of Investment Propensity, a composite score is calculated (see appendix 6) by averaging the values of the *Investment_Preference* and *Investment_Stage* variables. As (Tabachnick & Fidell, 2013) note, creating composite variables by averaging multiple related items can help reduce measurement error and increase the reliability of the construct being measured. This composite score reflects the overall propensity of a Business Angel to engage in risky investments. Since Investment_Preference ranged from 1 to 4 and Investment_Stage ranged from 1 to 3, we rescaled

Investment_Stage to match the 1 to 4 range. A new temporary variable, Rescaled_Investment_Stage was calculated through the following formula:

*Rescaled_Investment_Stage = (Investment_Stage - 1) * (3/2) + 1*

The scores of Investment_Preference and Rescaled_Investment_Stage are then averaged to create the composite score for our final dependent variable Investment_Propensity:

Investment_Propensity = (Investment_Preference + Rescaled_Investment_Stage) / 2

This composite score ranges from 1 to 4, where higher values indicate a greater propensity for riskier investments.

- 1 - 1,49 Lowest level of investment propensity, indicating a preference for not investing at all or engaging only in the least risky investments.
- 1,5 - 2,49 Moderate level of investment propensity, indicating a willingness to invest in more stable and less risky stages of investment.
- 2,5 - 3,49 Higher level of investment propensity, indicating a preference for growth stages with moderate risk and reward.
- 3,5 - 4,0 Highest level of investment propensity, indicating a willingness to engage in the earliest and riskiest stages of investment with the highest potential rewards.

Sample & Population.

The goal of this study was to explore the impact of potential Business Angels' characteristics on financial risk-taking and early-stage investments. Due to limitations in accessing a large and diverse pool of active Business Angels, a strategic approach was adopted to approximate the Business Angel population. This section provides an overview of the sample selection, power analysis, and the limitations faced during the study.

Sample Selection

To support the choice for a specific sample size, a power analysis for the main analysis method, multiple regression, was conducted. For the regression models, a total maximum number of five independent variables were used. Assuming an expected effect size of 0.4 and an alpha level (α) of 0.05, a minimum of 39 respondents was needed (see Appendix 5). To enhance the reliability, validity, and statistical power of the research, a minimum target sample size of n = 50 was determined. This larger sample size allows for a safety margin to account for potential non-response, invalid responses, and better control over the data. Including a larger number of respondents provides more robust and representative findings, increasing the generalizability of the results and reducing the potential impact of individual variations or anomalies.

A quantitative approach was adopted, and a survey instrument was used to collect data from a diverse, Dutch-oriented sample of investors. "Dutch-oriented" includes respondents with Dutch nationality, permanent residence in the Netherlands, or employment at a Dutch company. The survey was administered online through the platform Qualtrics, provided by the BMS lab from the University of Twente. This method allowed the collection of quantitative data from a relatively large sample in a short period. The survey was open for two weeks and was shared through LinkedIn, resulting in data from 57 respondents.

Characteristics of the Sample

The Dutch-oriented respondents aimed to reach with the questionnaire included Business Angels and representatives of potential Business Angels. These representatives are individuals with similar business actions and responsibilities as those of a Business Angel. By simulating certain qualifications, these respondents were chosen to approximate the behaviors and characteristics of actual Business Angels.

To approximate Business Angels, the study included respondents with relevant experience, sufficient capital, and interest in early-stage investments. This included individuals such as real estate investors, business owners, and high-net-worth individuals, as well as financial advisors, wealth managers, and policymakers. These individuals routinely make financial decisions affecting themselves or their organizations. By assuming factors like available capital and time and presenting investment dilemmas in the survey questions, these representatives of Business Angels offer valuable insights for addressing the primary and secondary research inquiries.

Justification for Including Specific Professions

The following professions were included based on the responses from the survey and their relevance to Business Angel activities:

Financial Service (42%): Professionals in financial services are well-versed in investment strategies, risk assessment, and financial management. Their daily activities involve making informed financial decisions, similar to those of Business Angels.

Real Estate (15%): Real estate agents and investors handle substantial financial transactions and investment decisions, assessing market conditions and risks, which parallels the decision-making process of Business Angels.

Corporate Finance (5%): Individuals in corporate finance are experienced in managing company finances, investment strategies, and risk management, aligning closely with the responsibilities of Business Angels.

Business Owners (14%): Business owners manage their enterprises, make strategic investment decisions, and often seek growth opportunities, akin to the responsibilities of Business Angels.

Government (7%): Government officials involved in economic development or financial regulation have a broad understanding of market dynamics and financial policies, providing a unique perspective on investment decisions.

Other Professions (17%): This category includes various other professionals such as sales, logistics, education, IT services, and business controlling. These individuals, while not directly involved in financial services or investments, still make significant financial decisions within their roles, providing additional insights into investment behaviors.

Potential Component

The inclusion of these diverse respondents is justified by the understanding that Business Angels are not born but formed through their careers, financial success, or other life events. Many Business Angels begin their careers in different sectors, gaining knowledge, and experience, and building a network. If respondents from these various sectors have sufficient capital, they could easily transition into the role of Business Angels. This potential component underscores the dynamic nature of career paths leading to becoming a Business Angel, highlighting the relevance of including professionals from various backgrounds in the study.

The inclusive approach allowed for the validation of possible research findings. If different groups of respondents consistently provided similar responses, it contributed to the reliability and credibility of the results. This method acknowledges the constraints regarding the generalizability of its findings but provides a useful estimation of Business Angel behavior.

Data Collection and Ethical Considerations

To uphold ethical standards, the survey ensured that respondents remained anonymous and that their answers were treated confidentially, as detailed in Appendix 3. Respondents were provided with consent information outlining the purpose of their data collection. Additionally, the survey underwent pilot testing, validity and reliability checks, and received approval from an Ethical Committee. These measures, detailed in Appendix 4, aim to enhance the robustness of this paper and contribute valuable insights to the field.

The survey was administered using Qualtrics, an online data collection tool. Qualtrics offers features for data validation and quality control, as well as basic descriptive and inferential statistics, which enabled us to perform the analyses, such as regression analyses. For example, the "Sector" question was set up as a multiple-choice question with specified categories, and Qualtrics

automatically handled the encoding of these responses when exporting the data. This feature reduced the time spent on transferring data between different platforms.

In addition to Qualtrics, SPSS (Statistical Package for the Social Sciences) was used for more advanced statistical analyses. SPSS is a powerful statistical tool well-suited for conducting correlation analyses, t-tests, ANOVA, and regression analysis. The use of SPSS allowed for comprehensive data analysis and validation of research findings through its robust and interactive capabilities.

To test our hypotheses, the following statistical tests were used:

- Descriptive Statistics: To summarize and describe the basic features of the data.
- Correlation Analysis: To examine the relationships between variables.
- Independent Samples t-test: To compare means between two groups.
- ANOVA (Analysis of Variance): To compare means among three or more groups.
- Regression Analysis: To explore the relationships between dependent and independent variables and to test the hypotheses.

By leveraging these statistical tools and techniques, the study aimed to ensure the accuracy and reliability of the findings. The combination of Qualtrics for data collection and SPSS for data analysis provided a comprehensive approach to handling the data and testing the hypotheses effectively.

Results

Introduction to the results:

The distributed survey results offer valuable insights into the financial risk-taking behaviors and investment preferences of potential Dutch investors. In our analysis, we examine the characteristics and qualifications of the 57 anonymous respondents, who form a 'Dutch-oriented' sample as per the research's focus. This investigation aims to understand how inherent and acquired characteristics influence financial risk-taking and investment decisions. A full survey report is available in Appendix 1.

The age range of the respondents spans from 18 to 63 years, with a mean age of 34.45 years, indicating a diverse age group. The gender distribution is uneven, with 64% male (36) and 36% female (21), reflecting a higher representation of male respondents in the sample.

The sample consists entirely of individuals from the Netherlands, accounting for 100%, aligning with the research's 'Dutch-oriented' focus. This ensures that the findings are relevant to the Dutch investment landscape. We investigate possible relationships between the respondents' financial risk-taking and investment preferences and their inherent characteristics (such as age and gender) as well as their acquired characteristics (such as education and professional experience).

Respondents were asked to indicate their level of professional experience and highest achieved level of education. Over 70% of respondents hold a higher secondary or university-level degree, as depicted in Figure 4. Regarding experience, the distribution across the five options is relatively balanced, with 54.4% having less than 10 years of relevant professional experience and 45.6% having over 10 years of experience. This spread provides a comprehensive view of varying levels of expertise within the sample.

We found meaningful differences within industry segments and the level of education of the respondents in those segments. For instance, 54.2% of the respondents working in the financial services sector have achieved a university-level degree or higher. In comparison, only 12.5% of all respondents active in Real Estate, Corporate Finance, or as a Business Owner have accomplished that level of education. These disparities highlight the diversity in educational backgrounds and professional experiences across different sectors, which could influence investment behaviors and risk preferences.

Descriptive Statistics and Preliminary Analyses

Before conducting the regression analyses, we first examined the descriptive statistics and conducted preliminary analyses to check for multicollinearity among the independent variables.

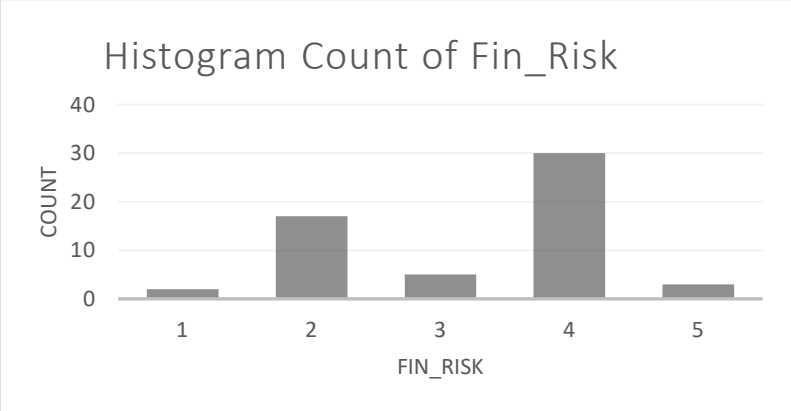
The descriptive statistics table provides an overview of the basic statistical properties of the variables used in the analysis. For each variable, the table includes the mean, standard deviation, minimum, and maximum values, along with the number of observations (N). For a more in-depth understanding of the operationalization of variables, see Table X, in the relevant section.

Table 1 : Descriptive statistics

Variable	Mean	SD	MIN	MAX	N
Age	34.45	12.23	18	63	57
Education	3.89	1.18	1	5	57
Experience	3.51	1.28	1	5	57
Financial Risk	2.53	1.10	1	5	57
Investment Preference	2.48	0.88	1	4	57
Investment Stage	2.40	0.75	1	4	57
Investment Propensity	2.65	0.70	1	4	57

To further understand the distribution of our key variables, we generated histograms for Financial Risk, Investment Propensity, Investment Stage, and Investment Preference.

Figure 2: Financial Risk



The histogram for Financial Risk shows that the majority of respondents are risk-averse, with a large portion scoring 2 and 4 on the risk scale, indicating a preference for moderate financial risk-taking behavior.

To create a comprehensive measure of investment propensity, we merged the variables Investment Stage (Inv_stage) and Investment Preference (Inv_pref). The Investment Propensity (Inv_propensity) composite score was computed by averaging the values of these two variables. This approach allows us to capture a more holistic view of the respondents' overall investment behavior, reflecting both their preferred stage of investment and their general investment preferences. The rescaling process ensured that both variables contributed equally to the composite score. Investment Stage, originally measured on a 1 to 3 scale (Figure 5), was rescaled to a 1 to 4 scale to match the range of Investment Preference (Figure 6).

Figure 3: Investment Stage

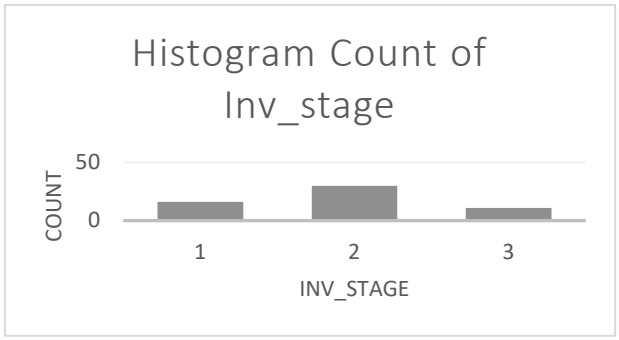
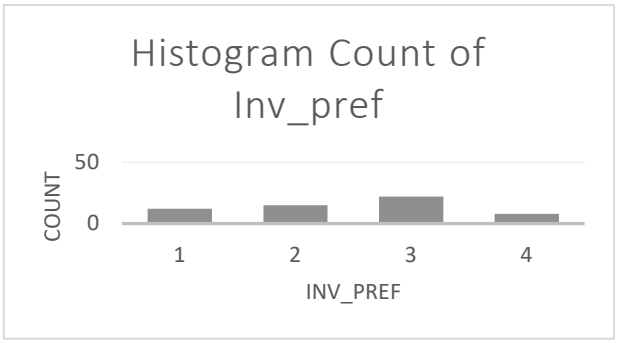


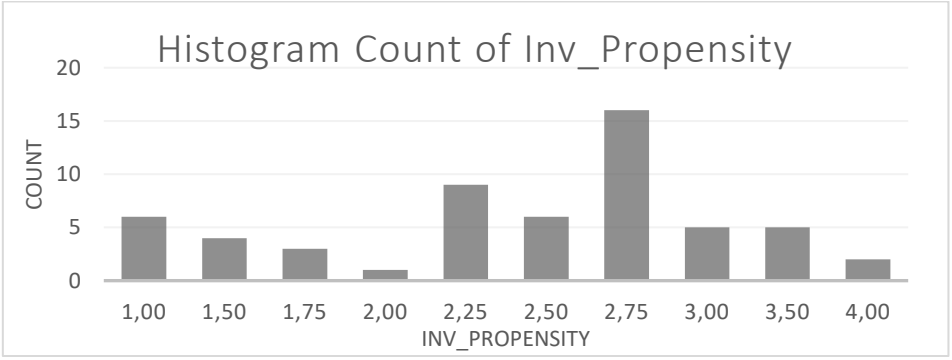
Figure 4: Investment Preference



This rescaling ensured consistency in measurement, allowing us to accurately average the two variables to compute the Investment Propensity score. The composite score ranges from 1 to 4, with higher values indicating a greater propensity for riskier investments at various stages of venture development. Specifically, this score reflects a Business Angel's combined preference for the stage of investment (from early to mature stages) and their overall investment preferences, capturing both their willingness to invest in riskier early-stage ventures and their general propensity towards investment risk.

The histogram for Investment Propensity indicates that most respondents have a moderate propensity for investments, with a noticeable peak at the value of 2.75, showing a moderate to high investment propensity.

Figure 5: Investment Propensity



Implications for Regression Analysis

These descriptive statistics and histograms provide a clear understanding of the distributions and central tendencies of the key variables. Such insights are essential for interpreting the regression outcomes accurately. For instance, the predominance of moderate scores in both financial risk- and investment propensity underscores the need to explore individual characteristics that drive these preferences. Additionally, the histograms highlight the variability within the sample, which is crucial for understanding the impact of inherent and acquired characteristics on financial decision-making.

Collinearity Diagnostics for Financial Risk and Investment Propensity Models

To assess the presence of multicollinearity, we conducted a collinearity diagnostics analysis. Table 2 presents the results of this analysis. In the collinearity diagnostics table, each row labeled "Dimension" represents a principal component derived from a Principal Component Analysis (PCA) on the predictor variables. These dimensions capture the variance in the original predictors, with each dimension's eigenvalue indicating the amount of variance explained. Variance proportions show how much of each predictor's variance is explained by each dimension, where high proportions (typically greater than 0.5) across multiple predictors in the same dimension suggest potential multicollinearity issues. In our analysis, the dimensions are consistent across both models, indicating similar multicollinearity diagnostics for the predictors involved. The collinearity diagnostics reveal that while some dimensions exhibit moderate condition indices, none exceed the critical threshold of 30. However, dimensions 4 and 5, with condition values of 11.253 and 17.498 respectively, and higher variance proportions for Age, Education, and Experience, indicate potential multicollinearity concerns among these variables. Despite these indications, the multicollinearity is not severe enough to invalidate the regression analyses, but these results should be interpreted with caution.

Table 3: Collinearity Diagnostics

Dimension	Eigenvalue	Condition Index	(Constant)	Dum_Male	Age	Education	Experience
1	4.578	1.000	.00	.01	.00	.00	.00
2	0.231	4.453	.00	.78	.01	.00	.04
3	0.140	5.716	.03	.01	.11	.18	.12
4	0.036	11.253	.19	.23	.03	.39	.37
5	0.015	17.498	.78	.74	.07	.42	.46

Regression Analysis

To understand the impact of inherent and acquired characteristics on financial risk-taking behavior and investment propensity, we conducted an ordinal logistic regression analysis. The results are presented in Table 4.

Table 4: This table presents regression coefficients after a logistic regression analysis. Z-statistics are in parentheses.

Variable	Model 1	Model 2
Inherent variables:		
Gender (Male)	0.35 **	-0.324
	(2.05)	(-1.363)
Age	-0.02	-0.016
	(-1.30)	(-1.042)
Acquired variables:		
Level of Education	0.45 ***	-0.178
	(3.60)	(-1.686)
Working Experience	0.25 *	0.148
	(1.95)	1.220
Observations	57	57
R-squared	0.196	0.086
Std. Error of the Estimate	0.987	0.764

P-values less than 0.01, 0.05, and 0.1 are denoted by ***, **, and * respectively, indicating significance levels at the 1%, 5%, and 10% levels.

Financial Risk

The regression results indicate that Gender (Male) and Level of Education are significant predictors of financial risk-taking behavior. Specifically, being male is positively associated with higher financial risk-taking, as indicated by the coefficient of 0.35 ($z = 2.05$, $p = 0.041$). Additionally, higher levels of education are associated with greater financial risk-taking (coefficient = 0.45, $z = 3.60$, $p < 0.001$). Age and Working Experience, while showing the expected directions, are not statistically significant at conventional levels

The model summary indicates that the predictors explain approximately 19.6% of the variance in financial risk-taking behavior (R Square = 0.196). This suggests that the model has some explanatory power, it also implies that a significant portion (80.4%) of the variance in financial risk-taking is due to factors not included in the model.

Investment Propensity

The regression results indicate that none of the predictors are statistically significant at conventional levels. Gender (Male) has a negative coefficient (-0.324), suggesting that being male is associated with a lower investment propensity, though this result is not statistically significant ($p = 0.179$). Age also has a negative coefficient (-0.016) but is not statistically significant ($p = 0.302$). Level of Education and Working Experience show expected directions but do not reach statistical significance.

The model summary indicates that the predictors explain approximately 8.6% of the variance in investment propensity (R Square = 0.086). This relatively low R-squared value suggests that the model explains only a small portion of the variance in investment propensity, indicating that most of the variability is likely due to factors outside of those included in the model.

The analysis and results of model 1 suggest that certain inherent characteristics, such as gender and level of education, significantly influence financial risk-taking behavior among the respondents, who could be potential early-stage investors such as Business Angels. These findings highlight the importance of considering individual characteristics when analyzing investment behaviors and risk preferences in a financial decision-making context. Conversely, the results and analysis of the second model suggest that the inherent and acquired characteristics examined in this study do not significantly influence investment propensity among these respondents. This finding underscores the complexity of predicting investment behavior and suggests that other factors not included in this model may play a more significant role. These insights emphasize the need for further research to identify and include additional variables that could better explain investment propensity.

Discussion

The primary objective of this study was to investigate how different inherent and acquired characteristics of a potential Business Angel influence financial risk-taking and investment propensity. The logistic regression analyses as presented earlier revealed some significant insights, particularly concerning the role of Gender and Education in financial risk-taking. On the other hand, no significant influence was found between the inherent- and acquired characteristics and investment propensity.

Hypothesis Evaluation

H1: Relationship between inherent characteristics (age & gender) and financial risk-taking.

The findings indicate that Gender is a significant independent predictor of financial risk-taking. Especially, being male is positively associated with higher financial risk-taking, as shown by the significant coefficient of 0.35 ($z = 2.05$, $p = 0.041$). This means that our first alternative hypothesis, is supported, confirming that inherent characteristics, in this case Gender, significantly influence financial risk-taking. Conversely, age did not show a significant relationship with financial risk-taking, indicating that within our sample, age does not play a critical role in determining risk behavior among potential Business Angels.

The outcomes of our study partly align with previous research that consistently finds gender differences in financial risk-taking behavior. Studies such as (Barber & Odean, 2001) and (Bannier & Neubert,2016) have documented that men generally exhibit higher risk tolerance compared to women. This is often attributed to social and psychological factors that influence risk perception and decision-making. On the other hand, the non-significance of age contrasts with findings by (Brooks et al.,2018) and (Weierich & Wright, 2010), who reported that risk aversion increases with age due to neurological changes. This discrepancy might be due to the specific characteristics of the Business Angel sample in the Netherlands or other unobserved factors influencing this relationship.

H2: Relationship between inherent characteristics (age & gender) and investment propensity.

The conducted analyses for our second model did not show any significant relationship between inherent characteristics and the composite independent variable Investment propensity. The coefficients for both Gender (-0.324, $p = 0.179$) and age (-0.016, $p = 0.302$) were not statistically significant. Therefore, our second null hypothesis is not rejected by the data. This suggests that factors other than Age and Gender might be more influential in determining Investment Propensity among potential Business Angels.

The lack of significant findings for age and gender in predicting investment propensity suggests a more complex interplay of factors influencing investment decisions. While research by (Kang Li Lim, 2013) and (Croce et al., 2020) has highlighted the role of demographic factors in different market contexts, our study's focus on potential Dutch Business Angels might reflect unique market conditions or cultural influences that mitigate the impact of age and gender on investment propensity. This calls for further investigation into contextual and environmental factors that could shape investment behaviors in specific regions.

H3: Relationship between acquired characteristics (level of education & working experience) and financial risk-taking.

The results of our logistic regression for the first model, show that the level of education is a significant predictor of financial risk-taking behavior. Higher levels of education are associated with greater financial risk-taking (coefficient = 0.45, $z = 3.60$, $p < 0.001$). This finding supports the third alternative hypothesis, indicating that acquired characteristics, such as education, significantly influence financial risk-taking. However, working experience did not show a significant effect (coefficient = 0.25, $p = 0.051$), suggesting that the role of professional experience in financial risk-taking is less clear within this sample, especially considering that the respondents are employed in different sectors.

These findings, just like our first hypothesis, are partly consistent with studies such as those from (Grable & Joo,2004) and (Sung & Hanna, 1996), which have documented that higher levels of education correlate with greater financial risk tolerance. Education enhances individuals' understanding of complex financial concepts and market dynamics, thereby increasing their confidence in taking financially related risks. The non-significance of professional experience contrasts with research by Huang and Kisgen (2013), which suggested that experience leads to more informed decision-making. This may indicate that in the context of early-stage investments, the benefits of experience are not as pronounced as the theoretical knowledge and cognitive skills acquired through formal education.

H4: Relationship between acquired characteristics (level of education & working experience) and investment propensity.

Lastly, the regression analysis for the second model did not reveal significant relationships between acquired characteristics and investment propensity. The coefficients for education (-0.178, $p = 0.098$) and working experience (0.148, $p = 0.228$) were not statistically significant. Thus, our fourth null hypothesis is not rejected by the findings. This implies that while education and experience might be crucial for understanding other aspects of investment behavior, they do not significantly predict investment propensity in this context.

The non-significant relationship between education, experience, and investment propensity suggests that these acquired characteristics might not be as crucial in influencing investment decisions as initially thought. While financial literacy and, experience are often linked to better investment decisions and higher risk tolerance (Pak & Mahmood, 2012; Samsuri et al., 2019), their direct impact on the propensity to invest in early-stage ventures may be limited. This finding could point to the importance of other factors, such as market conditions, investment opportunities, or psychological traits, which were not accounted for in this study. Further research is needed to explore these additional variables and their potential impact on investment propensity.

Reflection and Concluding Answers to Sub-Questions

The study provides valuable insights into the role of inherent and acquired characteristics in financial risk-taking and investment propensity among Business Angels. Gender and education emerged as significant predictors of financial risk-taking, highlighting the importance of these characteristics in shaping investment behaviors. However, the lack of significant relationships between these characteristics and investment propensity suggests that other, potentially more context-specific factors, may be more critical.

Sub-question 1: Gender influences financial risk-taking, with males showing higher risk tolerance; age does not significantly affect financial risk-taking.

Sub-question 2: Education influences financial risk-taking, with higher levels leading to greater risk tolerance; professional experience does not significantly impact financial risk-taking.

Sub-question 3: Neither age nor gender significantly influences investment propensity among potential Business Angels.

Sub-question 4: Neither education nor professional experience significantly influences investment propensity in this context.

Conclusion

The main research question of this study was:

How do inherent and acquired characteristics of representatives of Business Angels influence financial risk-taking behavior and investment propensity?

In conclusion, our analysis revealed the following key insights:

Inherent Characteristics:

Gender: Gender significantly influences financial risk-taking behavior, with males showing a higher propensity for financial risk-taking compared to females. This finding aligns with existing literature that consistently finds men to be more risk-tolerant than women. However, gender did not significantly influence investment propensity, suggesting that while gender affects risk attitudes, it does not directly translate to a willingness to engage in early-stage investments.

Age: Age did not significantly affect financial risk-taking or investment propensity. This contrasts with some previous studies that found risk aversion to increase with age. The lack of significance might be due to the specific characteristics of the Dutch Business Angel sample or other unobserved factors influencing this relationship.

Acquired Characteristics:

Education: Higher levels of education were positively associated with greater financial risk-taking. This supports the hypothesis that education enhances individuals' understanding of financial concepts and their confidence in taking risks. However, like gender, education did not significantly predict investment propensity, indicating that educational attainment influences risk tolerance but not necessarily the inclination to invest in early-stage ventures.

Experience: Professional experience did not show a significant effect on financial risk-taking or investment propensity. This finding suggests that in the context of early-stage investments, the theoretical knowledge and cognitive skills acquired through formal education may play a more critical role than the practical experience gained through years of work.

Overall, the study found that inherent characteristics, such as gender, and acquired characteristics, such as education, significantly influence financial risk-taking behavior among Business Angels. However, these characteristics do not appear to significantly impact investment propensity, indicating that other factors, potentially more context-specific or psychological, may play a more critical role in determining investment behavior.

Implications

Tailored Investment Strategies

Understanding that males and individuals with higher education levels are more risk-tolerant can help financial advisors tailor their recommendations to match investors' unique preferences and behavioral tendencies. This personalization can lead to better-protected portfolios and enhanced financial well-being.

For example, consider a 35-year-old male Business Angel with an MBA and a 45-year-old female Business Angel with a high school diploma. Based on the study's findings, the male Business Angel is likely to be more financially risk-tolerant due to his gender and higher education level. Therefore, he might be more inclined to invest in high-risk, high-reward early-stage investments such as technology startups and emerging markets. On the other hand, the female Business Angel, who is likely to be more risk-averse, might prefer more conservative early-stage investments, such as companies in later development stages with lower risk. By tailoring their investment strategies to their unique profiles, Business Angels can better align their investments with their own needs and risk preferences, potentially leading to higher satisfaction and better investment outcomes.

Educational Programs

The significant impact of education on risk tolerance suggests that improving financial literacy and risk comprehension may lead to more informed investment decisions. The institution uses the study's findings to emphasize the importance of financial literacy in increasing risk tolerance. By equipping participants with the knowledge and tools needed to understand and manage investment risks, the program helps them make more informed decisions.

Sector-Specific Insights

Sectors with a reputation for innovation and risk-taking may consider fostering a balanced workforce with varying risk propensities, while risk-averse sectors could attract more risk-tolerant individuals to spur innovation and growth.

For example: Tech companies, known for their innovativeness and volatility could use the study’s findings to create a balanced team with varying risk-propensities. The HR or recruitment department could hire individuals who are more risk-averse for roles as planning and risk management. This balanced approach ensures that the company remains innovative, but also pay attention to the continuity of the company.

Holistic Assessment of Experience

The non-significant effect of experience on risk tolerance highlights the need for a more holistic assessment of qualifications, particularly for roles requiring financial decision-making. Instead of focusing solely on candidates with extensive years of experience, a firm could adopt a holistic approach to the assessment. They could consider candidates' educational background, cognitive skills, and psychological traits such as risk tolerance and decision-making style.

Conclusion

These practical examples illustrate how the findings of the study can be applied in real-world scenarios to enhance investment strategies, educational programs, sector-specific insights, and the holistic assessment of experience. By leveraging these insights, financial advisors, institutions, and companies can make more informed decisions that align with the unique characteristics and behaviors of investors and professionals. They could consider candidates' educational background, cognitive skills, and psychological traits such as risk tolerance and decision-making style. Of course, due to the limitations of the study, assumptions and findings should be approached with caution. This alignment can lead to more effective investment outcomes, better client satisfaction, and improved organizational performance, ultimately contributing to a more dynamic and responsive financial ecosystem.

Limitations

While this study provides valuable insights, several limitations should be acknowledged:

Survey instrument limitations: The survey instrument, while comprehensive, may have limitations in capturing the full complexity of financial risk-taking and investment propensity. The use of self-reported measures can lead to inaccuracies due to social desirability bias or misunderstanding of questions. Respondents may answer questions in a way they believe is socially acceptable or favorable rather than truthfully reflecting their actual behavior and attitudes. This can lead to an overestimation or underestimation of risk tolerance and investment propensity. Additionally, Some respondents might misinterpret survey questions, leading to inaccurate responses. This is particularly relevant for complex concepts like financial risk-taking, where different individuals might have varying interpretations of what constitutes "risk."

For future research, employing mixed methods and more sophisticated data collection techniques can provide deeper insights and a more accurate understanding of how investor characteristics influence financial risk-taking and investment propensity.

Potential Limited Generalizability: Given the specific demographic and professional background of the respondents, the findings may not be applicable to all Business Angels or early-stage investors. Future studies should consider stratifying samples based on more specific criteria to improve generalizability. Limited generalizability from a non-representative sample can lead to inaccurate assumptions about the broader population of Business Angels. For example, the specific characteristics and financial risk levels observed in this study might not reflect those of real Business Angels operating in different regions or industries. Recognizing the potential for limited generalizability is crucial for accurately interpreting the findings of this study.

Impact of External Economic Conditions: The study does not account for the current economic climate or market conditions at the time of data collection. Market conditions, including interest rates, inflation, and stock market performance, can directly impact investment decisions. Without accounting for the economic context, it is challenging to compare the results with other studies conducted during different economic conditions. This makes it difficult to determine whether observed behaviors are due to intrinsic investor characteristics or external economic influences.

Future studies should collect data on relevant economic indicators at the time of data collection, such as GDP growth rate, unemployment rate, stock market indices, and interest rates. This data can be used to contextualize the findings and better understand the external influences on investor behavior.

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Appendix

1. Survey enquête.

Default Report

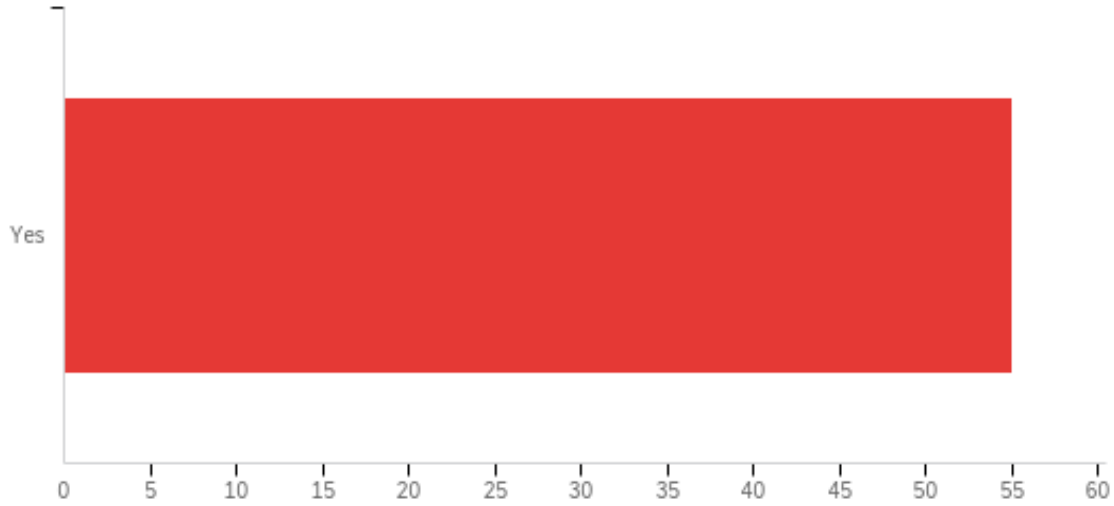
Investor Insights Survey: Education, Experience, and Risk

January 18th 2024, 2:28 pm CET

Q_RecaptchaScore

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Q_RecaptchaScore	0.40	1.00	0.88	0.08	0.01	58

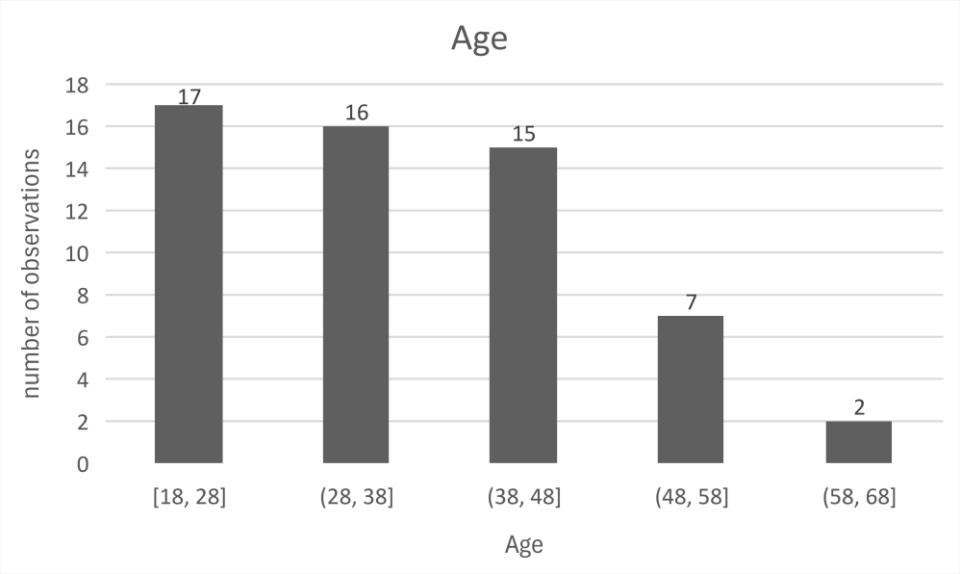
Q15 - I have read the information in the opening statement, I am informed about the nature of the study, and willingly agree to participate in it. I was made aware that I can withdraw from the survey at any time during its completion.



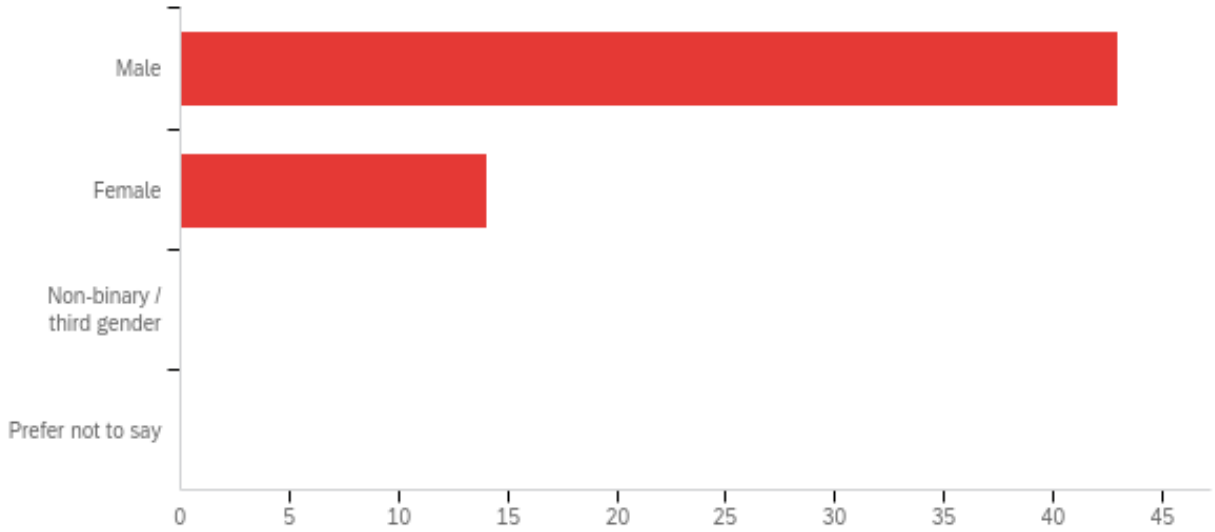
#	Answer	%	Count
1	Yes	100.00%	55
	Total	100%	55

Q2 - What is your age?

! For the sake of readability, this question / raw data output from Qualtrics has been transformed into a histogram using Excel. This visual representation provides a clearer and more accessible overview of the age distribution among the respondents.

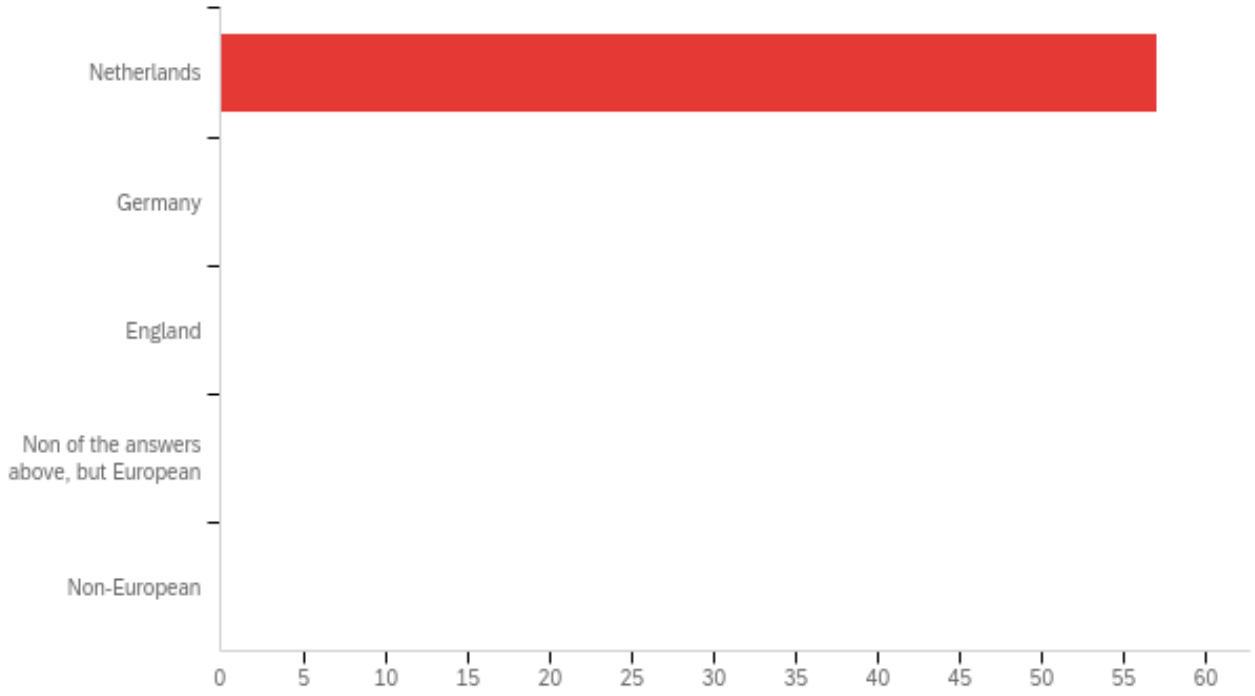


Q2 - What is your gender?



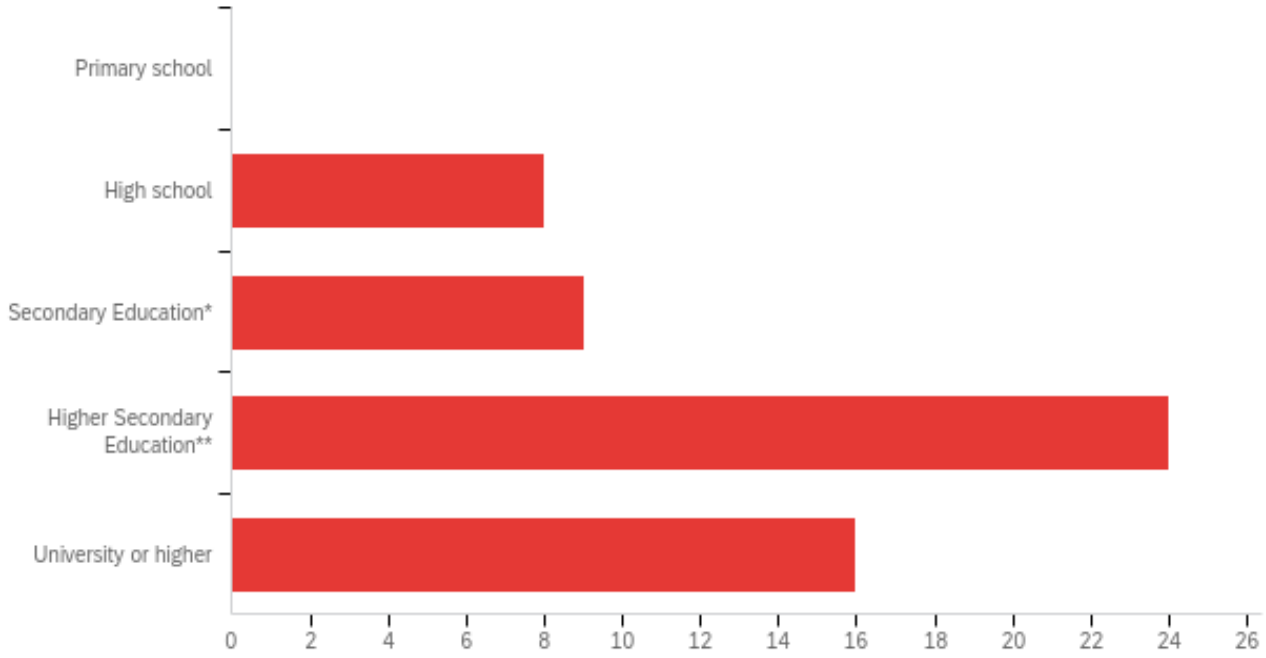
#	Answer	%	Count
1	Male	75.44%	43
2	Female	24.56%	14
3	Non-binary / third gender	0.00%	0
4	Prefer not to say	0.00%	0
	Total	100%	57

Q3 - What is your country of origin?



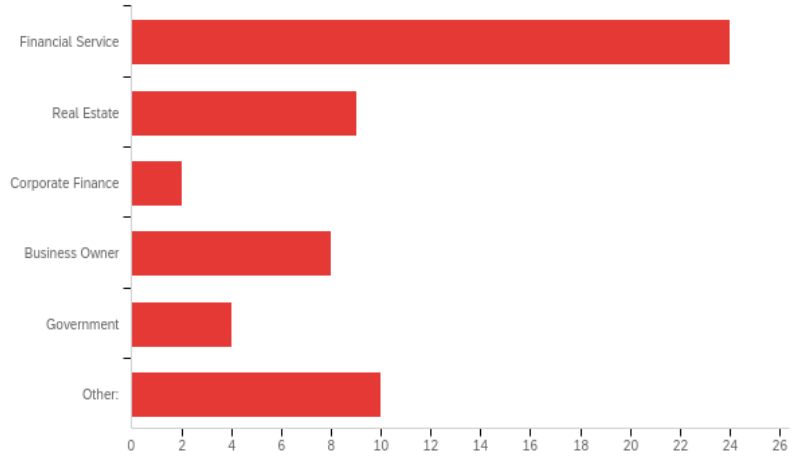
#	Answer	%	Count
1	Netherlands	100.00%	57
2	Germany	0.00%	0
3	England	0.00%	0
4	Non of the answers above, but European	0.00%	0
5	Non-European	0.00%	0
	Total	100%	57

Q4 - What is your highest achieved level of education? *MBO ** HBO



#	Answer	%	Count
1	Primary school	0.00%	0
2	High school	14.04%	8
3	Secondary Education*	15.79%	9
4	Higher Secondary Education**	42.11%	24
5	University or higher	28.07%	16
	Total	100%	57

Q5 - My daily 'working' activities are best explained in the field of:

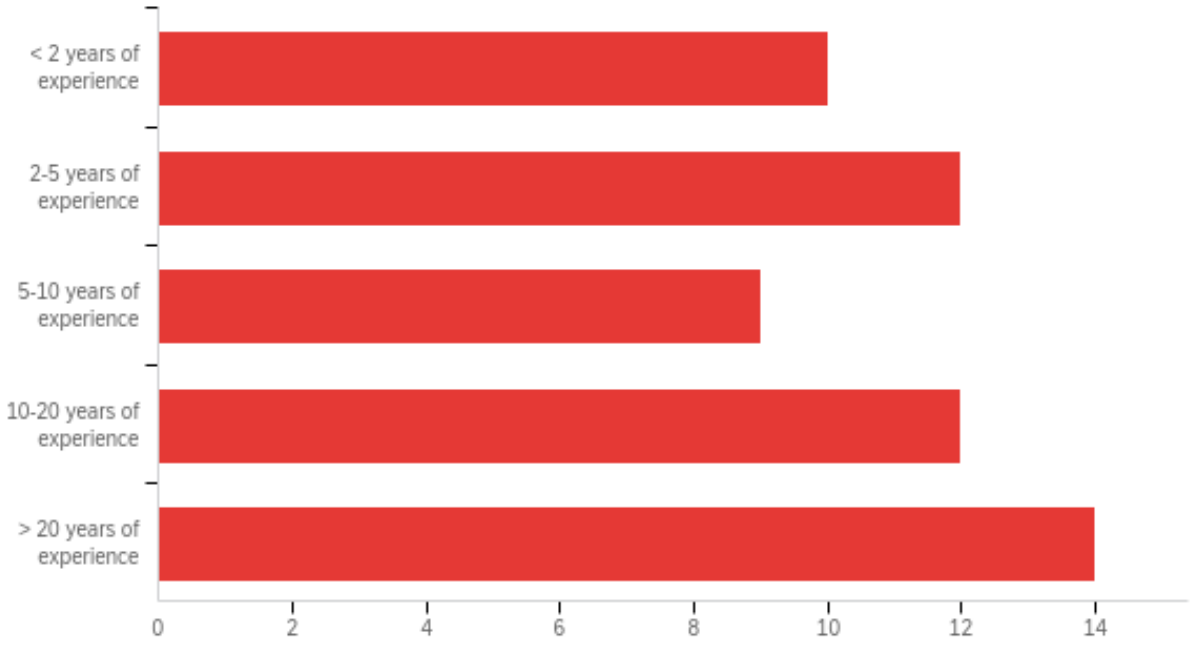


#	Answer	%	Count
1	Financial Service	42.11%	24
2	Real Estate	15.79%	9
3	Corporate Finance	3.51%	2
4	Business Owner	14.04%	8
5	Government	7.02%	4
6	Other:	17.54%	10
	Total	100%	57

Q5_6_TEXT - Other:

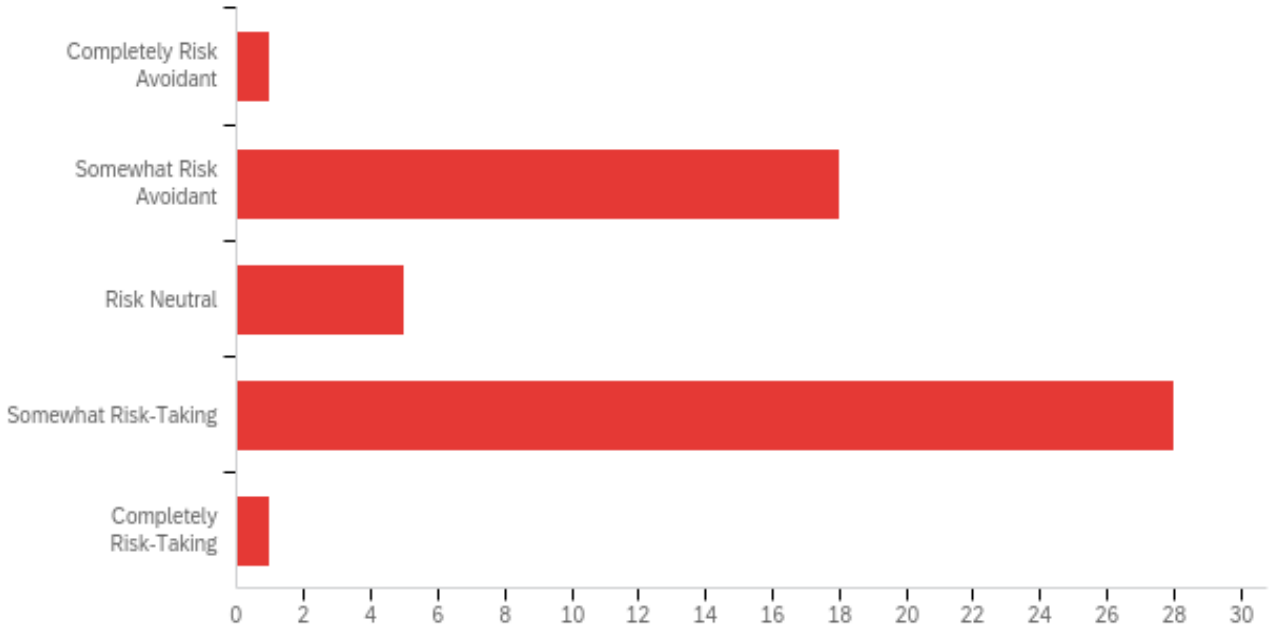
Other: - Text
Sales
Logistics
Logistics
HBO Teacher
Professor
HRM
Commercieel
IT services
Financial- and business control
Business controlling

Q6 - In addition to your previously chosen business area, how experienced are you?



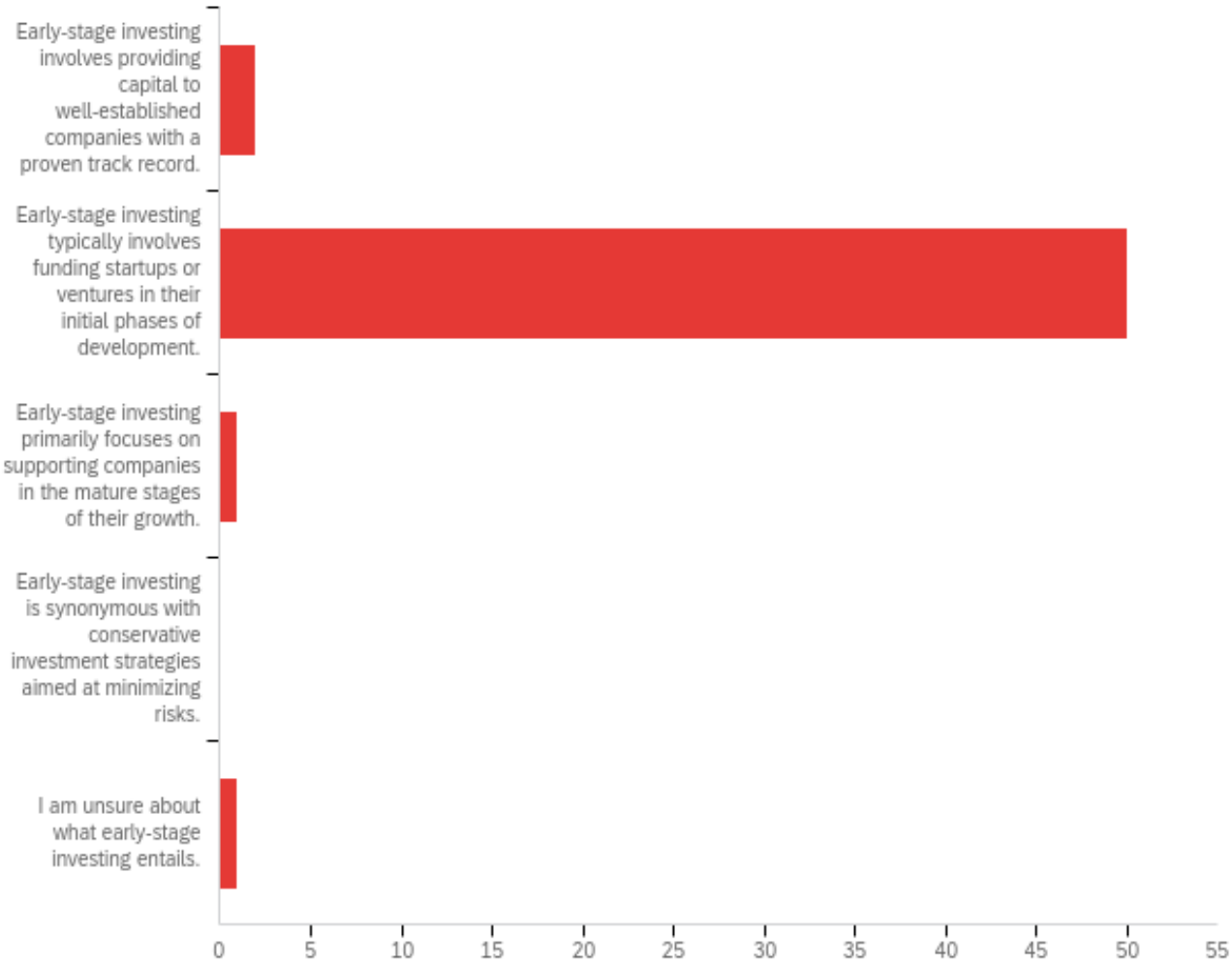
#	Answer	%	Count
1	< 2 years of experience	17.54%	10
2	2-5 years of experience	21.05%	12
3	5-10 years of experience	15.79%	9
4	10-20 years of experience	21.05%	12
5	> 20 years of experience	24.56%	14
	Total	100%	57

Q7 - In general, do you consider yourself as a risk-taker or risk-avoider?



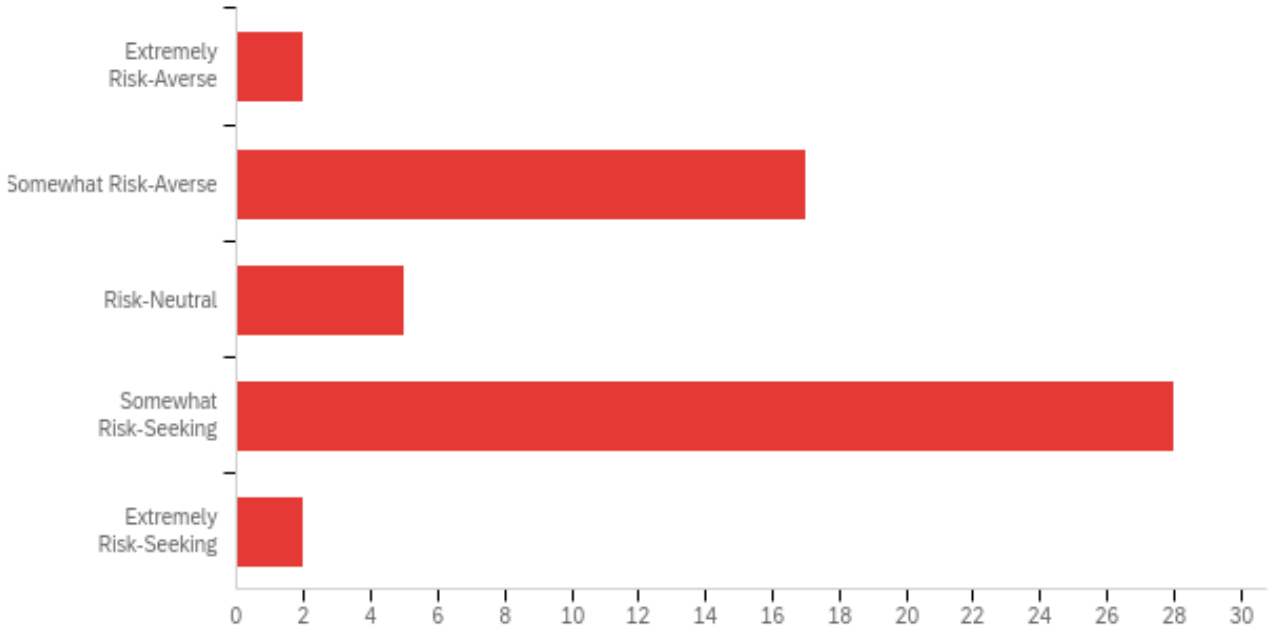
#	Answer	%	Count
5	Completely Risk Avoidant	1.89%	1
6	Somewhat Risk Avoidant	33.96%	18
7	Risk Neutral	9.43%	5
8	Somewhat Risk-Taking	52.83%	28
9	Completely Risk-Taking	1.89%	1
	Total	100%	53

Q8 - Please describe or choose the option that best characterizes early-stage investing:



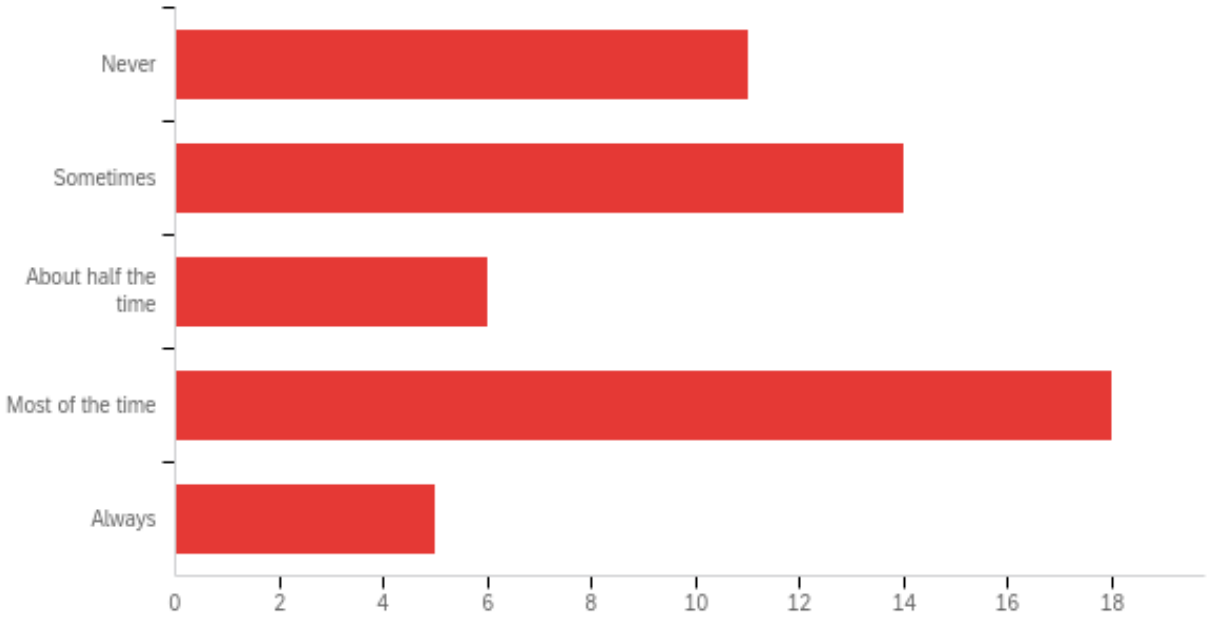
#	Answer	%	Count
1	Early-stage investing involves providing capital to well-established companies with a proven track record.	3.70%	2
2	Early-stage investing typically involves funding startups or ventures in their initial phases of development.	92.59%	50
3	Early-stage investing primarily focuses on supporting companies in the mature stages of their growth.	1.85%	1
4	Early-stage investing is synonymous with conservative investment strategies aimed at minimizing risks.	0.00%	0
5	I am unsure about what early-stage investing entails.	1.85%	1
	Total	100%	54

Q9 - In terms of risk and financial reward, are you risk-averse or more risk-seeking?



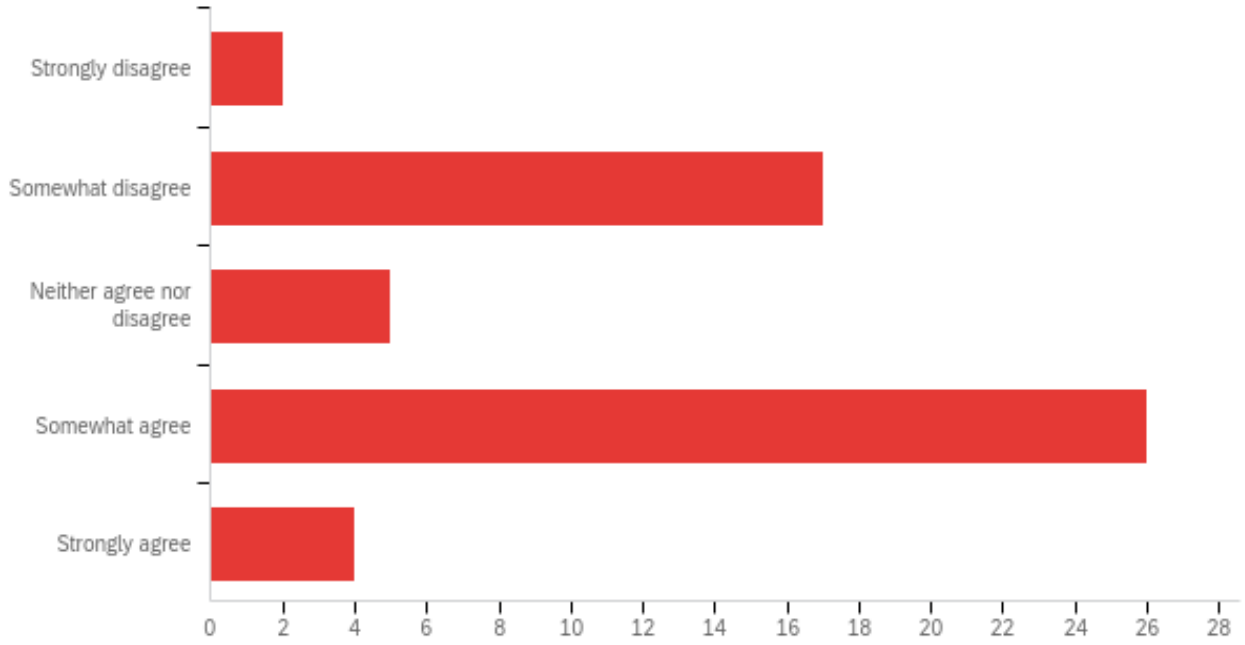
#	Answer	%	Count
1	Extremely Risk-Averse	3.70%	2
2	Somewhat Risk-Averse	31.48%	17
3	Risk-Neutral	9.26%	5
4	Somewhat Risk-Seeking	51.85%	28
5	Extremely Risk-Seeking	3.70%	2
	Total	100%	54

Q10 - In my daily business activities, I use knowledge from my highest-achieved education:



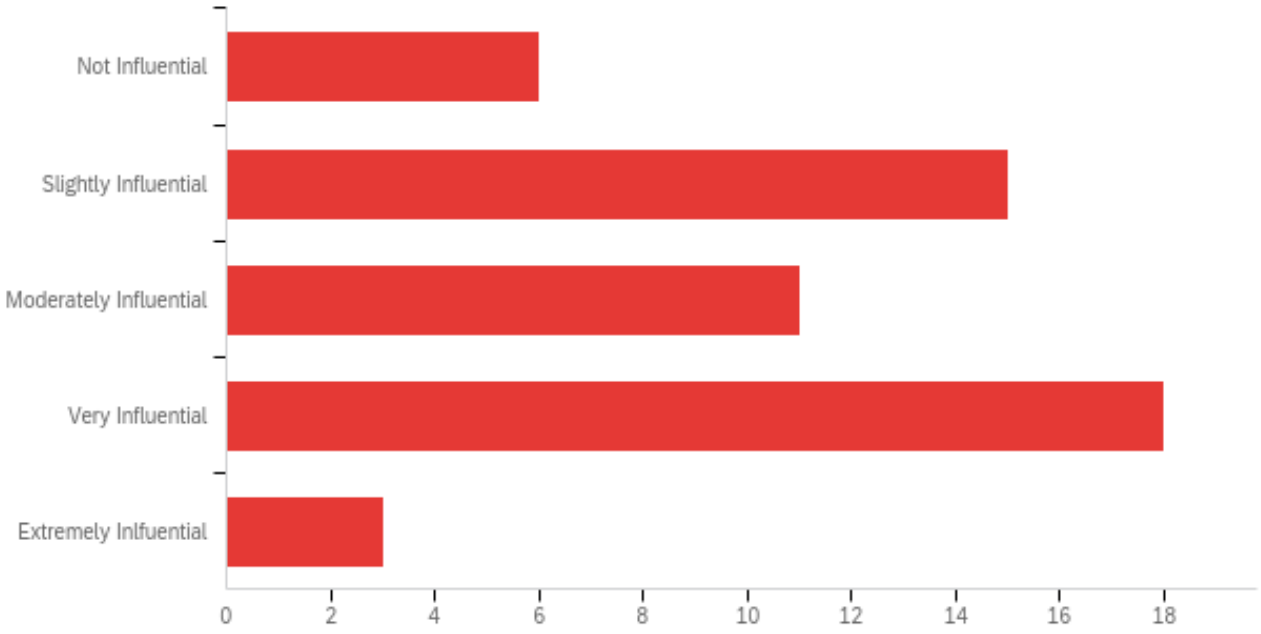
#	Answer	%	Count
1	Never	20.37%	11
2	Sometimes	25.93%	14
3	About half the time	11.11%	6
4	Most of the time	33.33%	18
5	Always	9.26%	5
	Total	100%	54

Q11 - Agree or Disagree: "As I get older, I become more risk-averse in my financial decision-making"



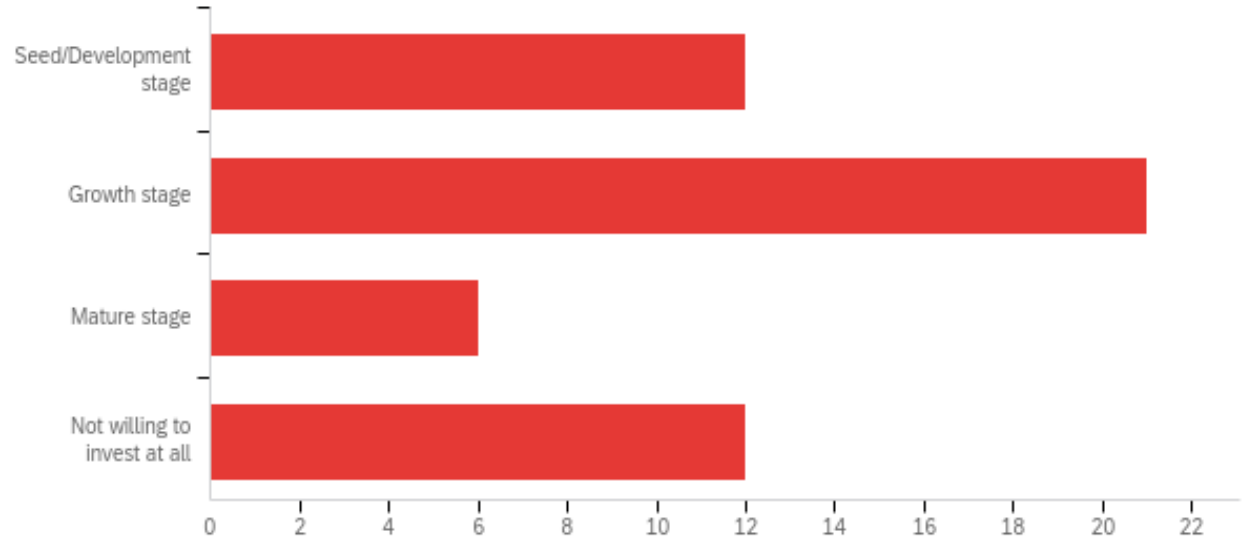
#	Answer	%	Count
1	Strongly disagree	3.70%	2
2	Somewhat disagree	31.48%	17
3	Neither agree nor disagree	9.26%	5
4	Somewhat agree	48.15%	26
5	Strongly agree	7.41%	4
	Total	100%	54

Q12 - In your opinion, has your experience in the business industry influenced your comfort level with taking financial risks?



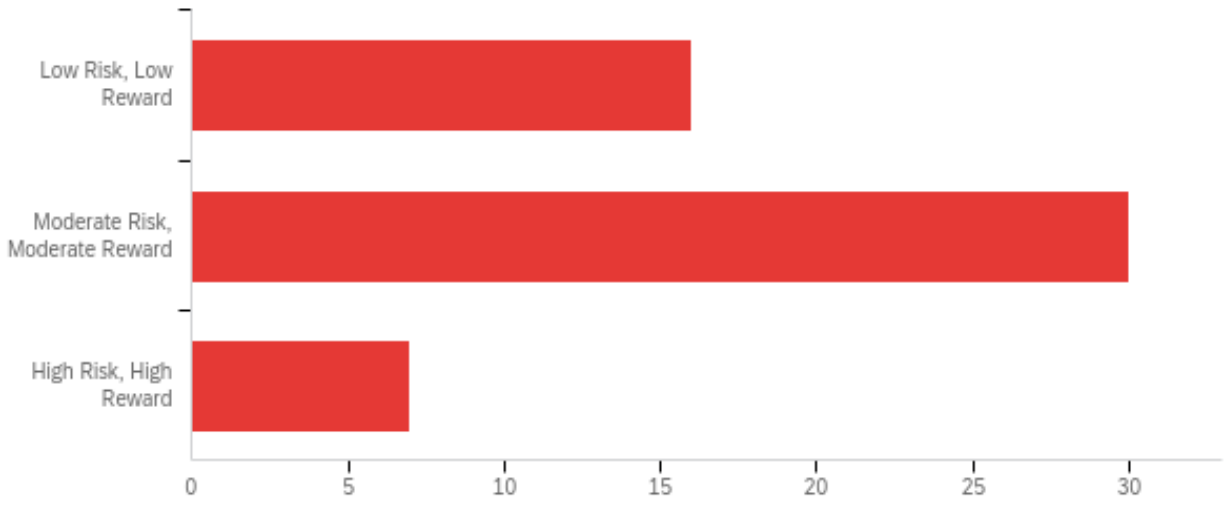
#	Answer	%	Count
1	Not Influential	11.32%	6
2	Slightly Influential	28.30%	15
3	Moderately Influential	20.75%	11
4	Very Influential	33.96%	18
5	Extremely Influential	5.66%	3
	Total	100%	53

Q13 - Would you be willing to invest in a seed stage/development stage, growth stage, or more mature stage company?



#	Answer	%	Count
1	Seed/Development stage	23.53%	12
2	Growth stage	41.18%	21
3	Mature stage	11.76%	6
4	Not willing to invest at all	23.53%	12
	Total	100%	51

Case Scenario - Imagine you have the opportunity to invest your own savings in a promising early-stage startup. The company operates in a hypothetical industry with high growth potential, but it also comes with inherent risks typical of early-stage ventures. Please prioritize your preference between risk and reward in making an investment decision: Option 1: High Risk, High Reward. This investment promises significant returns, but there's a higher level of uncertainty and risk involved. The potential rewards are substantial, but the likelihood of success is very small. Option 2: Moderate Risk, Moderate Reward. This investment offers a balanced approach with moderate risk and moderate potential rewards. It aims for a more stable and predictable outcome, with a reasonable chance of success. Option 3: Low Risk, Low Reward. This investment minimizes risk, providing a more secure and stable return, but the potential rewards are lower compared to higher-risk options. The likelihood of success is relatively high. Please choose the option that best aligns with your investment preference:



#	Answer	%	Count
3	Low Risk, Low Reward	30.19%	16
5	Moderate Risk, Moderate Reward	56.60%	30
6	High Risk, High Reward	13.21%	7
	Total	100%	53

2. *Survey distribution.*

Best netwerk,

In het kader van mijn Master Thesis heb ik jullie hulp nodig voor het verzamelen van de juiste data. In mijn onderzoek ga ik opzoek naar de relatie tussen persoonlijke kenmerken van zakelijk actieve personen en risico-tolerantie bij het doen van (eerste) investeringen in bedrijven.

Ben jij ondernemer, bedrijfseigenaar, actief in de financiële dienstverlening, het vastgoed, of werkzaam in de breedste zin van het woord finance & control? Dan vraag ik 5 minuten van jouw volle agenda ;).

Bijgaand heb ik de link naar de enquête opgenomen, het is vrijblijvend en volledig anoniem. Ik zou je erg dankbaar zijn!

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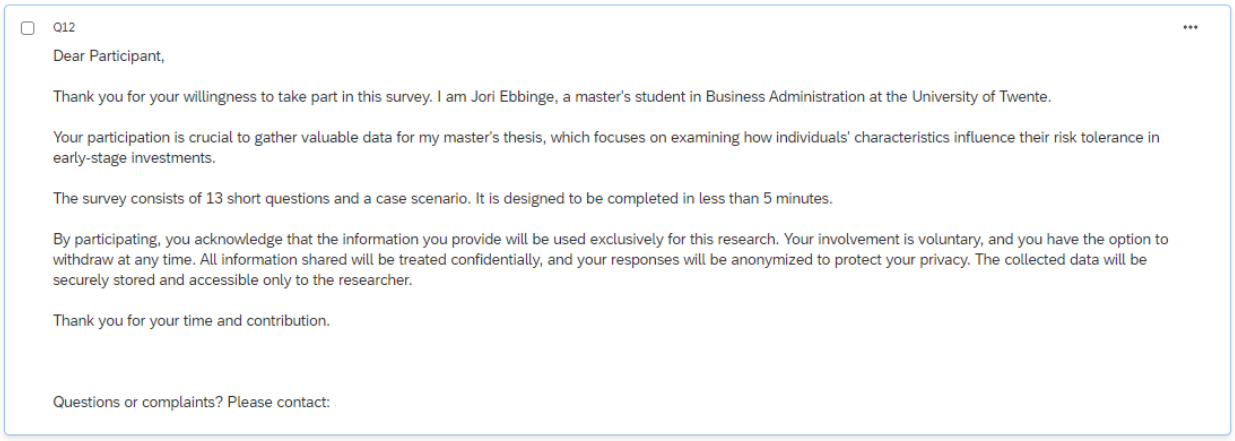
3. *Informed consent.*



Q12

Dear Participant,

Thank you for your willingness to take part in this survey. I am Jori Ebbinge, a master's student in Business Administration at the University of Twente.

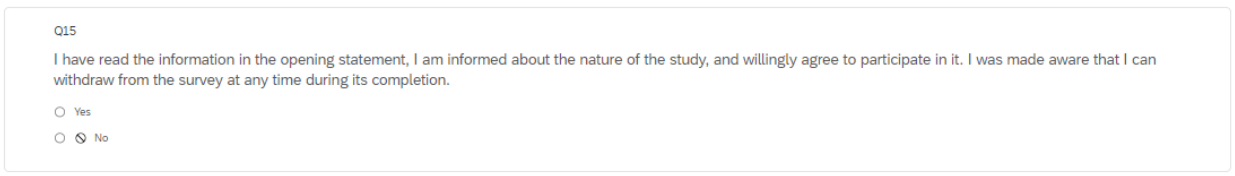
Your participation is crucial to gather valuable data for my master's thesis, which focuses on examining how individuals' characteristics influence their risk tolerance in early-stage investments.

The survey consists of 13 short questions and a case scenario. It is designed to be completed in less than 5 minutes.

By participating, you acknowledge that the information you provide will be used exclusively for this research. Your involvement is voluntary, and you have the option to withdraw at any time. All information shared will be treated confidentially, and your responses will be anonymized to protect your privacy. The collected data will be securely stored and accessible only to the researcher.

Thank you for your time and contribution.

Questions or complaints? Please contact:



Q15

I have read the information in the opening statement, I am informed about the nature of the study, and willingly agree to participate in it. I was made aware that I can withdraw from the survey at any time during its completion.

- Yes
- No

Summary of **Q15: I have read the information in the opening statement, I am informed about the nature of the study, and willingly agree to participate in it. I was made aware that I can withdraw from the survey at any time during its completion.**

Sample Size	Number of Distinct Categories
56	1

Reorder/Recode | Bucketing

Q15:...ion.	Count	Percent	Cumu...tive
Yes	56	100,0%	100,0%
Total	56	100,0%	

0,0% 20,0% 40,0% 60,0% 80,0% 100,0%

4. *Ethical approval.*

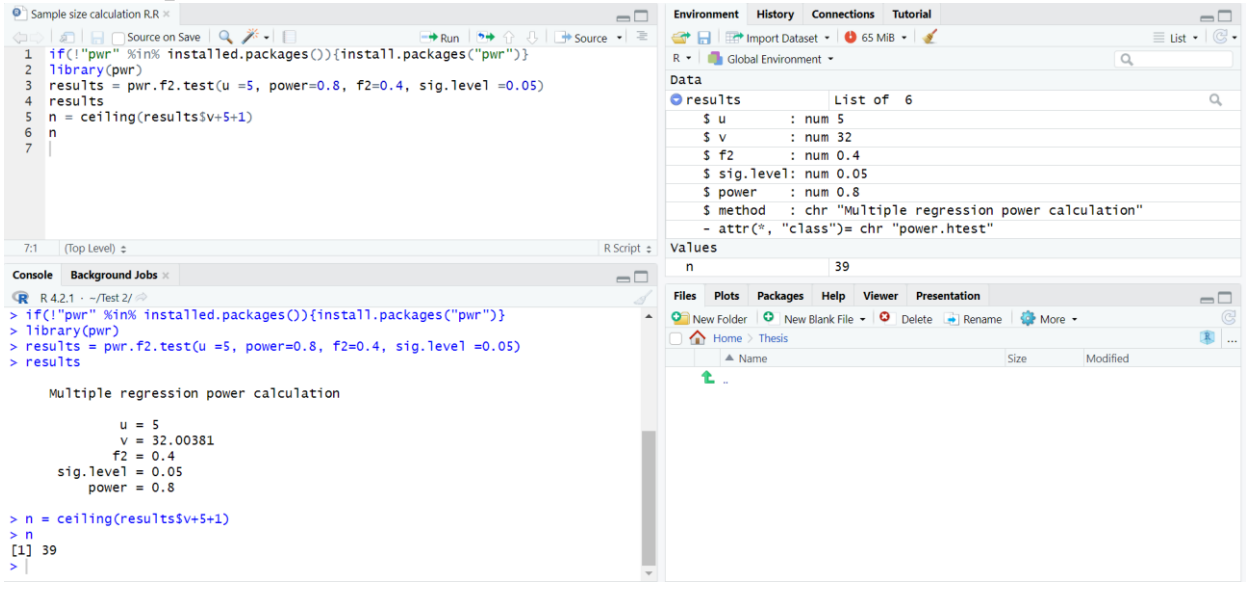
Status: Approved by commission

The BMS ethical committee / Domain Humanities & Social Sciences has assessed the ethical aspects of your research project. On the basis of the information you provided, the committee does not have any ethical concerns regarding this research project. It is your responsibility to ensure that the research is carried out in line with the information provided in the application you submitted for ethical review. If you make changes to the proposal that affect the approach to research on humans, you must resubmit the changed project or grant agreement to the ethical committee with these changes highlighted.

Moreover, novel ethical issues may emerge while carrying out your research. It is important that you re-consider and discuss the ethical aspects and implications of your research regularly, and that you proceed as a responsible scientist.

Finally, your research is subject to regulations such as the EU General Data Protection Regulation (GDPR), the Code of Conduct for the use of personal data in Scientific Research by VSNU (the Association of Universities in the Netherlands), further codes of conduct that are applicable in your field, and the obligation to report a security incident (data breach or otherwise) at the UT.

5. *Sample size calculations*



6. *Composite model*

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Age	Dum_Male	Dum_Female	Education	Experience	Fin_Risk	Inv_pref	Inv_stage	Rescaled_Inv_Stage	Inv_Propensity
1	18	1	0	2	1	3	3	3	4,00	3,50
2	21	1	0	2	1	2	1	3	4,00	2,50
3	22	1	0	4	1	4	1	1	1,00	1,00
4	22	1	0	3	1	4	2	1	1,00	1,50
5	22	1	0	4	1	2	3	2	2,50	2,75
6	22	0	1	4	2	4	4	3	4,00	4,00
7	23	1	0	4	2	4	1	1	1,00	1,00
8	23	1	0	4	1	3	1	2	2,50	1,75
9	23	1	0	5	5	4	3	2	2,50	2,75
10	23	1	0	5	2	4	3	2	2,50	2,75
11	24	0	1	4	1	2	1	1	1,00	1,00
12	24	1	0	4	1	4	2	1	1,00	1,50
13	25	1	0	4	2	2	1	2	2,50	1,75
14	25	1	0	4	2	4	3	2	2,50	2,75
15	26	0	1	3	2	4	4	1	1,00	2,50
16	27	0	1	4	2	2	4	1	1,00	2,50
17	28	1	0	5	2	2	2	2	2,50	2,25
18	29	0	1	5	3	3	4	2	2,50	3,25
19	29	1	0	5	3	2	3	2	2,50	2,75
20	30	1	0	3	1	4	3	2	2,50	2,75
21	30	1	0	3	5	4	3	2	2,50	2,75
22	30	1	0	2	2	4	3	2	2,50	2,75

Data View Variable View