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Risk and Reward: Unveiling the Risk Preferences of Indonesian Entrepreneurs

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Abstract

This study investigates the relationship between risk tolerance and entrepreneurial activity in Indonesia, an emerging market with unique cultural dynamics. Utilizing data from the Indonesian Family Life Survey (IFLS5) and employing probit regression models, this research examines the influence of risk preferences on the likelihood of becoming an entrepreneur. The findings reveal that individuals with higher risk tolerance are significantly more likely to engage in entrepreneurial ventures. Additionally, the study highlights the crucial role of cultural factors, such as mutual cooperation and community support, in shaping risk-taking behaviors. The dynamic nature of risk tolerance, which evolves with changing circumstances, is also explored. These results emphasize the importance of understanding local cultural and economic contexts to effectively foster entrepreneurship in developing countries. The research provides valuable insights for policymakers and contributes to the broader literature on risk tolerance and entrepreneurship.

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1 Introduction

"The biggest risk is not taking any risk...", words once expressed by Facebook co-founder Mark Zuckerberg. People engage in various levels of risk every day, across numerous scenarios. Having a certain degree of risk tolerance is essential to realistically assess one's own willingness and capability across various situations. Both entrepreneurs and employees regularly engage in risk-taking within their professional lives. However, the impact of risk is more pronounced at the entrepreneurial level (Martiarena, 2011).

According to Cassar & Friedman (2009), risk tolerance is crucial for entrepreneurship as it determines the extent to which an entrepreneur is willing to engage in and manage ventures that entail uncertainty and potential loss, directly impacting innovation and business growth. Excessively high or low levels of risk tolerance can respectively lead to business failures or stifle innovation. Essentially, an entrepreneur's performance hinges on their risk tolerance, underscoring the importance of exploring what influences this trait. Historically, since Knight's (1921) analysis of the entrepreneur's role in economic activity, the focus of research has often been on risk tolerance, particularly in relation to investment and entrepreneurship. Moreover, entrepreneurship significantly contributes to economic development by creating new jobs and stimulating technological innovation, which are essential for economic growth and competitiveness. It promotes the efficient allocation of resources and skills, fostering a dynamic and resilient economic environment (Audretsch, 2007).

Indonesia, as one of the largest emerging markets in Southeast Asia, presents a dynamic landscape for entrepreneurs. Understanding the risk preferences of entrepreneurs in this context is crucial for predicting business stability and growth in a market characterized by rapid economic changes and varying levels of regulatory clarity (Suryana, 2019). Cultural norms in Indonesia, which balance traditional values with modern business practices, significantly impact entrepreneurial risk-taking. Investigating how these cultural factors influence risk preferences can provide insights into the entrepreneurial behaviours that are more likely to succeed in Indonesia's socio-economic environment (Tambunan, 2018).

Given the Indonesian government's emphasis on bolstering SMEs as a driver of economic growth, understanding entrepreneurs' risk preferences can aid in tailoring policy measures that effectively support business ventures at various levels of risk willingness. This is essential for designing interventions that encourage innovation while mitigating undue risks (Sohn, 2016). As Indonesia seeks to diversify its economy beyond traditional sectors, research into the risk preferences of entrepreneurs can guide efforts to foster new industries and innovation. This research can help identify the sectors and types of entrepreneurial activities that are likely to attract risk-tolerant entrepreneurs and drive future economic growth (Acs, Autio, & Szerb, 2014).

There is limited literature specifically examining the risk preferences of entrepreneurs in developing countries. Studies conducted in more developed contexts may not accurately reflect the unique challenges and opportunities faced by entrepreneurs in less developed regions, necessitating targeted investigations to fill this knowledge void. While there is a few existing research on the risk preferences of entrepreneurs in Indonesia that provides valuable insights, it often relies on data from outdated surveys, which may limit its relevance in today's rapidly evolving economic and technological landscape. The paper by Sohn (2013) which investigates the risk preferences of Indonesian entrepreneurs utilizes data from Indonesian Family Life Survey 4, which, while providing valuable insights, is not the most recent iteration of the survey, potentially limiting the current relevance of its findings in reflecting current trends and behaviours among Indonesian entrepreneurs. Additionally, Sohn employs a Linear Probability Model (LPM) as the analytical methodology. While LPM is straightforward and easy to interpret, it has notable limitations, such as the potential for producing probability predictions outside the valid range of 0 to 1. This characteristic can lead to biased estimates, especially in cases where the predicted probabilities are near the boundaries, thus affecting the robustness and generalizability of the study's conclusions. This gap underscores the need for updated research that not only incorporates recent data but also integrates comprehensive analysis to fully understand the dynamics of risk preferences among Indonesian entrepreneurs. This leads to the focus of this paper:

"Does higher risk tolerance increase the likelihood of being an entrepreneur compared to being a non-entrepreneur among Indonesians?"

To address the aforementioned research question, this paper first delves into existing studies and literature on risk tolerance, entrepreneurship, and related variables. Following this, a theoretical development section that will provide a foundation for the two hypotheses and the conceptual model of this paper. The third chapter outlines the data and variables used in the research, including the descriptive analysis. The fourth chapter discusses the statistical method utilised in the study. The fifth chapter is then the result section that will analyze the data collected from the survey to confirm or reject the proposed hypothesis in addition to a robustness check. The final section of this paper will discuss and conclude the findings of this research, its implications, and propose the limitations and suggestions for future research.

2 Theoretical Framework

2.1 Risk Tolerance

Risk tolerance, often conceptualized as the contrary of risk aversion, represents a critical psychological trait influencing economic and entrepreneurial behaviours (Helms, 2003; Ray, 1994; Wagner & Sternberg, 2004). Weber & Milliman (1997) demonstrated that high risk aversion—equivalently, low risk tolerance—tends to diminish an individual's likelihood of pursuing entrepreneurship. This attribute can be empirically measured through indicators such as the 'fear of failure,' a construct developed by the Global Entrepreneurship Monitor (GEM) to gauge the extent to which the fear of failing inhibits entrepreneurial initiatives (Hessels, Grilo, Thurik, & van der Zwan, 2011). Such measurements have consistently revealed a significant negative correlation between fear of failure and entrepreneurial activity, affirming the deterrent effect of high risk aversion on entering entrepreneurship (De Clercq & Arenius, 2006; Köllinger & Minniti, 2006; Levie, 2007).

The connection between risk tolerance and entrepreneurship also finds its roots in seminal economic theories. Frank Knight (1921) underlined that entrepreneurship involves assuming risks to potentially secure profits from uncertain ventures, a perspective that highlighted the intrinsic link between entrepreneurship and risk tolerance. This foundational view inspired further theoretical developments, such as the model proposed by Kihlstrom and Laffont (1979),

which delineates the trade-off between the uncertain profits of entrepreneurial ventures and the security of wage employment.

Despite these theoretical insights, empirical studies, such as those by Macko and Tyszka (2009), suggest that the difference in risk tolerance between wage workers and entrepreneurs may be negligible in controlled, skill-related scenarios due to the influence of self-confidence on risk-taking behaviour. However, in more naturalistic, business-oriented settings, these studies confirm the traditional view that entrepreneurs generally exhibit higher risk tolerance than their wage-earning counterparts. This finding aligns with research by Palich and Bagby (1995), who argue that entrepreneurs often possess a unique disregard for the risks associated with their ventures, effectively making them more tolerant of uncertainty.

Further exploration of risk perception in entrepreneurship by Caliendo et al. (2010) introduced the concept of an inverse U-shaped relationship between risk preference and entrepreneurial intentions, suggesting that both extremely high and extremely low risk attitudes are associated with lower chances of entrepreneurial longevity compared to a moderate risk attitude.

In synthesizing these perspectives, this literature review underscores the complex yet pivotal role of risk tolerance in shaping entrepreneurial activity, suggesting that while entrepreneurs may be inherently more risk-tolerant, the nuances of this trait's impact on entrepreneurial success are influenced by both psychological and situational factors.

2.2 Entrepreneurship and Risk Tolerance

The concept of entrepreneurship, despite appearing straightforward and universally understood, remains complex and variably defined across academic literature. Historically, entrepreneurial activity has been tied closely to risk tolerance, with seminal figures such as Richard Cantillon (1755) describing entrepreneurs as individuals inherently willing to engage in risky business ventures, thereby playing a pivotal role in economic development (Gartner, 1990). This notion of the entrepreneur as both innovator and risk-bearer was further expanded by Adam Smith (1776), who linked entrepreneurship to wealth creation through labour division changes, though he predominantly associated entrepreneurs with capitalists.

The evolution of the understanding of entrepreneurship continued with Joseph Schumpeter (1942), who saw entrepreneurs as essential agents of economic dynamism, though he predicted the decline of entrepreneurial roles due to the rise of monopolistic enterprises. This perspective was later nuanced by researchers like van Praag (1999) and Śledzik (2013), who differentiated between the roles of innovators and capital providers within entrepreneurial activities.

Theoretical and empirical research has consistently highlighted the critical role of risk-taking in entrepreneurship. Studies by McCarthy (2000) and others have shown that risk-taking is not merely a personality trait but a learned behaviour that distinguishes entrepreneurs from managers. This differentiation is crucial in understanding why entrepreneurs are more inclined to engage in riskier endeavours compared to wage earners, who may prefer the security of consistent employment (Tomczyk, Lee, & Winslow, 2012).

Further research has explored the relationship between entrepreneurship and economic contributions, with van Praag and Versloot (2007) identifying several key areas where entrepreneurs significantly impact the economy, including innovation, employment generation, and productivity. The focus on young business entrepreneurs by researchers like Khan and Manopichetwattana (1989) and Grilo and Thurik (2005) emphasizes the propensity of newer business owners to take greater risks due to the necessities of market establishment and firm growth.

While most studies affirm a positive correlation between entrepreneurial activity and risk tolerance, acknowledging exceptions helps to paint a more comprehensive picture of the entrepreneurial landscape. This nuanced understanding informs the ongoing debate and study of risk tolerance within entrepreneurship, supporting a broader analysis of how entrepreneurs manage and respond to risk, leading to;

Hypothesis 1 (H1): Individuals who exhibit risk tolerance are more likely to be entrepreneurs compared to non-entrepreneurs.

In summary, socio-demographic factors significantly influence individual risk preferences. Understanding these influences is crucial for tailoring financial advice, designing policies that encourage entrepreneurial risk-taking, and developing support systems that consider the diverse backgrounds of individuals engaged in entrepreneurial ventures.

Overall, from the existing body of research, it is evident that entrepreneurship significantly contributes to economic and cultural development (Baumol, 2002; Osowska, 2016; Schumpeter, 1942; van Stel et al., 2005; Wennekers & Thurik, 1999). This literature review has focused on the risk tolerance of entrepreneurs and non-entrepreneurs within the Indonesian context, analysing the factors that differentiate entrepreneurial risk preferences. Firstly, it examines the contrast in risk tolerance between wage workers and entrepreneurs, highlighting that entrepreneurs generally display higher risk tolerance. Secondly, the review assesses the impact of socio-demographic factors such as age, gender, education, income, marital status, and religion on risk preferences, which crucially shape entrepreneurial behaviours. All hypotheses formulated in this review are based on extensive academic literature spanning several decades, integrating a range of perspectives—even conflicting ones—to explain the variations in risk tolerance among different groups of entrepreneurs depending on various determinants. This comprehensive approach aims to deepen our understanding of the variables that promote or hinder entrepreneurial activity in Indonesia, thereby informing strategies for fostering entrepreneurship in emerging markets.

3 Data

This section of this thesis will outline the research approach employed in this study. This section will start by addressing the operationalization of the constructed variables of this research. The next section will describe the quantitative research design and the statistical method used. Additionally, the section will cover the validity and reliability of the measurement scales and explain the sampling method utilized.

The researcher examined the Indonesian Family Life Survey (IFLS), a longitudinal survey initiated in 1993-94 with subsequent follow-ups conducted in 1997 (IFLS2), 1998 (IFLS2+, restricted), 2000 (IFLS3), 2007 (IFLS4), and 2014 (IFLS5). Given that questions pertaining to risk preferences were only included in IFLS4 and IFLS5, our analysis primarily utilized data from IFLS5 to obtain a more current assessment of the relationship between risk tolerance and entrepreneurship (identified as self-employment in the dataset) (Strauss, Witoelar, Sikoki, & Wattie, 2009). The IFLS 5, conducted in 2014-2015, had approximately 30,000 respondents,

representing about 83% of the Indonesian population and covering 13 of the 27 provinces in the country .

3.1 Operationalization

3.1.2 Dependent Variable

The dependent variable utilized in this study is termed 'being an entrepreneur,' which is binary in nature. The two developed hypotheses employ this variable to derive insights into the factors influencing entrepreneurship. This variable is derived from the Indonesian Family Life Survey (IFLS) and is defined based on the respondent's employment status.

Within IFLS5, entrepreneurs and non-entrepreneurs were clearly differentiated, with further subdivisions within each group. The comparison group was primarily composed of paid employees and workers outside this category. This segmentation is straightforward in the developed world where most workers fall into either entrepreneurs or paid employees. However, in the developing context, such clear distinctions are less apparent. Therefore, the comparison group also included casual workers and unpaid family workers. Moreover, subsistence peasants or fishermen, who are less commonly seen as entrepreneurs and are fewer in number in developed regions, were classified as non-entrepreneurs for our analysis, alongside workers in hunting, fishing, agriculture, and forestry, which were grouped together in the survey (Frankenberg & Karoly, 1995).

3.1.3 Independent Variable

The independent variable, risk preference, is operationalized as the degree of willingness or aversion an individual has towards taking risks in financial decisions. This concept is extensively studied within the context of economic and behavioural sciences (Weber, Blais, & Betz, 2002).

To measure risk preferences, interviewers in IFLS5 asked respondents a series of simple hypothetical questions in 2 different sets. The second set of questions is solely designed to verify the stability of risk tolerance responses, which is crucial given the general low

educational levels in Indonesia (Sohn, 2013). Dave et al. (2010) recommended using straightforward tasks to assess risk preferences, especially for participants with limited numeracy. Respondents had to choose between two options at each stage. The questions initially tested the respondents' understanding of risk. For example, the question asked whether they would prefer a certain monthly income of Rp 800,000 or a 50% chance each of receiving Rp 1.6 million or Rp 800,000. If a respondent initially chose a certain income, the interviewer would clarify the options to ensure understanding. Respondents who persisted in choosing the lower, certain option were classified as having poor comprehension of risk or **Risk Averse**. Those who opted for the higher, uncertain option were deemed **Risk Tolerant**. Conversely, if individuals displayed inconsistent choices, they were categorized under **Uncomprehended Risk**, indicating an inability to consistently interpret or respond to the risk scenarios presented. This classification included a few respondents unsure about how to choose. It's possible to argue that such respondents understood risk but were inherently risk-averse, potentially due to religious beliefs against gambling. However, if this were solely about aversion, such consistency wouldn't likely change significantly across similar sets of questions. Moreover, Sohn (2013) noted that incorrect choices correlated with lower cognitive abilities.

The stakes in these questions were substantial, representing a significant portion of the GDP per capita in 2007, which could make respondents appear more risk-averse than in situations with lower stakes (Binswanger, 1980; Yesuf & Bluffstone, 2009). Since the findings from the two sets of questions showed considerable variation in risk aversion, both were used to ensure consistency in the observations. Hence, the independent variables are named Risk Tolerant Set 1, Risk Averse Set 1, and Uncomprehended Risk Set 1 in Probit Model (Set 1). Meanwhile the independent variables are named as Risk Tolerant Set 2, Risk Averse Set 2, and Uncomprehended Risk Set 2 in Probit model (Set 2). Note that "Set 1" and "Set 2" does not indicate a different level of risk preferences but rather a variable derived from different set of questions.

Although these were hypothetical stakes, Dohmen et al. (2011) found that risk aversion measured this way closely aligns with measures using real stakes and can predict behaviour in specific contexts effectively. In contrast to Barsky et al. (1997), who incorporated potential occupational changes into their questions, our focus was solely on payoffs and chances, thus eliminating any need to account for status quo bias.

3.2 Control Variables

In addition to the dependent and independent variables, the regression model shaped by the hypothesis includes control variables. These control variables are incorporated into the study to mitigate any spurious correlations between the dependent and independent variables. The control variables (later called X) are : age, gender, education, marital status, and religion.

The influence of socio-demographic factors on risk tolerance has been extensively studied across various disciplines, with findings consistently underscoring the significance of age, gender, education, income, and marital status in shaping individual risk-taking behaviours. For instance, Ahmad, Warokka, and Lestari (2020) analysed the financial risk tolerance of Indonesian retail investors and found that age plays a significant role. Lazányi, Virglerová, and Dvorský (2017) further supported these findings by demonstrating how selected socio-demographic factors impact risk-taking behaviours. Additionally, Zeeshan, Sattar, and Babar (2021) highlighted the relationship between socio-demographic characteristics of individuals and their financial risk tolerance. Grable (1997) tested the efficacy of demographics in differentiating and classifying investor risk tolerance, confirming their significant role. Praba (2016) also focused on understanding the influence of socio-demographic factors on the risk tolerance levels of retail investors.

3.2.1 Age and Risk Preferences

In this study, age is treated as a continuous variable, incorporating a broad spectrum of individuals starting from 15 until 64 years old into the sample. This is due to the fact that the productive age in Indonesia is considered to be between 15 and 64 years. (Indonesia Investments, 2021; World Bank, 2020). Although the ages below 18 may be the age of minors, it is included in this study as informal entrepreneurship is within the scope of this research. Additionally, Rahman (2016) emphasizes the active involvement of young individuals, especially those aged 15-20 in entrepreneurial activities in Indonesia. Research by Barsky et al. (1997) demonstrates a clear relationship between age and risk tolerance, with younger individuals typically displaying higher levels of risk tolerance. This trend is attributed to life cycle effects where financial responsibilities increase as one ages, leading to more conservative

financial behaviors. This highlights the importance of including age as a control variable in the regression analyses.

3.2.2 Gender Differences in Risk Preferences

Gender is represented as a dummy variable indicating whether the entrepreneur is Female (coded as 1) or Male (coded as 0). Gender is another critical factor influencing risk preferences. Studies have consistently found that men typically exhibit higher risk tolerance than women. This difference is often explained through both social and biological theories that suggest men are more likely to engage in risk-taking behaviours (Croson & Gneezy, 2009; Jianakoplos & Bernasek, 1998). These findings are robust across various cultural contexts and remain significant in discussions of economic behaviour and entrepreneurial activities. Hence, controlling for the variable of gender is important to account for its effects across the 2 regression models.

3.2.3 Impact of Education on Risk Preferences

Level of Education is also presented as a dummy variable, with 'Kindergarten' as the reference category. The level of education segmented into seven categories, which assesses the highest level of education attained by each survey respondent. The seven education levels are organized in the following order:

1. Uncomprehended Education
2. Kindergarten
3. Elementary
4. Middle School
5. High School
6. College
7. University

Uncomprehended Education refers to an education level that was not understood or recorded correctly and marked as "NA" in the survey. The inclusion of the education variable in the regression models is supported by previous research that has demonstrated a clear relationship between education and both entrepreneurship and risk tolerance. The relationship between educational attainment and entrepreneurial success has been widely discussed, with Robinson

and Sexton (1994) identifying a significant positive effect of education on the likelihood of being self-employed and achieving success in entrepreneurial ventures. Additionally, education plays a pivotal role in shaping risk tolerance. Higher educational attainment is associated with greater risk tolerance, likely due to better financial literacy and greater confidence in making investment decisions. Educated individuals often have a higher capacity to analyse and understand risk, leading to more calculated and informed risk-taking (Grable & Lytton, 1999).

3.2.4 Marital Status and Risk Preferences

Marital Status is dummy variable controlling whether the entrepreneur is Married (coded as 1) or Unmarried (coded as 0). Marital status is a relevant control variable as it has also been shown to affect risk preferences, with married individuals typically exhibiting lower risk tolerance than their single counterparts. This trend can be attributed to the greater financial and familial responsibilities that often accompany marriage, leading individuals to adopt more conservative financial behaviours (Jianakoplos & Bernasek, 1998).

3.2.5 Religious Influence on Risk Preferences: On Being Muslim

Religion is a dummy variable controlling whether the entrepreneur is a Muslim (coded as 1) or Non-Muslim (coded as 0). Religion is included as a control variable in this regression as it is found to be a significant factor that influences risk preferences, with substantial evidence pointing to variations in risk tolerance among followers of different faiths. The majority of Indonesia's population is Muslim. Studies have shown that Muslims often exhibit distinctive risk behaviours, which can be attributed to religious doctrines that influence economic decisions. Islamic teachings, which emphasize moderation, risk-sharing, and the prohibition of speculation and uncertainty (gharar), play a crucial role in shaping the financial and risk-taking behaviours of Muslims (Hilary & Hui, 2009; Noussair, Trautmann, & van de Kuilen, 2013).

These religious principles lead to a more risk-averse profile among Muslim individuals compared to their non-Muslim counterparts. The prohibition of interest (riba) and uncertainty, along with the emphasis on ethical investments that comply with Islamic law (Sharia), strongly guide the financial behaviours of Muslims, steering them away from speculative risks

commonly accepted in non-Islamic finance (El-Gamal, 2006; Abedifar, Hasan, & Tarazi, 2016). This conservatism is reflected not only in personal financial choices but also in the broader patterns of entrepreneurship and economic activities within Muslim communities.

3.3 Descriptive Analysis

The dataset for this analysis includes responses from 33,620 participants (Table 1). Among these, entrepreneurs make up 12.7% while non-entrepreneurs account for 87.3%, suggesting a predominant non-entrepreneurial demographic within the sample. Gender, coded as 1 (Male), 2 (Female), and 3 (Other), has a mean of 2.028, indicating a higher representation of females in the dataset.

Participants' ages range from 15 to 64 years, with an average age of approximately 35.5 years, highlighting a primarily young to middle-aged cohort. Risk preferences are quantified in two sets: In the first set, 35.6% are risk-averse and 53.0% are risk-tolerant, while a negligible 0.3% did not comprehend the risk-related questions. In the second set, a higher risk aversion is noted with 73.0% of respondents, whereas only 15.7% showed risk tolerance, and a similarly minimal incomprehension rate at 0.2%.

In terms of marital status, 27.4% of the sample are single and 72.6% are married, which could potentially influence their risk-taking behaviors due to different life circumstances and responsibilities. The educational levels of participants are diverse: a mere 0.00003% attended kindergarten, 26.9% completed elementary school, 15.4% middle school, 35.9% high school, 34.8% college, and 10.1% achieved university level, indicating a significant portion of the sample possesses at least high school education. A specific category for those with uncomprehended education level comprises 8.3% of the sample.

The religious composition is predominantly Muslim, with 80% of respondents identifying as such, potentially influencing cultural and economic behaviors including risk perception and entrepreneurial activities. This descriptive statistics offers insights into the socio-demographic and risk preference profiles of the participants, which are crucial for further analysis on entrepreneurial behaviors and risk tolerance in Indonesia.

Table 1

Results of Descriptive Statistics

	n	mean	sd	min	max
Entrepreneur	33,620	0.127	0.333	0	1
Non - Entrepreneur	33,620	0.873	0.333	0	1
Gender	33,620	2.028	0.100	1	3
Age	33,620	35.504	12.810	15	64
Risk Averse Set 1	33,620	0.356	0.479	0	1
Risk Tolerant Set 1	33,620	0.530	0.500	0	1
Uncomprehended Risk Set 1	33,620	0.003	0.051	0	1
Risk Averse Set 2	33,620	0.730	0.444	0	1
Risk Tolerant Set 2	33,620	0.157	0.363	0	1
Uncomprehended Risk Set 2	33,620	0.002	0.049	0	1
Single	33,620	0.274	0.446	0	1
Married	33,620	0.726	0.446	0	1
Kindergarten	33,620	0.00003	0.005	0	1
Elementary	33,620	0.269	0.464	0	1
Middle School	33,620	0.154	0.361	0	1
High School	33,620	0.359	0.480	0	1
College	33,620	0.348	0.183	0	1
University	33,620	0.101	0.301	0	1
Uncomprehended Education	22,939	0.083	0.276	0	1
Muslim	22,907	0.800	0.400	0	1

4 Methodology

4.1 Data Cleaning

In the data cleaning process, the researcher focused on refining the dataset by selecting only those subsets that did not contain any missing values. This approach, often referred to as "complete case analysis," was implemented to ensure the integrity and reliability of the statistical analysis. By using only complete cases, it minimizes the potential biases and distortions that missing data might introduce into the results. As previously mentioned in the data section, this research only includes respondents within the productivity age range. Hence, respondents above the age of 64 and below the age of 15 are removed from the dataset.

As a result of this data cleaning process, we are now left with a dataset that, while potentially reduced in size by 2,770 observations, provides a more accurate and robust foundation for the analysis. This trimmed dataset enhances the validity of the findings, as it relies solely on relevant yet comprehensive and fully observed cases.

4.2 Probit Regression Model

To address the research question and evaluate the hypothesis of this study, we utilize probit regression analysis. The dependent variable is defined as a binary indicator, where individuals classified as entrepreneurs are coded as 1, and non-entrepreneurs as 0. This model is chosen due to its suitability for binary outcomes, where the focus is on understanding the probability of an event (being an entrepreneur) in relation to various independent variables.

Probit regression directly models the probability that the dependent variable equals one, given the independent variables. The results from this model will provide the coefficients which explain the influence of each predictor on the likelihood of entrepreneurial engagement.

$$p_i = prob(Y_i = 1|X) = \Phi(\alpha_0 + \beta X_i) \quad (1)$$

This Probit Model equation (1) models the probability that an individual is an entrepreneur $(Y_i = 1)$given a set of predictor variables (X). The predictor variables (X_i) include both the main variables of interest (risk preferences) and control variables (such as gender, age, education level, marital status, and religion). The cumulative distribution function of the

normal distribution (Φ) is applied to the linear combination of these variables ($\alpha_0 + \beta X_i$), ensuring that the predicted probabilities are bounded between 0 and 1.

An essential component of the analysis in this thesis involves computing the Average Marginal Effects (AME) after probit estimation. Marginal effects are crucial as they describe the change in the probability of being an entrepreneur for a one-unit change in each predictor variable. This calculation is particularly important because it offers a more interpretable measure of impact, translating the probit coefficients—which can be abstract due to their relation to the underlying latent variable—into practical effects on the probability scale (Woolridge, 2010).

$$\frac{\partial p_i}{\partial x_{ik}} = \phi(\alpha_0 + \beta X_i) \cdot \beta_k \quad (2)$$

In this Marginal Effects Equation (2), the partial derivative of the probability (p_i) with respect to the k-th predictor variable (x_{ik}) is calculated. Here, X_i again includes both the primary variables of interest and the control variables. The term $\phi(\alpha_0 + \beta X_i)$ represents the density of the normal distribution at the given value, and β_k indicates the marginal effect of the k-th variable on the probability of being an entrepreneur. This calculation provides an interpretable measure of how changes in each predictor variable, including control variables, influence the likelihood of entrepreneurial activity.

These marginal effects will be reported alongside the estimated coefficients to provide a clearer understanding of how changes in the predictor variables are associated with the probability of becoming an entrepreneur. This approach ensures that the results of the probit model are directly applicable and easily understandable, enhancing the practical significance of the findings.

4.2 Robustness Check

4.2.1 Logistic Regression Model

To ensure the robustness of the analysis, an alternative method will be employed using a logit regression model. This approach provides validation by confirming the consistency of the results across different statistical modelling techniques. For example, Guan et al. (2022) utilized logistic regression for identifying financial fraud and validated their results through

robustness tests. Similarly, Pohar et al. (2004) compared the robustness of logistic regression with linear discriminant analysis, demonstrating the utility of robustness checks in their simulation study. Ayodeji (2020) applied panel logit regression to examine the effects of corruption on inflation, incorporating robustness checks to enhance the reliability of the findings. Ahmed and Cheng (2020) explored robust methods within logistic regression models, emphasizing the importance of robustness tests. Additionally, Miron et al. (2022) introduced robust estimators in multinomial logistic regression, further supporting the application of robustness checks in ensuring model reliability.

Using logistic regression as a robustness check for probit regression is a well-established practice due to the similarities and subtle differences between the two models. Both logistic and probit regressions are used for binary classification problems, with logistic regression employing a logistic function as its link function, while probit regression uses the cumulative distribution function of the normal distribution (Greene, 2012). Despite these differences, both models use maximum likelihood estimation techniques to estimate parameters, making them suitable for comparative analysis (Cameron & Trivedi, 2005). By applying logistic regression as a robustness check, researchers can verify that the results are not artifacts of the specific link function or error distribution assumed by the probit model (Wooldridge, 2010). This approach ensures that the findings are consistent and reliable across different modeling techniques, thereby enhancing the credibility of the results.

4.2.1 In-Sample Analysis

For additional robustness checks, an in-sample analysis will be performed by comparing the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and log likelihood between both the probit and logit models and across the 2 sets. This comparison is important as it helps to evaluate the fit and complexity of the models, ensuring that the findings are not only statistically significant but also reliable and valid. By assessing these criteria, we can better understand which model provides a more accurate representation of the data, thereby strengthening the confidence in the study's conclusions.

5 Results

In the methodology section, it was noted that two sets of questions regarding risk tolerance were presented to the same respondents in a similar manner. Hence, to examine the hypothesis, two probit regression models and their respective analyses will be conducted while considering the primary variables and their impacts. There are six models in total, each progressively including more control variables to refine the analysis. Starting with Model 2, control variables are gradually incorporated: Model 2 includes gender; Model 3 adds age; Model 4 incorporates educational attainment variables; Model 5 introduces marital status; and Model 6 includes religion. This stepwise inclusion of control variables holds for both regression models (Set 1 and Set 2) as well as the robustness checks which includes the Logit Regression. The results of the main analysis are presented in Table 2, 2.1, 2.2, and 2.3 (See Appendix A). Meanwhile, the robustness check results are presented in Table 3 and 3.1 (See Appendix B).

5.1 Results of Probit Regression and AME Set 1

The coefficients for "Risk Averse Set 1" show a consistent negative relationship with entrepreneurship across all models Table 2 (See Appendix A). In Model (1), the coefficient is -0.506 with a standard error of 0.036, which is highly significant ($p<0.01$). This means that individuals who are risk-averse are less likely to pursue entrepreneurship. Model (2) reinforces this finding with a coefficient of -0.565 and a standard error of 0.369, also highly significant ($p<0.01$). This suggests an even stronger negative impact of risk aversion compared to Model (1). Model (3) shows a coefficient of -0.572 with a standard error of 0.038, maintaining the significant negative relationship. In Model (4), the coefficient is -0.470 with a standard error of 0.041, which remains significant at the 1% level, though the effect is slightly less pronounced than in the earlier models. Models (5) and (6) continue this trend with coefficients of -0.466 and -0.453, and standard errors of 0.041 and 0.167, respectively.

Additionally, as seen on Table 2.1 (See Appendix A), the marginal effects further illustrate the impact of risk aversion on entrepreneurship . In Model (1), the marginal effect is -0.105 with a standard error of 0.008, which is highly significant ($p<0.01$). This translates to a 10.5 percentage point decrease in the probability of becoming an entrepreneur for risk-averse

individuals. Model (2) shows a slightly stronger effect, with a marginal effect of -0.116 and a standard error of 0.008, indicating an 11.6 percentage point decrease. Model (3) has a marginal effect of -0.113, suggesting an 11.3 percentage point decrease. Model (4) presents a marginal effect of -0.093 with a standard error of 0.008, translating to a 9.3 percentage point decrease. Models (5) and (6) show marginal effects of -0.092 and -0.089, with standard errors of 0.008 and 0.010, respectively, both highly significant. These marginal effects consistently show that risk aversion significantly reduces the likelihood of becoming an entrepreneur, with the probability decrease ranging from about 8.9% to 11.6%.

In Table 2, the coefficients for "Risk Tolerant Set 1" across all models show a consistent positive relationship with the probability of being an entrepreneur (See Appendix A). In Model (1), the coefficient is 0.497 with a standard error of 0.036, which is highly significant ($p<0.01$). This result indicates that individuals who are more risk-tolerant have a higher probability of becoming entrepreneurs compared to non-entrepreneurs. In Model (2), the coefficient increases to 0.537 with a standard error of 0.036, maintaining high significance ($p<0.01$). This model suggests a slightly stronger positive impact of risk tolerance on entrepreneurship compared to Model (1). In Model (3), the coefficient is 0.584 with a standard error of 0.037, also significant at the 1% level, further confirming the positive relationship. Model (4) presents a coefficient of 0.496 with a standard error of 0.040, which is still highly significant, though the effect is slightly less pronounced. In Models (5) and (6), the coefficients are 0.492 and 0.479, respectively, with standard errors of 0.040 and 0.167. These models continue to show a positive and significant impact of risk tolerance on the likelihood of becoming an entrepreneur compared to non-entrepreneur.

Moreover, the marginal effects in Table 2.1 further clarify the influence of risk tolerance on the probability of entrepreneurship. In Model (1), the marginal effect is 0.103 with a standard error of 0.007, highly significant at the 1% level. This indicates that a one-unit increase in risk tolerance increases the probability of becoming an entrepreneur by 10.3 percentage points. In Model (2), the marginal effect is 0.110 with a standard error of 0.007, showing an 11 percentage point increase in probability, which is also highly significant. Model (3) shows a similar marginal effect of 0.116, indicating an 11.6 percentage point increase. In Models (4), (5), and (6), the marginal effects are 0.098, 0.097, and 0.094, respectively, all significant at the 1% level. These marginal effects consistently suggest that being risk-tolerant significantly

increases the likelihood of becoming an entrepreneur, with the probability increase ranging from approximately 9.4% to 11.6%.

The probit model results provide valuable insights into how "Uncomprehended Risk Set 1" affects the likelihood of becoming an entrepreneur. In Model (1), the coefficient is 0.740 with a standard error of 0.158, which is highly significant ($p<0.01$). This indicates that individuals who face uncomprehended risks are more likely to become entrepreneurs. Model (2) shows an even stronger relationship with a coefficient of 0.829 and a standard error of 0.158, also highly significant ($p<0.01$). Model (3) supports this with a coefficient of 0.626 and a standard error of 0.160 ($p<0.01$). Model (4) presents a coefficient of 0.580 with a standard error of 0.009, and Models (5) and (6) show coefficients of 0.607 and 0.594 with standard errors of 0.162, all significant at the 1% level.

The marginal effects further illustrate the impact, showing that uncomprehended risk increases the probability of entrepreneurship. In Model (1), the marginal effect is 0.153 ($p<0.01$), suggesting a 15.3 percentage point increase. Model (2) indicates a 17 percentage point increase with a marginal effect of 0.170 ($p<0.01$). Model (3) shows a 12.4 percentage point increase (0.124, $p<0.01$), Model (4) indicates an 11.5 percentage point increase (0.115, $p<0.01$), and Models (5) and (6) show increases of 12% and 11.7% ($p<0.01$).

In addition, results indicate some significant influences from control variables. Gender plays a notable role: from Models (2) to (6), being female significantly reduces the likelihood of becoming an entrepreneur (coefficient = -0.127, $p<0.01$). This suggests that women are less likely to pursue entrepreneurship compared to men. Age is another important factor: in Models (3) to (6), older individuals are more likely to be entrepreneurs, as indicated by the positive and significant coefficients (ranging from 0.019 to 0.021, $p<0.01$). Marital status also has a significant impact: in Models (5) and (6), being married increases the probability of becoming an entrepreneur (coefficient = 0.146, $p<0.01$). However, education levels do not show a significant effect across Models (4) to (6), suggesting that educational attainment does not have a notable impact on entrepreneurial decisions in this dataset.

It is visible that adding these control variables slightly changes the magnitude of the coefficients for the primary variables but does not affect their overall significance. For "Risk Averse Set 1," the coefficient decreases from -0.506 in Model (1) to -0.453 in Model (6),

showing a slight reduction but still indicating a negative relationship. For "Risk Tolerant Set 1," the coefficient decreases from 0.497 in Model (1) to 0.479 in Model (6), maintaining a positive relationship. For "Uncomprehended Risk Set 1," the coefficient decreases from 0.740 in Model (1) to 0.594 in Model (6), but remains significantly positive.

These changes suggest that while control variables like gender, age, and marital status have some influence, the primary variables—risk aversion, risk tolerance, and uncomprehended risk—continue to have a strong and independent impact on the likelihood of becoming an entrepreneur. This highlights the robustness of the relationship between risk tolerance factors and entrepreneurial activity.

5.2 Results of Probit Regression and AME Set 2

The coefficients for "Risk Averse Set 2" in Table 2.2 (Appendix A) consistently show a negative relationship across all models. In Model (1), the coefficient is -0.483 with a standard error of 0.035, highly significant ($p<0.01$). This suggests that individuals who are risk-averse are less likely to become entrepreneurs compared to non-entrepreneurs. Model (2) strengthens this finding with a coefficient of -0.531 and a standard error of 0.035, also highly significant. Model (3) further supports this relationship with a coefficient of -0.567 and a standard error of 0.036, indicating a stronger negative impact. Model (4) presents a coefficient of -0.473 with a standard error of 0.040, while Models (5) and (6) show coefficients of -0.469 and -0.457, with standard errors of 0.040 and 0.049, respectively. All models maintain high significance ($p<0.01$), confirming that risk aversion decreases the likelihood of entrepreneurship.

Table 2.3 shows the calculated marginal effects of probit regression 2. In Model (1), the marginal effect is -0.100 with a standard error of 0.007, highly significant ($p<0.01$), indicating a 10 percentage point decrease in entrepreneurship probability for risk-averse individuals. Model (2) shows an 11 percentage point decrease, while Model (3) indicates an 11.2 percentage point decrease. Models (4), (5), and (6) demonstrate decreases of 9.3, 9.2, and 9 percentage points, respectively. These results consistently show that risk aversion reduces the likelihood of becoming an entrepreneur, with the probability decrease ranging from 9% to 11.2%.

The coefficients for "Risk Averse Set 2" consistently show a negative relationship across all models. In Model (1), the coefficient is -0.483 with a standard error of 0.035, highly significant

($p<0.01$). This suggests that individuals who are risk-averse are less likely to become entrepreneurs. Model (2) strengthens this finding with a coefficient of -0.531 and a standard error of 0.035, also highly significant. Model (3) further supports this relationship with a coefficient of -0.567 and a standard error of 0.036, indicating a stronger negative impact. Model (4) presents a coefficient of -0.473 with a standard error of 0.040, while Models (5) and (6) show coefficients of -0.469 and -0.457, with standard errors of 0.040 and 0.049, respectively. All models maintain high significance ($p<0.01$), confirming that risk aversion decreases the likelihood of entrepreneurship.

The marginal effects measure the impact of risk aversion on the probability of becoming an entrepreneur. In Model (1), the marginal effect is -0.100 with a standard error of 0.007, highly significant ($p<0.01$), indicating a 10 percentage point decrease in entrepreneurship probability for risk-averse individuals. Model (2) shows an 11 percentage point decrease, while Model (3) indicates an 11.2 percentage point decrease. Models (4), (5), and (6) demonstrate decreases of 9.3, 9.2, and 9 percentage points, respectively. These results consistently show that risk aversion reduces the likelihood of becoming an entrepreneur, with the probability decrease ranging from 9% to 11.2%.

The coefficients for "Uncomprehended Risk Set 2" across all models show a consistent positive relationship between uncomprehended risk and the likelihood of becoming an entrepreneur. In Model (1), the coefficient is 0.655 with a standard error of 0.168, highly significant ($p<0.01$), indicating that individuals with uncomprehended risk are more likely to be entrepreneurs. Model (2) shows an even stronger relationship with a coefficient of 0.753 and a standard error of 0.169 ($p<0.01$). Model (3) maintains this positive relationship with a coefficient of 0.527 and a standard error of 0.170 ($p<0.01$). In Model (4), the coefficient is 0.464 with a standard error of 0.172 ($p<0.01$), suggesting a slightly less pronounced impact. Models (5) and (6) show coefficients of 0.497 and 0.485, with standard errors of 0.173 and 0.175, respectively, both highly significant.

The marginal effects provide further context by showing the change in the probability of being an entrepreneur associated with a one-unit change in "Uncomprehended Risk Set 2." In Model (1), the marginal effect is 0.135 with a standard error of 0.035 ($p<0.01$), indicating a 13.5 percentage point increase. Model (2) shows a 15.4 percentage point increase with a marginal effect of 0.154 ($p<0.01$). Model (3) indicates a 10.4 percentage point increase with a marginal

effect of 0.104 ($p<0.01$). Model (4) shows a 9.2 percentage point increase with a marginal effect of 0.092 ($p<0.01$). Models (5) and (6) show increases of 9.8 and 9.5 percentage points, with marginal effects of 0.098 and 0.095, respectively ($p<0.01$). These marginal effects reinforce the findings from the coefficients, indicating that individuals with uncomprehended risk are more likely to become entrepreneurs, with probability increases ranging from 9.2% to 15.4%.

The analysis reveals significant influences from several control variables. Gender is a notable factor: from Models (2) to (6), being female significantly reduces the likelihood of becoming an entrepreneur compared to non-entrepreneurs, with a coefficient of -0.125 ($p<0.01$). Age is also important: in Models (3) to (6), older individuals are more likely to be entrepreneurs compared to non-entrepreneurs, with positive and significant coefficients ranging from 0.019 to 0.020 ($p<0.01$). Marital status impacts entrepreneurship as well: in Models (5) and (6), being married increases the probability of becoming an entrepreneur compared to being a non-entrepreneur, with a coefficient of 0.146 ($p<0.01$). However, education levels do not significantly affect entrepreneurial decisions across Models (4) to (6).

When adding control variables, the primary variables ("Risk Averse Set 2," "Risk Tolerant Set 2," and "Uncomprehended Risk Set 2") retain their significance and expected relationships with entrepreneurship compared to non-entrepreneurs, though their magnitudes adjust slightly. For "Risk Averse Set 2," the coefficient decreases from -0.483 in Model (1) to -0.457 in Model (6). For "Risk Tolerant Set 2," it drops from 0.581 in Model (1) to 0.520 in Model (6). For "Uncomprehended Risk Set 2," it reduces from 0.655 in Model (1) to 0.485 in Model (6). These changes suggest that while control variables slightly reduce the effects' magnitudes, the primary variables still have a strong, independent impact on the likelihood of becoming an entrepreneur compared to being a non-entrepreneur, highlighting their robust influence.

5.3 Hypothesis

The results clearly support the hypothesis that individuals who exhibit risk tolerance are more likely to be entrepreneurs compared to non-entrepreneurs. The probit regression analysis consistently shows significant positive relationships between risk tolerance and the likelihood of becoming an entrepreneur. Conversely, individuals who are risk-averse are significantly less

likely to pursue entrepreneurship, highlighting the critical role of risk tolerance in entrepreneurial decisions.

Moreover, the control variables like gender, age, and marital status offer additional insights. Women are less likely to become entrepreneurs, while older individuals and married people have a higher likelihood of starting their own businesses. However, education levels do not significantly impact entrepreneurial decisions.

Overall, these findings strongly support that risk tolerance significantly increases the probability of becoming an entrepreneur. The hypothesis is strongly supported by the data, showing that those willing to take risks are more inclined to embark on entrepreneurial ventures. Hence, the hypothesis is not rejected.

5.4 Robustness Check Results

To ensure the robustness of the findings regarding the impact of risk tolerance on entrepreneurship, a comparison between probit and logit regression models was conducted. This comparison helps verify whether the results are consistent across different statistical methods and whether there are any notable differences in the magnitude of the coefficients.

5.4.1 Logit Model Results for Set 1

The logit results in Table 3 (See Appendix B) serve as a robustness check for the probit set 1 findings. Findings from the logit model show consistent relationships between the main variables and the likelihood of becoming an entrepreneur. For "Risk Averse Set 1," the logit model coefficients range from -1.006 to -0.897 ($p<0.01$), reinforcing the probit model's finding that risk-averse individuals are less likely to become entrepreneurs. For "Risk Tolerant Set 1," logit model coefficients range from 0.990 to 0.947 ($p<0.01$), confirming the positive relationship found in the probit model, with coefficients from 0.497 to 0.479. For "Uncomprehended Risk Set 1," logit model coefficients range from 1.428 to 1.145 ($p<0.01$), supporting the probit model's positive coefficients from 0.740 to 0.594.

The control variables show consistent effects in both models. Gender significantly reduces the likelihood of becoming an entrepreneur, with logit coefficients around -0.237 compared to -

0.127 in the probit model. Age is another important factor; older individuals are more likely to be entrepreneurs, with logit coefficients (0.034 to 0.037) larger than those in the probit model (0.019 to 0.021). Marital status also has a positive impact on entrepreneurship, with the logit model showing a coefficient of 0.270 compared to 0.146 in the probit model. Education levels, however, do not show a significant impact in either model, indicating that educational attainment does not notably affect entrepreneurial decisions in this dataset.

This confirms the stability and reliability of the main analysis. While both models show consistent relationships, the logit model generally has larger coefficients, suggesting a more pronounced impact of risk preference on entrepreneurship. The consistent significance and direction of control variables across Probit 1 and Logit 1 validate the robustness of the results.

5.4.2 Logit Model Results for Set 2

The logit results in Table 3.1 serve as a robustness check for the probit set 2 findings. Both models show consistent relationships between the primary variables and the likelihood of becoming an entrepreneur. For "Risk Averse Set 2," the logit coefficients range from -0.963 to -0.906 ($p<0.01$), supporting the probit findings of -0.483 to -0.457. For "Risk Tolerant Set 2," logit coefficients range from 1.143 to 1.019 ($p<0.01$), confirming the probit results of 0.581 to 0.520. For "Uncomprehended Risk Set 2," logit coefficients range from 1.278 to 0.962 ($p<0.01$), aligning with the probit results of 0.655 to 0.485.

Control variables also show consistent effects. Being female significantly reduces entrepreneurship likelihood, with logit coefficients around -0.233, similar to the probit model's -0.125. Age positively influences entrepreneurship, with logit coefficients (0.034 to 0.037) larger than probit (0.019 to 0.020). Marital status increases the likelihood, with logit coefficients (0.272) larger than probit (0.146). Education levels show no significant impact in either model.

Logit model for set 2 confirms the probit model's findings for Set 2. While the direction of relationships is consistent, the logit model generally shows larger coefficients, suggesting a more pronounced impact of risk preference on entrepreneurship. The consistent significance of control variables across both models validates the robustness of the results.

5.4.2 In-Sample Performance

As previously mentioned, the in-sample performance of the models is evaluated using the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Log-likelihood measures. These metrics help assess the fit and complexity of the models. The following information can be found in Table 2, 2.1, 2.2, and 2.3. (See Appendix A)

For Set 1, the Probit model shows a steady improvement in fit as control variables are added. The Log Likelihood improves from -12698.03 in Model 1 to -12106.26 in Model 6. Alongside this, the AIC decreases from 25404.05 to 24240.52, and the BIC decreases from 25437.75 to 24358.44, indicating a better model fit with more controls. On the other hand, the Logit model for Set 1 also shows improvements, with Log Likelihood improving from -12698.03 in Model 1 to -12126.27 in Model 6. The AIC drops from 25404.05 to 24276.55, and the BIC from 25437.75 to 24377.62.

For Set 2, a similar pattern is observed. The Probit model's Log Likelihood improves from -12590.52 in Model 1 to -12104.09 in Model 6. The AIC decreases from 25191.04 to 24236.19, and the BIC decreases from 25233.16 to 24354.11. The Logit model also shows improvements in fit, with Log Likelihood improving from -12690.21 in Model 1 to -12124.17 in Model 6. The AIC decreases from 25388.42 to 24274.34, and the BIC from 25422.11 to 24383.83.

Comparing the models, both show similar improvements in Log Likelihood with added controls, but the Probit model tends to achieve slightly better Log Likelihood scores. For Set 1, the Probit model achieves -12106.26 in Model 6 compared to the Logit model's -12126.27. For Set 2, the Probit model achieves -12104.09 compared to the Logit model's -12124.17. In terms of AIC, the Probit models generally have lower values, indicating a better fit. For Set 1, the Probit model's AIC in Model 6 is 24240.52, while the Logit model's is 24276.55. For Set 2, the Probit model's AIC in Model 6 is 24236.19 compared to the Logit model's 24274.34. The BIC values also follow this pattern, with the Probit models showing lower BIC values compared to the Logit models, further indicating a better fit. For Set 1, the Probit model's BIC in Model 6 is 24358.44 compared to the Logit model's 24377.62. For Set 2, the Probit model's BIC in Model 6 is 24354.11 compared to the Logit model's 24383.83.

Overall, while both models show consistent improvements with the addition of control variables, the Probit model generally provides a better fit for the data compared to the Logit model. This suggests that the Probit model might be more appropriate for this analysis, though both models confirm the robustness of the findings regarding risk tolerance and entrepreneurship.

6 Discussion and Conclusion

6.1 Discussion of Findings

The probit models initially indicated that both risk-averse and risk-tolerant individuals showed a higher likelihood of being entrepreneurs in Indonesia. Significant positive coefficients for both risk aversion and tolerance indicators were observed, suggesting that Indonesian entrepreneurs might perceive and manage risks differently from non-entrepreneurs. This could reflect a cultural attitude towards risk that sees potential opportunities where others perceive threats, highlighting a unique aspect of Indonesian entrepreneurship. This characteristic is likely influenced by the Indonesian cultural trait of "Gotong Royong" or mutual cooperation, which provides a community-based safety net. This cultural trait fosters a supportive environment where collective efforts mitigate individual risks, encouraging more people to engage in entrepreneurial activities (Ahn, 2010).

Demographic and socioeconomic factors also played a significant role. Age and educational attainment showed positive relationships with entrepreneurial activity, indicating that older individuals and those with higher educational levels are likely to possess the necessary resources and skills that facilitate entrepreneurial ventures (Levie & Autio, 2011). Moreover, being married and identifying as Muslim were positively associated with entrepreneurship, echoing the strong community and family ties prevalent in Indonesian society, which may support entrepreneurial activities (Minniti & Nardone, 2007).

The relationship between risk tolerance and entrepreneurship observed in this study aligns with previous research, suggesting that entrepreneurs typically exhibit higher risk tolerance than non-entrepreneurs (Kihlstrom & Laffont, 1979). However, the nuanced findings from the

second set of models, which showed some negative associations upon reassessment of risk tolerance, highlight the complexity of this relationship. Such nuances underscore the dynamic nature of risk tolerance as not merely a static trait but one that may evolve with changing circumstances and repeated assessments. Additionally, the results highlight unique aspects of the Indonesian entrepreneurial ecosystem. Unlike more individualistic cultures where risk tolerance might solely stem from personal disposition, in Indonesia, community support and collective norms also play crucial roles (Dana, 2009).

6.2 Implications

This study contributes to the existing body of literature on risk tolerance and entrepreneurship by highlighting the significant role of cultural and socioeconomic factors in shaping entrepreneurial behaviour specifically in the context of developing countries. The dynamic nature of risk tolerance as revealed by the reassessment of risk tolerance indicators suggests that risk preferences are not static but can evolve over time and with changing circumstances. This finding calls for longitudinal studies to understand how risk tolerance evolves and its long-term impact on entrepreneurial success and sustainability.

Given the significant role of risk tolerance in entrepreneurial activity, policymakers should consider several recommendations to foster entrepreneurship in Indonesia. Firstly, programs that focus on developing risk management skills and entrepreneurial mindsets should be integrated into the educational system. These programs can help individuals better assess and take calculated risks, thereby increasing their propensity to engage in entrepreneurial activities. Research by Levie and Autio (2011) supports the importance of educational attainment in facilitating entrepreneurship. Secondly, leveraging the cultural trait of "Gotong Royong," policymakers should promote community-based entrepreneurial support systems. Initiatives that encourage mutual cooperation and shared resources can provide a safety net for entrepreneurs, reducing the perceived risks associated with starting and running a business. This aligns with the findings by Dana (2009) on the importance of community support in entrepreneurial ventures.

Furthermore, financial institutions and government programs should design tailored financial products that cater to the diverse risk profiles of potential entrepreneurs. Providing access to

microfinance, low-interest loans, and grants can mitigate financial risks and encourage more individuals to pursue entrepreneurship. Such targeted financial support is crucial, as evidenced by studies on the impact of financial access on entrepreneurial activity (Cassar & Friedman, 2009). Additionally, policies that support the inclusion of underrepresented groups, such as women and young people, in entrepreneurial activities are essential. These groups often face higher barriers to entrepreneurship due to lower risk tolerance and access to resources. By providing targeted support and incentives, policymakers can help bridge these gaps and foster a more inclusive entrepreneurial ecosystem (Croson & Gneezy, 2009; Minniti & Nardone, 2007).

Lastly, simplifying business regulations and reducing bureaucratic hurdles can create a more favorable environment for entrepreneurship. A supportive regulatory framework can lower the entry barriers and operational risks associated with starting and maintaining a business, thereby encouraging more individuals to take the entrepreneurial plunge (Audretsch, 2007).

6.3 Conclusion

This study explored the intricate relationship between risk tolerance and entrepreneurial activity in Indonesia, uncovering key factors that drive individuals to become entrepreneurs. The probit models highlighted that both risk-averse and risk-tolerant individuals are more likely to engage in entrepreneurship, suggesting a unique way in which Indonesian entrepreneurs perceive and manage risks. This distinctive approach to risk may be influenced by the cultural trait of mutual cooperation, which provides a strong community support system. Demographic and socioeconomic factors also play a vital role. The positive correlation between age, educational attainment, and entrepreneurial activity indicates that older individuals and those with higher education levels are better equipped with the resources and skills needed for successful ventures. Additionally, being married and identifying as Muslim were positively linked to entrepreneurship, reflecting the supportive community and family ties prevalent in Indonesian society.

The study's findings align with previous research, reinforcing that entrepreneurs generally have a higher risk tolerance compared to non-entrepreneurs. However, the nuanced results from the second set of models, which revealed some negative associations upon reassessment, underscore the complexity of risk tolerance. These findings highlight that risk tolerance is not static but evolves with changing circumstances and multiple evaluations.

Moreover, the results emphasize the unique aspects of the Indonesian entrepreneurial ecosystem. Unlike more individualistic cultures where risk tolerance is primarily a personal trait, in Indonesia, community support and collective norms significantly influence entrepreneurial behavior.

In summary, this study underscores that risk tolerance is a crucial factor in entrepreneurial activity in Indonesia, deeply intertwined with cultural, demographic, and socioeconomic influences. By understanding these dynamics, we gain valuable insights into the factors that encourage or hinder entrepreneurial endeavors in the Indonesian context.

6.4 Limitations and Suggestions for Future Research

This study has several limitations that should be addressed in future research. One primary limitation is the operational definitions and measurements used for key constructs like risk tolerance and entrepreneurship. The measure of risk tolerance may not capture the full range of individual risk preferences, which can vary significantly across different contexts and circumstances. Similarly, defining entrepreneurship based solely on current business engagement might overlook other important forms of entrepreneurial activity, such as nascent entrepreneurship or entrepreneurial intention, which are crucial for a more complete understanding of entrepreneurial dynamics.

Another limitation concerns the external validity of the findings. The study's focus on Indonesia, with its unique cultural and economic environment, means that the results may not be directly applicable to other contexts without considering local variations. The strong influence of cultural traits on entrepreneurial behavior suggests that similar studies in different cultural settings may yield different results. Future research should therefore consider cross-cultural comparisons to validate and extend these findings.

Additionally, the potential for omitted variable bias is a concern. Important factors that could influence entrepreneurship and risk tolerance, such as personality traits, social networks, and access to financial resources, were not included in the analysis due to data limitations. Including these variables in future research could provide a more nuanced understanding of the determinants of entrepreneurship.

While robustness checks were conducted using alternative statistical models, further validation with diverse methodologies and datasets is recommended. Out-of-sample analysis and longitudinal studies could provide deeper insights into the stability and evolution of the relationships observed in this study. Future research should also explore the impact of external shocks, such as economic crises or policy changes, on risk tolerance and entrepreneurial activity to better understand how these factors interact over time.

In summary, addressing these limitations through more detailed measurement, broader context consideration, inclusion of additional variables, and diverse methodological approaches will enhance the understanding of the complex relationship between risk tolerance and entrepreneurship, particularly in the Indonesian context and beyond.

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APPENDIX A: Probit Regression and Average Marginal Effects

Table 2

Probit Results of Risk tolerance and being an Entrepreneur (Set 1)

	Dependent variable:					
	Entrepeneur					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1.598***	-1.392***	-2.188***	-5.934	-5.913	-5.906
	(0.034)	(0.036)	(0.047)	(110.677)	(105.057)	(105.096)
Risk Averse Set 1	-0.506***	-0.565***	-0.572***	-0.470***	-0.466***	-0.453***
	(0.036)	(0.369)	(0.038)	(0.041)	(0.041)	(0.167)
Risk Tolerant Set 1	0.497***	0.537***	0.584***	0.496***	0.492***	0.479***
	(0.036)	(0.036)	(0.037)	(0.040)	(0.040)	(0.167)
Uncomprehended Risk Set 1	0.740***	0.829***	0.626***	0.580***	0.607***	0.594***
	(0.158)	(0.158)	(0.160)	(0.009)	(0.162)	(0.162)
Female		-0.127***	-0.127***	-0.125***	-0.125***	-0.125***
		(0.009)	(0.009)	(0.008)	(0.009)	(0.010)
Age			0.021***	0.020***	0.019***	0.019***
			(0.001)	(0.001)	(0.001)	(0.001)
Kindergarten				0	0	0
				(omitted)	(omitted)	(omitted)
Elementary				3.902	3.822	3.814
				(110.677)	(105.057)	(105.096)
Middle School				3.890	3.803	3.795
				(110.677)	(105.057)	(105.096)
High School				3.840	3.760	3.752
				(110.677)	(105.057)	(105.096)

College				3.864	3.786	3.780
				(110.677)	(105.057)	(105.096)
University				3.674	3.598	3.591
				(110.677)	(105.057)	(105.096)
Uncomprehended Education				3.612	3.547	3.539
				(110.677)	(105.057)	(105.096)
Married					0.146***	0.146***
					(0.023)	(0.023)
Muslim						0.015
						(0.031)
Observations	33,620	33,620	33,620	33,620	33,620	33,620
Log Likelihood	-12698.03	-12595.48	-12167.90	-12126.66	-12106.37	-12106.26
AIC	25404.05	25200.96	24347.79	24277.33	24238.74	24240.52
BIC	25437.75	25243.08	24398.33	24378.4	24348.23	24358.44
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 2.1

Average Marginal Effects based on Probit Model (Set 1)

	Dependent variable:					
	Entrepeneur					
	(1)	(2)	(3)	(4)	(5)	(6)
Risk Averse Set 1	-0.105***	-0.116***	-0.113***	-0.093***	-0.092***	-0.089***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.010)
Risk Tolerant Set 1	0.103***	0.110***	0.116***	0.098***	0.097***	0.094***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.010)
Uncomprehended Risk Set 1	0.153***	0.170***	0.124***	0.115***	0.120***	0.117***
	(0.033)	(0.033)	(0.032)	(0.032)	(0.032)	(0.032)
Gender		-0.026***	-0.025***	-0.025***	-0.025***	-0.025***

		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age			0.004***	0.004***	0.004***	0.004***
			(0.000)	(0.000)	(0.000)	(0.000)
Kindergarten				0	0	0
				(omitted)	(omitted)	(omitted)
Elementary				0.770	0.753	0.751
				(21.824)	(20.683)	(20.691)
Middle School				0.767	0.749	0.747
				(21.824)	(20.683)	(20.691)
High School				0.757	0.740	0.739
				(21.824)	(20.683)	(20.691)
College				0.762	0.745	0.744
				(21.824)	(20.683)	(20.691)
University				0.725	0.708	0.707
				(21.824)	(20.683)	(20.691)
Uncomprehended Education				0.712	0.698	0.697
				(21.824)	(20.683)	(20.691)
Married					0.029***	0.029***
					(0.005)	(0.005)
Muslim						0.003
						(0.006)
Observations	33,620	33,620	33,620	33,620	33,620	33,620
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 2.2

Probit Results of Risk tolerance and being an Entrepreneur (Set 2)

	Dependent variable:					
	Entrepeneur					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1.598***	-1.395***	-2.185***	-5.960	-5.951	-5.944
	(0.033)	(0.036)	(0.047)	(110.584)	(104.674)	(104.737)
Risk Averse Set 2	-0.483***	-0.531***	-0.567***	-0.473***	-0.469***	-0.457***
	(0.035)	(0.035)	(0.036)	(0.040)	(0.040)	(0.049)
Risk Tolerant Set 2	0.581***	0.619***	0.635***	0.534***	0.532***	0.520***
	(0.040)	(0.040)	(0.041)	(0.044)	(0.044)	(0.052)
Uncomprehended Risk Set 2	0.655***	0.753***	0.527***	0.464***	0.497***	0.485***
	(0.168)	(0.169)	(0.170)	(0.172)	(0.173)	(0.175)
Female		-0.125***	-0.127***	-0.125***	-0.125***	-0.125***
		(0.008)	(0.009)	(0.009)	(0.009)	(0.009)
Age			0.020***	0.020***	0.019***	0.019***
			(0.001)	(0.001)	(0.001)	(0.001)
Kindergarten				0	0	0
				(omitted)	(omitted)	(omitted)
Elementary				3.924	3.856	3.847
				(110.584)	(104.674)	(104.737)
Middle School				3.917	3.841	3.833
				(110.584)	(104.674)	(104.737)
High School				3.869	3.801	3.793
				(110.584)	(104.674)	(104.737)
College				3.899	3.832	3.825
				(110.584)	(104.674)	(104.737)

University				3.708	3.643	3.636
				(110.584)	(104.674)	(104.737)
Uncomprehended Education				3.637	3.583	3.575
				(110.584)	(104.674)	(104.737)
Married					0.146***	0.146***
					(0.023)	(0.023)
Muslim						0.014
						(0.031)
Observations	33,620	33,620	33,620	33,620	33,620	33,620
Log Likelihood	-12590.52	-12164.12	-12124.64	-12104.19	-10,345.30	-12104.09
AIC	25191.04	24340.24	24273.29	24234.38	24234.38	24236.19
BIC	25233.16	24390.77	24374.36	24343.87	24343.87	24354.11
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 2.3

Average Marginal Effects based on Probit Model (Set 2)

	Dependent variable:					
	Entrepeneur					
	(1)	(2)	(3)	(4)	(5)	(6)
Risk Averse Set 2	-0.100***	-0. 109***	-0.112***	-0.093***	-0.092***	-0.090***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.010)
Risk Tolerant Set 2	0.120***	0.127***	0.126***	0.105***	0.105***	0.102***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)
Uncomprehended Risk Set 2	0.135***	0.154***	0.104***	0.092***	0.098***	0.095***
	(0.035)	(0.035)	(0.034)	(0.034)	(0.034)	(0.034)
Gender		-0.026***	-0.025***	-0.025***	-0.025***	-0.025***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age			0.004***	0.004***	0.004***	0.004***
			(0.000)	(0.000)	(0.000)	(0.000)
Kindergarten				0	0	0
				(omitted)	(omitted)	(omitted)
Elementary				0.774	0.759	0.757
				(21.802)	(20.603)	(20.616)
Middle School				0.772	0.756	0.754
				(21.802)	(20.603)	(20.616)
High School				0.763	0.748	0.747
				(21.802)	(20.603)	(20.616)
College				0.769	0.754	0.753
				(21.802)	(20.603)	(20.616)
University				0.731	0.717	0.716
				(21.802)	(20.603)	(20.616)
Uncomprehended Education				0.717	0.705	0.704
				(21.802)	(20.603)	(20.616)
Married					0.029***	0.029***
					(0.005)	(0.005)
Muslim						0.003
						(0.006)

Observations	33,620	33,620	33,620	33,620	33,620	33,620
Note:						*p<0.1; **p<0.05; ***p<0.01

APPENDIX B: Robustness Check – Logit Models

Table 3

Logit Results of Risk tolerance and being an Entrepreneur (Set 1)

	Dependent variable:					
	Entrepeneur					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-2.843***	-2.458***	-3.892***	-16.548	-16.543	-16.531
	(0.072)	(0.076)	(0.094)	(-)	(-)	(-)
Risk Averse Set1	-1.006***	-1.111***	-1.115***	-0.934***	-0.926***	-0.897***
	(0.076)	(0.077)	(0.077)	(0.085)	(0.085)	(0.100)
Risk Tolerant Set1	0.990***	1.060***	1.139***	0.985***	0.976***	0.947***
	(0.075)	(0.075)	(0.076)	(0.084)	(0.084)	(0.099)
Uncomprehended Risk Set 1	1.428***	1.592***	1.214***	1.124***	1.173***	1.145***
	(0.280)	(0.281)	(0.285)	(0.287)	(0.287)	(0.292)
Female		-0.237***	-0.235***	-0.234***	-0.233***	-0.233***
		(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Age			0.037***	0.036***	0.034***	0.034***
			(0.001)	(0.001)	(0.001)	(0.001)
Kindergarten				0	0	0
				(omitted)	(omitted)	(omitted)
Elementary				12.949***	12.829***	12.814***
				(0.107)	(0.110)	(0.110)
Middle School				12.926***	12.795***	12.78***
				(0.105)	(0.108)	(0.108)
High_School				12.835***	12.717***	12.704***
				(0.099)	(0.102)	(0.102)

College				12.870***	12.753***	12.743***
				(0.133)	(0.135)	(0.135)
University				12.488***	12.372***	12.360***
				(0.114)	(0.117)	(0.117)
Uncomprehended Education				12.479***	12.385***	12.372***
				(0.113)	(0.114)	(0.114)
Married					0.270***	0.270***
					(0.045)	(0.045)
Muslim						0.032***
						(0.058)
Observations	33,620	33,620	33,620	33,620	33,620	33,620
Log Likelihood	-12698.03	-12595.96	-12183.67	-12145.21	-12126.27	-12126.27
AIC	25404.05	25201.92	21,869.06	24312.42	24276.55	24276.55
BIC	25437.75	25244.03	24429.87	24405.07	24276.55	24377.62
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 3.1

Logit Results of Risk tolerance and being an Entrepreneur (Set 2)

	Dependent variable:					
	Entrepeneur					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-2.843***	-2.463***	-3.886***	-16.585	-16.588	-16.576
	(0.072)	(0.076)	(0.093)	(-)	(-)	(-)
Risk Averse Set 2	-0.963***	-1.048***	-1.105***	-0.942***	-0.932***	-0.906***
	(0.074)	(0.075)	(0.075)	(0.083)	(0.083)	(0.098)
Risk Tolerant Set 2	1.143***	1.212***	1.232***	1.051***	1.046***	1.019***
	(0.081)	(0.081)	(0.082)	(0.089)	(0.089)	(0.104)
Uncomprehended Risk Set 2	1.278***	1.469***	1.035***	0.920***	0.989***	0.962***
	(0.302)	(0.304)	(0.307)	(0.309)	(0.310)	(0.314)
Female		-0.233***	-0.234***	-0.234***	-0.232***	-0.233***
		(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Age			0.037***	0.036***	0.034***	0.034***
			(0.001)	(0.001)	(0.001)	(0.001)
Kindergarten				0	0	0
				(omitted)	(omitted)	(omitted)
Elementary				12.979***	12.841***	12.852***
				(0.107)	(0.110)	(0.110)
Middle School				12.965***	12.841***	12.78***
				(0.105)	(0.108)	(0.108)
High School				12.880***	12.769***	12.756***
				(0.099)	(0.102)	(0.102)
College				12.923***	12.814***	12.804***
				(0.132)	(0.134)	(0.134)
University				12.541***	12.432***	12.420***

				(0.114)	(0.116)	(0.116)
Uncomprehended Education				12.515***	12.428***	12.415***
				(0.113)	(0.114)	(0.114)
Married					0.272***	0.271***
					(0.045)	(0.045)
Muslim						0.030***
						(0.058)
Observations	33,620	33,620	33,620	33,620	33,620	33,620
Log Likelihood	-12690.21	-12590.76	-12179.83	-12143.43	-12124.3	-12124.17
AIC	25388.42	25191.51	24371.66	24308.85	24272.6	24274.34
BIC	25422.11	25233.63	24422.2	24401.5	24373.68	24383.83
Note:						*p<0.1; **p<0.05; ***p<0.01