

**International
Institute of
Social Studies**

Erasmus

**To Save or Not to Save: The Role of Personality Traits and
Cognitive Ability on Household Savings Behavior in Indonesia**

A Research Paper presented by:

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INDONESIA

in partial fulfilment of the requirements for obtaining the degree of
MASTER OF ARTS IN DEVELOPMENT STUDIES

Major:

Economics of Development

ECD

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November 2022

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This document represents part of the author's study programme while at the International Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

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Acknowledgement

I have had many ups and downs while studying and writing my research, however I believe that every path of life that I choose is the best destiny that will help me become a better human being. In light of this, I am grateful to Allah SWT for granting me the opportunity to expand my education and life experiences. Following that, I would like to thank everyone who helped me finish this research.

First, I would like to thank my supervisor, Dr. Robert Sparrow, for his supervision, support, feedback, and knowledge. Second, I would also like to thank Prof. Dr. Arjun S. Bedi, the second reader of my thesis, for his insightful criticisms, feedback and suggestions at every level of my seminar.

Third, I want to thank my husband and son for their support and understanding in allowing me to continue my education while away from them. Moreover, I would like to thank my parents for encouraging me to pursue my education and expand my experiences. I would also like to thank my sister for being a friend with whom I can discuss and sharing stories. Thank you, mother-in-law and extended relatives, for your patience and support for me and my little family.

I would also like to appreciate Bank Indonesia for providing every employee the opportunity to pursue their education. To my ECD major discussion group friends, especially Thea, Andika, and Octavia, I really appreciate all of your input. To my friends at the ISS, particularly the PPI of The Hague, you are my family here; thank you for your friendship, joy, and desire to support one another, as well as for the great experience we have had while studying at the ISS. When we return to Indonesia, I hope that our friendship last forever. Last, I would like to thank all professors, employees, and friends at the Institute of Social Studies (ISS) for their kindness and support.

Abstract

Why do two households with the same income and characteristics may have different savings? In particular, this is where it is considered that the willingness to save (which is impacted by psychological variables) may play a role. In this regard, the objectives of this study are to investigate the effect of psychological factors on household savings, as well as the effect of those factors via intra-household decision-making channel. The motivation for this research stems from the fact that Indonesian households have relatively low level of savings and financial resilience, as well as the condition that household savings remain important. Further, the findings show that conscientiousness, neuroticism, cognitive ability, risk and time preferences are the psychological factors that influence household savings. Meanwhile, in the indirect channel, conscientiousness, neuroticism, extraversion, and cognitive ability also influence the involvement in the savings decision-making process. In addition to the four factors, agreeableness and time preference also affect household decision-making types. Moreover, the results demonstrate that concerning the role of the decision-making types on household savings, when husbands have a large role in monthly savings, overall household savings tend to be higher.

Relevance to Development Studies

Despite the importance of savings for household well-being, it is evident that this remains an issue in Indonesia. As a result, in relation to development studies, this study addresses the topic of savings behavior in Indonesia. Furthermore, the objective of this study is to dive deeper into the issue of unobserved factors that influence household savings. In light of the preceding, this study is intended to fill a gap in the study of savings in Indonesia – which focuses more on socioeconomic and demographic characteristics, with the aim to enrich the literature on savings in Indonesia.

Keywords

Household; personality traits; cognitive ability; risk preference; time preference

Chapter 1 Introduction

1.1. Background

Imagine there are two individuals with similar income, age and education. Will the two people then also save at the same level? Apparently not always. Equal socio-economic situations may exist at the household level however the level of savings may vary, possibly due to the difference of household savings behavior. Cronqvist and Siegel (2015) support this argument by asserting that differences in wealth accumulations cannot be simply explained by the same asset allocation choices or socioeconomic characteristics factors, implying that there are other factors influencing wealth accumulation that go beyond these. This is where an individual or household willingness to save comes into play, that supported by Katona (1975) in van Raaij (2016, p.39) who states that saving is a combination of two aspects: “the ability to save”, and “the willingness to save”, in which economic factors and psychological factors are behind the two aspects respectively.

However, before delving further into savings behavior and the role of psychological components in it, it may be necessary to understand why savings is essential particularly for households. In this context, various studies have emphasized the importance of savings. One study comes from Kapounek, Korab, and Deltuvaite (2016) who claim that households can utilize their savings not only as protection against unpredictable economic shocks, but also as a mechanism of redistributing financial resources throughout their lives. Meanwhile, other studies highlight that savings also help households improve their financial well-being and financial independence (Yao *et al.*, 2011, Loibl, Kraybill and DeMay, 2011, Azizah and Salam, 2021). In Indonesia, the importance of household savings is evident for example when there is an income shock and an unexpected situation, in which the savings performance then influences the households’ resilience in overcoming financial shocks. Apart from that, savings are essential in Indonesia when people want to buy houses or vehicles, including when qualifying for a bank loan for purchasing those assets. Individuals in this scenario need to submit a down payment and demonstrate their financial soundness in order to secure bank financing to purchase assets. Savings for education financing are also important, since not all local Indonesian governments have the capability to provide free education up to high school.

Nevertheless, on average Indonesian households save only 8.5% of their total income, with the savings rates of low-income and high-income households being 5.2% and 12.6%, respectively. This is considered as low ratio given that most experts recommend saving at least 20% of income (Indonesia-investments.com, 2016). Furthermore, one study from Noerhidajati *et al.*, (2021) argue that Indonesian households have a low resistance to financial disturbances, where around 40%-80% of households only have savings to be able to meet their needs in less than one month, whereas, as in Despard, Friedline and Martin-West (2020), the level of savings is suggested to be able to cover at least three months of housing and food expenditures in the sudden loss of income. Particularly during the Covid-19 outbreak, the impact of low household savings in Indonesia may be evident. The pandemic had an impact on the imposition of many restrictions on population mobility in various countries, which then disrupted the economic activities. In Indonesia, the pandemic also affected the household's financial condition due to temporary or permanent layoffs, or disruption of business activities. For example, UNICEF, UNDP, PROSPERA, The SMERU Research Institute (2021) find that only around 18 percent of households who experienced job loss by the pandemic had sufficient savings. As a result, around 88 percent of households had to sell assets, take out new loans or reduce food consumption to deal with income loss during the pandemic.

Given the low saving rates and financial buffers, it is important to investigate the savings behavior of Indonesian households. However, there is a limited body of literature on household savings in Indonesia mainly because these studies focus primarily on socio-economic and demographic aspects: income, education, and ethnicity, as well as technological factors, such as internet access (e.g. Ajija *et al.*, 2021, Thaariq, Anindita and Ifina, 2021, and Syofyan and Ekananda, 2022). Although Syofyan and Ekananda (2022) do attempted to incorporate psychological aspects in the form of risk preferences, other important psychological aspects such as personality and cognitive abilities are not included. Furthermore, given how household savings varies even when households have relatively the same income, as mentioned in the beginning part, research on household savings behavior, particularly the investigation about how the willingness to save that related to psychological characteristics affects household savings, become relevant.

In this context, we aim to examine at how psychological factors, particularly personality and cognitive ability, affect households' willingness to save. Meanwhile, although it is not our main variable of interest, we are considering incorporating time preference, based on the finding from Choi and Han (2018) that this element is an important aspect in the study of savings behavior, with those who tend to be patient having a higher savings rate, and thus appropriate interventions are expected to encourage people to be more patient and have a higher savings rate. Furthermore, we agree with the approach by Syofyan and Ekananda (2022) by including the risk preference variable, as individual risk appetite may influence the type of investment chosen by households, whether it is a higher-risk form or a lower-risk one, such as savings.

In addition, we also consider the decision-making process which we believe influences household savings, in that who and how are the characteristics of individual(s) that determine savings will shape the household savings' performance. This information also essential to have more understanding about precise information for financial education. Given that Indonesia is still a patriarchal society, the primary household decision maker may be the husband, who is typically the head of the household. However, growing female empowerment due to increasing education and labour market participation may change and affect the intra-household decision-making process. To the best of our knowledge, no research has yet been taken into account on how decision-making types affect household savings in Indonesia. Lubis (2020) considers personality and cognitive abilities in assessing the effect of financial literacy on financial decision-making authorities in Indonesia, however, these aspects of household finances are broad and do not specifically address household savings. Therefore, this study intends to fill a gap in the study of savings in Indonesia in order to contribute to the existing body of knowledge on the subject.

1.2. Research Objectives and Questions

The objectives of this study are to analyze the effect of personality characteristics and cognitive ability on household savings, as well as their effect on the involvement of husband and wife in making intra-household monthly savings decisions and the types of savings decisions. In addition, as additional variables of interest, we also incorporate certain psychological aspects namely time preference and risk preference to enhance our study. It identifies one main question: the overall effect of psychological characteristics on savings. The second question then looks at indirect channels: the role of the intra-household decision-making process.

I.3. Scope and Limitations of the Study

We utilize data from the Indonesian Family Life Survey (IFLS) wave 5 in 2014/2015 to meet the objectives of this study. However, our study has some limitations, first of which that we will only be able to use cross-sectional data of IFLS, which is owing to the fact that questions about personality have only been posed since IFLS-5 as an improvement of preceding waves. The limitations of this study are discussed in further depth in the sixth chapter: the conclusion.

I.4. Organization of the Research Paper

There are six chapters in this research paper. The next chapter explores the literature review of related psychological concepts, prior studies and the conceptual framework, while the third chapter discusses the methodology and data selection. The fourth chapter explores the socio-economic and demographic characteristics of households and individuals in Indonesia, as well as the psychological characteristics, intra-household financial decision-making, and household savings. The fifth chapter discusses the result of the empirical model and policy recommendations, while the last chapter presents the conclusions of the paper.

Chapter 2 Literature Review

2.1. A Brief Discussion of Related Psychological Concepts

In this subsection, we present several concepts pertaining to the psychological factors that are the subject of our study. Here, the first aspect we would like to explain relates to personality and personality traits. Personality can be defined as “*the distinctive and characteristic patterns of thought, emotion, and behavior that make up an individual’s personal style of interacting with the physical and social environment*” (Nolen-Hoeksema *et al.*, 2009). The term of personality traits is frequently employed to measure and classify personal characteristics that define an individual's personality. In this context, Matthews, Deary and Whiteman (2009) express that in everyday conceptions, personality traits are based on two fundamental assumptions. The first assumption is that personality traits are stable over time, despite the fact that individual behavior may vary depending on the situation, there is a fundamental consistency that reflects the individual's true self. The second assumption is that a person's characteristics is believed to have impact on his or her behavior. Further, several approaches are used to categorize personality traits, such as the Myers-Briggs Type Indicator (MBTI), The 16 Personality Factor, and The Big Five of Personality Traits. The latter is one of the most commonly used measurement in many studies (Kabigting, 2021).

The Big Five of Personality Traits or The Big Five is a construction of individual personality traits that are believed to influence human behavior. The concept has long historical foundations since the term trait was conceptualized in the 1930s and has been evolving. Digman (1990) discusses that according to The Big Five by Costa and McCrae (1985) this personality measurement consists of five elements that are extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. The first element, extraversion, is translated to how individuals interact with others, which is associated with excitement seeking, cheerfulness, and assertiveness. The second element is agreeableness, which corresponds to the concerns with interpersonal orientation, care for others, and a preference for harmony and collaboration. Meanwhile, conscientiousness is associated with the ability to control, discipline, and self-persistence. The fourth element is neuroticism, related to emotional instability, impulsiveness, and how individuals react to stress. The last element, openness to experience, is related to acceptance and appreciation of new ideas or experiences (Kabigting, 2021).

The second aspect of the psychological factors is cognitive ability, which is associated with human capability in thinking, reasoning, solving problems, as well as comprehending ideas, and learning from experience (Newman and Newman, 2020). In terms of financial decision-making, Agarwal and Mazumder (2013) argue that the capacity to absorb information and conduct financial calculations appears to be a major element of good financial decision-making, and there are a rising number of studies that relate cognitive abilities to financial behavior. Moreover, the authors also contend that people with higher cognitive abilities, particularly in math, are less likely to make financial mistakes. In a similar fashion, Sobkow, Garrido and Garcia-Retamero (2020) also emphasize the importance of cognitive abilities in financial decision-making. In this context, the authors define cognitive abilities as intelligence, statistical numeracy, and multiple numeric competencies. Discussing various empirical research, the authors suggest statistical numeracy and multiple numeric abilities determine the personal capacity and motivation in making financial decisions. Based on the foregoing, we may conclude that, in terms of cognitive capacity, numeracy ability may play the most essential role in financial behavior research and will be employed in the empirical work of this study.

The concept of risk preference is the other aspect we would like to discuss in this subsection. First, the term risk can be defined as the potential for suffering a loss, while risk

preference refers to the tendency of an individual either to avoid or to seek risk. In the study of economics, Harrison and Ruström (2008) suggest that the term risk preference most commonly refers to the tendency of an individual to participate in activities with higher returns, such as in the context of financial payoffs including lotteries. Regarding financial decision-making, van Raaij (2016) argues that risk is one of crucial parts of financial behavior, owing to the fact that an individual might undertake many decisions without fully comprehending the consequences of those decisions. Decision makers who avoid taking risks tend to have a more pessimistic outlook on the future than decision makers who actively seek out risks. Moreover, we can observe that the higher the risk preference (more risk-loving) of individual, the more the individual's willingness to take higher financial risks. In terms of the stability of this trait, Mata et.al, (2018) argue that risk preference can be considered as a moderately stable general psychological characteristic when it is self-reported, and it becomes an essential variable in psychology and economics, as well as for the policy-making process.

Following that, we will briefly cover the concept of the last aspect: time preference. In this context, we follow the concept by Rothbard (2008) who argues that time preference refers to the way in which individuals prefer to choose 'present goods,' or commodities that can be enjoyed right now, rather than 'future goods,' or expectations connected to the consumption of these items at a later period. Moreover, in the context of financial decision-making, van Raaij (2016) states that the term time preference may refer to the behavior of individuals that can be divided into two categories: those who are impatient and impulsive in spending, and those who are more patient and willing to save or invest money for future needs. Regarding this, the author also argues that time preference is important in consumer financial behavior, such as for saving, retirement plan, as well as insurance take-up. As a result of prior studies, we believe that the time preference factor needs to be incorporated in this study as one of the psychological variables which may influence household savings.

2.2. Summary of Previous Studies

In this part, we present a summary of previous studies that highlight various focuses and methodologies related to intra-household financial decision-making and household savings. In these two clusters, we also include research that address the role of observable and unobserved variables that can influence household financial decision-making and household savings.

2.2.1. Intra-household Financial Decision-Making

Intra-household decision-making is a complex process impacted by a variety of circumstances. Since it is more likely that the number of household members is more than one, decisions may be taken by a single person or by a number of individuals. The unitary model is one of the commonly used types of household decision-making. The assumptions in this type are that a household behaves as a single entity and that all of the resources in the home are pooled together (Alderman *et al.*, 1995), although Browning, Chiappori and Lechene (2006) also argue that the unitary model can be applied whether or not they satisfy income pooling assumption (dependent unitary models). This theory has many criticisms since it does not consider the differences in individual preferences and utility functions. Later on, the theory developed into a collective model, which consider the different preferences intra-household, and how the household's members come up into a household decision through cooperative or noncooperative solutions (Alderman *et al.*, 1995). Browning, Chiappori and Weiss (2014) also explain that this model has two basic assumptions: the existence of a stable and unique decision-making process in a household and a decision-making process that considers Pareto efficient outcomes. Apart from the two assumptions, this model also considers

additional information or distribution factors. Although they do not affect budget preferences or constraints, they can affect household decision-making processes.

We begin to investigate factors that affect the involvement of household members on the decision-making process. In this context, a study by Sultana (2011) analyzes the factors that influence the autonomy of women in household decision-making in Bangladesh. The results show that education level, occupation, and income are positively correlated with women's autonomy in household decision making. Although not specifically related to financial decisions, we argue that the three elements to be important observable factors in the involvement of household members, particularly women, in the intra-household decision-making process. Meanwhile, Bertocchi, Brunetti and Toricelli (2014) investigate the factors that influence the bargaining power of household members in family economic decision making in Italy. The results indicate that the personal income of husband and wife influence the capacity to say "yes" in a non-linear way. Up to a particular level, personal income positively impacts on the authority, however after a certain income level, there is evidence that wife or husband will distribute their authorities. From these two studies, it is evident that income and socio-demographic aspects continue to be the focus of research pertaining bargaining power and household decision-making.

Next, we review several research that have investigated the psychological aspects of financial decision-making, focusing on personality, cognitive, time preference, and risk preference factors. One of those is a study by Donnelly, Iyer, and Howell (2012) that examine the relationship between certain personality and effective financial management. The findings show that all elements of personality traits have a significant impact on financial management, in particular, extraversion, neuroticism, and conscientiousness are the three most influential personality traits. In this regard, extraversion and neuroticism have a negative effect, whilst conscientiousness positively impacted money management, with the rationale that more conscientious individuals have more optimistic financial attitudes and a longer-term view. Meanwhile, another study from Dewberry, Juanchich and Narendran (2013) also find that extraversion and neuroticism have a detrimental effect on an individual's decision-making ability that emphasized the importance of considering the personality aspect of decision-making capacity. In contrast, Nga and Yien (2013) discover that conscientiousness, openness to experience, and agreeableness are more significant in financial decision-making, particularly in regards to risk-averse financial decisions as savings instruments. It is important to point out however, that the emphasis of the study is Generation Y, which may have a different personality than the previous generations. On the basis of previous studies, we may conclude that personality can influence decision-making in terms of capability and decision-making style.

Concerning particularly on household financial decision-making, Brown and Taylor (2014) examine personality traits associated with the household financial decision-making particularly in non-collateral debt and household financial assets. Applying the taxonomy of the Big Five, the authors focus on investigating personality traits of the head of household and average within the couple. One of the findings indicates that openness to experience increases the likelihood that a household can possess and manage assets, whilst extraversion has the opposite effect. In a similar way, Johnston, Kassenboehmer and Shields (2016) discuss various potential non-economic factors that can determine the probability of allocation of financial decision-making. Using household surveys in Australia, the authors focus on the role of personality traits using the Big Five Personality Traits on the household decision-making types, whether male or female as the sole decision makers in the household, or jointly. It is worth noting that the authors take into account any disagreements within the household about who makes financial decisions. To overcome this issue, the authors utilize male and female responses to evaluate the consistency of the generated empirical results. The cross-

sectional results suggest that agreeableness decreases the chance of a man or a woman being the sole decision maker, while increasing conscientiousness in both males and females leads them to become sole decision makers.

In terms of cognitive ability aspect, Cokely and Kelley (2009) using an experimental method find that cognitive abilities help individuals make better risky decisions, and tend to make decisions more consistent. In a relatively similar fashion, Agarwal and Mazumder (2013) examine the effect of cognitive abilities on financial decisions using a cognitive approach and AQFT scores that combined math scores and verbal ability scores, discover that math skills support individuals in making better financial decisions and reducing financial calculation errors. In this case, the authors argue, albeit speculatively, that people with mathematical skills tend to be more patient, have a better understanding of financial concepts, and have better calculation skills. Additionally, Ghazal, Cokely and Retamero (2014) highlight comparable findings to the earlier research. The study of 5,408 educated samples revealed that numeracy ability increases self-confidence, thereby promoting the metacognition process, which in turn improves evaluation and decision-making capabilities. On the contrary, a study by Dewberry, Juanchich and Narendran (2013) using the hierarchical regression method on the survey responses of 355 individuals failed to demonstrate the effect of cognitive styles on the decision-making competence. In this regard, the authors contend that this could be due to the measurement error of cognitive styles and the lack of variation in the data. Although those studies do not directly focus on household decision-making, they do provide insights into how cognitive capacity may play a role on decision-making process.

Several prior studies have emphasized the impact of time preference on decision-making and financial program participation. Meier and Sprenger (2013) emphasize that time preference influences the processing of financial decisions, with results indicating that the less time preference a person has – or the more patient he is – the more willing he is to participate in financial counselling and acquire financial information. Meanwhile, Finke and Huston (2013), who analyze how time preference can influence students' pension participation decisions, discover that an individual's desire to join the retirement program is lower if he or she has a low level of patience and prefers to seek pleasure at present. Consistent with the findings of prior studies, Huffman, Maurer, and Mitchell (2019) claim that seniors in the United States consider time preference while making money management and investment decisions, as well as when planning care for their retirement age.

In terms of risk preference, Powell and Ansic (1997) identify differences between male and female risk behavior in financial decision making. The study demonstrates, through an experimental investigation of insurance selection and participation in the money market, that women tend to be more risk-averse than males, which therefore affects their financial decision-making strategy. Similarly, Halko, Kaustia, and Alanko (2012) show that women in Finland who are bank clients have a lower risk tolerance than men, hence they choose to select asset allocations with low risk. Dohmen et al. (2011) find that risk-loving behavior has a positive effect on individual decisions to hold stocks. Likewise previous research, but at the household level, Webb and Friedberg (2006) reveal that when the husband has the final say in family decision-making, households choose for a riskier type of asset allocation in the form of a stock portfolio.

Specifically in Indonesia, there is a limited body research on how psychological aspects of household financial decision-making. To the best of our knowledge, there is only a study by Lubis (2020) that investigates the relationship between financial literacy, cognitive capacity, personality traits, and authority on financial decision-making in Indonesian households. Using the logistic regression approach, the results demonstrate that financial literacy has no significant relationship with the probability of an individual becoming the primary financial decision maker in the household. On the other hand, cognitive capacity, as reflected by

numeracy ability, has a substantial effect in the likelihood of becoming the primary financial decision-maker in the household. Furthermore, financial self-efficacy, money self-control, and general trust have no significant impacts on the authority of household decision-making. Based on the preceding studies, we can see how psychological factors can influence the participation of household members, particularly husbands and wives, in the household financial decision-making process, which then shapes the type of household decisions made by one person or carried out collectively. Although these studies do not particularly address the issue of decision-making on savings, they may offer insight into factors that influence household decision-making that can be applied to our research.

2.2.2. Savings Behavior

Saving entails postponing consumption of something in order to maintain consumption level in the future. Saving is considered to be motivated by concern about the future and the wish to do something to alleviate that uncertainty. Wärneryd (1993) states that one theory of saving behavior comes from Katona (1975) which predicated on the notion that saving is determined by two factors: ability to save which usually related to income, and willingness to save. Combining economic and psychological factors, this function captures the essence of most economic-psychological theories of saving. The willingness to save is evaluated using a variety of psychological characteristics, including motives and attitudes of saving, although the author also argues to use notion “will” as an individual-level concept, whereas Katona's willingness to save is a macro psychological term. Later on, Wärneryd (1999) adds that saving theories evolve with a primary emphasis on motivational variables and emotions, until economists demonstrate a new interest in psychology as discussed by Shefrin and Thaler (1988). However, the mainstream classical examples of the theory of saving, such as the life-cycle hypothesis, make some simplifying assumption in decision making. Shefrin and Thaler (1988) modify the life-cycle hypothesis into the Behavioral Life-Cycle hypothesis by including self-control, mental accounting, and framing. In this regard, a number of studies reveal that people are more likely not rational in making their decisions. Graham and Isaac (2000) examine the behavior of salary pay-cycle choices at American University and find evidence of mental accounts in respondents' decision making. Further, the result contradicts the neoclassical theory of consumer behavior and is more likely to follow the behavioral life-cycle theory.

In light of savings behavior, we intend to discuss several research which analyze the factors that affect household savings. Harris, Loundes, and Webster (2002) investigate the factors that influence household savings in Australia. By adapting the life-cycle precautionary hypotheses approach, the study focuses on the role of socio-economic and demographic aspects of household and individual, and macro variables: economic optimism and interest rates on saving ratio. The results demonstrate that households with more income and wealth tend to have higher savings rates. In addition, when household members tend to be pessimistic about economic situations, they are more likely to save. Likewise, Abdelkhalek *et al.*, (2010) analyze the microeconomic factors that influence household savings behavior in Morocco. Given the social security is still relatively limited in that country, and participation in insurance plan is relatively low, motivate the authors to investigate household savings behavior in that country. The findings demonstrate that, as expected, income has a positive impact on savings in both urban and rural regions. Meanwhile, the literacy rate of the head of the household has only a positive effect on the amount of savings in rural areas. In line with the previous two research but focusing on the savings behavior differences between gender, Mirpourian (2020) discover that women and men have different financial behavior and savings. These variances are determined by factors such as age, place of residence, frequency of transactions, and primarily when the savings transactions are performed, whether in the dry or rainy season.

In contrast to the previously mentioned studies, Raue, D'Ambrosio, and Coughlin (2020) discuss the significance of peer impact in boosting savings behavior. Through an experimental study, the findings show that peer pressure and social comparisons can affect individual savings behavior to have and increase retirement savings. Meanwhile, from a macroeconomic point of view, Niculescu-Aron and Mihăescu (2012) identify a number of factors that can influence household savings and the policies that can encourage savings. The findings suggest that economic growth, income, and interest rates can impact household savings. In light of this, the recommended policy is to promote economic growth and implement accommodating monetary and fiscal policies. Continuing with the topic of ways to increase household savings, Despard, Friedline and Martin-West (2020) emphasize the significance of financial capability in influencing savings behavior in order to improve American households' emergency savings. It is also suggested that the intervention be accompanied by financial coaching and counselling in addition to a focus on enhancing financial education.

Based on the aforementioned, we may infer that those studies have not addressed the psychological factors that can influence the willingness to save. In this context, we attempt to bring a study from Gerhard, Gladstone, and Hoffmann (2018) that investigates the influence of personality traits on household savings behavior. The authors utilize the British Household Panel Survey in 2013 with the total samples being 3,382 observations. Using Finite Mixture Model, this study finds that agreeableness and extraversion have significant negative impacts on the total household savings for the striving and established classes. The intuition behind this is that agreeableness is associated with the generosity in giving, and therefore less agreeable people tend to keep the money for themselves, which then impacts higher savings. Meanwhile, the negative impact of extraversion on savings is translated into a desire of households to express their status by spending their money on non-essential items, and hence reduces the income to save. Another study that takes into account the unobserved characteristic is that of Ballinger *et al.*, (2011), who analyzes the heterogeneity of saving behavior by incorporating cognitive ability and personality factors. The authors employ two approaches to measuring cognitive ability: the Beta III analytical approach for measuring nonverbal abilities such as reasoning, planning ability, and impulse control, and the working memory span for measuring the ability to focus attention in processing problems. Meanwhile, the procrastination and four dimensions of impulsivity element approach, as well as intrinsic motivation as evaluated by the demand for cognition, are used to reflect the personality aspect. Using random effects panel regressions, the findings demonstrate that cognitive abilities such as reasoning, planning ability, impulse control, and working memory span can increase saving performance.

Moreover, in terms of the influence of risk preference on savings behavior, van Raaij (2016) emphasizes how these characteristics can influence the choice of financial instruments. The findings suggest that people with a high-risk appetite tend to choose high-risk, high-return financial instruments, such as stocks. Regarding gender, the study also contends that women have a lower risk appetite than males and prefer low-risk financial instruments to secure their wealth. Pinjisakikool (2017) underlines the same point, where lower financial risk tolerance promotes households to choose financial instruments with lower risk in the form of savings. In a relatively similar way, Muhamad, Kusairi and Zamri (2021) examine household financial efficacy and risk preferences for savings behavior of the lowest income group in Malaysia. Financial efficacy in this context refers to people's skills and confidence in managing household finance. While risk preference is assessed by individuals in the household's willingness to accept a risky option, whether it is less risky or riskier. By employing Structural Equation Modelling, the results indicate that risk preference has a positive impact on financial efficacy, and financial self-efficacy increases saving. Meanwhile, risk preference itself has a negative relationship with savings, showing that household with risk-loving individuals tends to save less than those with risk-averse ones. Brounen, Koedijk, and Pownall

(2016), on the other hand, obtain different results. The basic regression results show that a higher risk preference has a positive effect on household savings when only risk preference and demographic factors are considered. Nevertheless, when other variables are incorporated (whether respondents were born into a wealthy family and obtained a good education, numeracy, self-efficacy, and locus future), risk preference has no substantial effect on household savings, despite the sign remains positive.

In terms of time preference, we attempt to bring a study by Middlewood *et al.*, (2018) that aims to investigate the time preference on savings behavior by adapting the Behavioral Life-Cycle hypothesis and utilizing 4,826 respondents who own savings accounts from a Consumer Financial Well-Being Survey in the US. The technique used to examine respondents' temporal preferences is whether they prefer a lower but sooner reward, or a greater payoff in the future. Using linear regression, the study claims that "doers," or those who are impatient, save less, have lower liquid savings. In a relatively similar way, Brounen, Koedijk, and Pownall (2016) examine the savings behavior of Dutch households. The results reveal that household members with a longer and more patient vision or time horizon has a positive effect on their willingness to save, and this factor is stronger perceived by households with younger household members who possess better financial literacy. Choi and Han (2018) also highlight that impatient individuals have a lower savings rate, and that time preference is one of key aspects of savings behavior.

Following that, we look into studies on savings behavior particularly in Indonesia. In this regard, several empirical works on the savings behavior of households in Indonesia primarily investigate the savings behavior from the demographical, socio-economic aspect, financial literacy, and technology. One of a previous study begin with Kelley and Williamson (1968) who analyze the determinant of households saving in the Daerah Istimewa Jogjakarta Province in Indonesia during 1958 to 1959. This study focuses primarily of the role of income per capita in influencing savings per household member. Based on a survey to 490 households in the province which divided into six types of occupation groups and employing linear regression, unsurprisingly the study finds that income per capita is increasing household savings as life-cycle hypothesis. Meanwhile, Ajija *et al.*, (2020) discuss the role of ethnicity and demographical aspects in household savings in Indonesia. Using three waves of Indonesia Family Life Survey (IFLS) with around 27,000 respondents and employing logit regression, the results show that several ethnic groups namely Sunda, Batak, and Bima-Dompu have a significant influence to the household saving behavior. Moreover, the findings also demonstrate that demographic characteristics: gender, education, and place of residence also impacted on the household saving behavior.

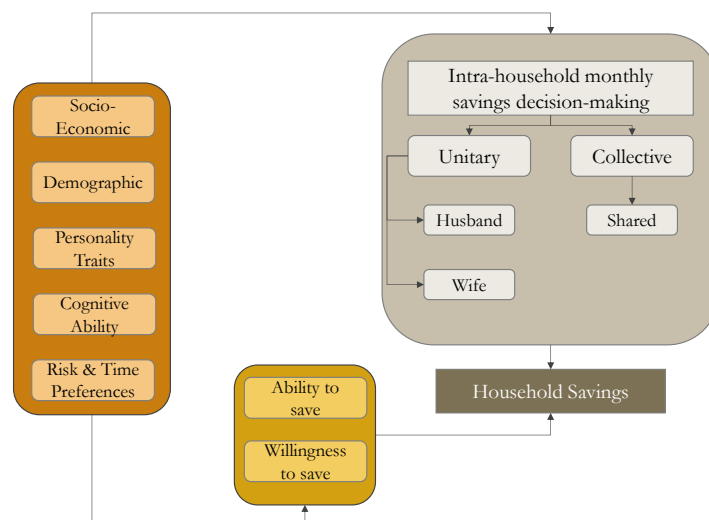
Furthermore, another study by Thaariq, Anindita and Iftina (2021) examines the impact of internet access on households saving behavior. Relatively similar with study by Ajija *et al.*, (2020), the authors utilize IFLS data despite that this study only take into account the wave five as the question about internet only available in that wave. Based on 6,146 households and employing Ordinary Least Square regression, the findings demonstrate that private internet access has a positive effect on savings and savings preferences. A recent study about household savings behavior in Indonesia is from Syofyan and Ekananda (2022) that also utilize IFLS data. Using the Life-Cycle Hypothesis (LCH) methodology, this research aims to identify the factors that influence household savings. Despite using the LCH approach, this study takes into account psychological variables such as past savings experiences and risk preferences, in addition to income variables, demographic factors such as age, dependency ratio, gender, education, household size, marital status, and occupation, and institutional factors. Based on the quantile regression results, income is the most influential variable on total household savings, followed by job status. Furthermore, the results suggest that risk preferences, education level, and previous saving experience also influence household savings.

Based on the preceding, we may conclude that income is one significant factor influencing savings, which is consistent with Katona (1975) in van Raaij (2016) that claims that income can influence the ability to save. Meanwhile, previous studies have shown that factors other than income and other socio-demographic characteristics can also influence willingness to save. Nevertheless, as previously mentioned, research on household savings in Indonesia continues to focus primarily on the aspect of the ability to save, despite the study by Syofyan and Ekananda (2022) also considers risk preference and saving experience. Based on the foregoing, this research aims to fill the gap by investigating the effect of psychological characteristics, particularly personality traits and cognitive ability, which also enriched by risk preference and time preference, and also the types of household savings decision-making on household savings behavior.

2.3. Conceptual Framework

In light of the research objectives and research questions, we aim to adapt the concepts, and the previous studies discussed above, and construct the conceptual framework in this study as indicated in Figure II.1. In this context, first, we attempt to adapt an approach developed by Alderman *et al.*, (1995) concerning unitary and collective models on intra-household decision making to determine whether the household’s decision-making follows a unitary or collective model. Considering the focus of our study, we incorporate psychological characteristics that we believe may influence husband and wife involvement and the types of household decision – making, which in this case are focused on monthly saving decisions. Furthermore, drawing on the research of Johnston, Kassenboehmer and Shields (2016), we consider the possibility of disagreement among Indonesian households regarding who is the monthly saving decision maker(s), by addressing the issue in the methodology section. In addition, we also adapt prior research that address psychological components of willingness to save, as Katona (1975) in van Raaij (2016), and nevertheless incorporate income variables that can influence ability to save, as well as other socio-demographic characteristics variables, into the framework. In this instance, we believe that all socioeconomic and demographic factors, as well as psychological variables, can directly influence household savings, as well as indirectly through household decision-making channels, which in turn affect household savings.

Figure 2.1. Conceptual Framework



Source: Author’s Adaptation from Alderman *et al.*, (1995), Katona (1975) in van Raaij (2016), and Johnston, Kassenboehmer and Shields (2016).

Chapter 3 Methodology

To achieve the objectives, this research adapts the theoretical work by Alderman *et al.*, (1995), Katona (1975) in van Raaij (2016), and empirical works developed by Johnston, Kassenboehmer, and Shields (2016), Lubis (2020), and Gerhard, Gladstone and Hoffmann (2018) which consider the role of personality traits and cognitive abilities on household financial decision-making and savings behavior. In this regard, this chapter will cover hypotheses and empirical strategies, including data and its measurement, as well as the analytical methods that will be employed.

3.1. Hypotheses

Referring to the research questions in the first chapter, we divide the hypotheses into two separate categories which are the intra-household financial decision making, and the household savings. Concerning the role of psychological aspects on the intra-household decision-making, we once more divide the hypotheses on this into two elements: the involvement of the household members in financial decision-making process, and the intra-household financial decision-making model. First, regarding the involvement in financial decision-making, our hypotheses are as follows. In terms of personality traits, we expect that conscientiousness and openness have positive relationships with the probability of husband and wives to be involved in the monthly savings decision-making, bearing in mind that the traits are associated with the ability to control, discipline, and the willingness to try new experiences. On the other hand, we expect that neuroticism, which is associated with emotional instability, impulsiveness, and how individuals react to stress, and agreeableness, which is associated with an interpersonal orientation that favors cooperation, harmony, and agreeableness with others, have negative relationships with involvement in the monthly savings decision-making.

Meanwhile, in terms of extraversion, those who score high on this attribute may be more assertive and hence more likely to have “final yes in decision-making.” It is important to note, however, that high scores in this attribute also represent extroverted, excitement, and cheerful persons. As a result, they may also reduce likelihood of involvement in household monthly savings decision-making. In the cognitive aspect, we expect that cognitive ability reflected by numeracy ability in this study positively affect the probability of involvement in monthly savings decision-making. Furthermore, positive risk preference (which indicates riskier individuals) and positive time preference (which indicates more impatient individuals) are expected to have a negative impact on their involvement in the process. The summary of hypotheses is provided in Table 3.1.

Table 3.1. Hypotheses of Psychological Aspects on Involvement in the Monthly Savings Decision-making Process

Variable	Hypotheses
Conscientiousness	Positive
Extraversion	Negative
Agreeableness	Negative
Neuroticism	Negative
Openness to Experience	Positive
Cognitive Ability	Positive
Risk Preference	Negative
Time Preference	Negative

Second, regarding the decision-making model, we expect that one or more personality traits, cognitive ability, time preference, risk preference of husbands and wives in households may influence the decision-making types, whether unitary – wife or husband as the sole decision maker, and collective decision-making. In addition, we also expect that there are relationships of socio-economic and demographic factors in the financial decision-making process.

Third, we turn into the hypothesis of the direct effect of psychological factors on the household savings. Here, we expect that personality traits also have significant effect to household savings with expected sign as in Table 3.2. In this regard, conscientiousness and openness to experience are expected to have a positive effect on household savings, given that individuals with high conscientiousness and openness scores tend to have self-control, discipline, are more imaginative, and have the desire to try new things that can increase household savings. Extraversion, agreeableness, and neuroticism, on the other hand, are expected to have negative effects on household savings. The idea underlying this hypothesis is that when the individuals in the household are more extroverted, agreeable, and emotionally instable, it is more likely that they spend their money than save it.

Cognitive abilities are expected to have a positive effect on household savings, as indicated by the condition that someone with higher numerical cognitive abilities would have more capacity and will to increase their savings for future needs. Risk preference, however, is expected to have a negative effect on households' savings. The intuition behind this hypothesis is individuals with higher risk preferences are expected to invest in other type of financial instruments to accumulate their wealth in the future. On the other hand, people with lower risk preferences may want to save their money in the form of savings. However, since our data concerning household savings is combined with stocks, the role of risk preference may be different as when the savings is solely in the form of deposits. Last, the time preference is expected to have a negative effect on households' savings, resulting in a situation in which a higher time preference score indicates more impatience and lesser self-control individuals, and thus, more likely to save less.

Table 3.2. Hypotheses of Psychological Aspects on Household Savings

Component	Hypotheses
Conscientiousness	Positive
Extraversion	Negative
Agreeableness	Negative
Neuroticism	Negative
Openness to experience	Positive
Cognitive Ability	Positive
Risk preference	Negative
Time preference	Negative

3.2. Empirical Strategy

3.2.1. Data

Our data source originates from The Indonesian Family Life Survey Wave 5 (IFLS-5), conducted in 2014/2015. IFLS is longitudinal survey that claims to represent around 83% of Indonesian population, with over 30 thousand individual respondents in a single wave. However, since the information regarding personality traits only begins in the wave 5, we consider to use the IFLS-5 for our main information. The measurement and the process to calculate the index of personality traits, cognitive ability, risk preference, and time preference will be detailed in the next subchapter.

3.2.1.1. Construction of Personality Traits Index

Personality traits are classified into five categories based on the literature review in the second chapter: conscientiousness, extraversion, agreeableness, neuroticism, and openness to experience. As in the IFLS-5 book 3B section PSN, the respondents were asked to identify themselves in 15 questions based on the Big Five Personality Traits concept, using a Likert Scale (1 representing strongly disagree, and 5 being strongly agree). For example, the trait of conscientiousness is characterized by three questions: “I consider myself as someone who does a thorough job, tends to be lazy, and does things efficiently”. Moreover, considering that each question needs to have the same direction, we reverse the Likert score of a negative question in the estimation such as “tends to be lazy”. Keeping this in mind, when a respondent selects “1. Disagree strongly”, the answer is reversed to “5. Agree strongly”, as well as when the respondent responds “2. Disagree a little”, the respond is reversed into “4. Agree a little”. The opposite direction with the other questions in the extraversion, agreeableness, and neuroticism traits are treated in a similar approach with the trait conscientiousness¹.

A composite index of each personality trait is then generated by averaging the questions across each attribute following the approach by Gerhard, Gladstone and Hoffmann (2018), and standardizing the indexes before using them in the estimations. In this context, following Gujarati and Porter (2009), the standardization procedure involves rescaling the score of each component as the equation 3.1, so that each standardized score (x_i^*) generated shows how many standard deviation (sd) the distance the value is from the average (\bar{x}).

$$x_i^* = \frac{x_i - \bar{x}}{sd} \quad \text{Eq. 3.1}$$

3.2.1.2. Construction of Cognitive Ability Score

Based on the literature review in chapter two, the cognitive ability in this study is restricted to numeracy ability, which is believed to influence financial decision-making capability and household savings, as demonstrated by the findings of Ghazal, Cokely, and Retamero (2014), Sobkow, Garrido, and Garcia-Retamero (2020), and Lubis (2020). Having this in mind, we apply ten numeracy ability questions from the book 3B section cognitive capacity and the book EK_EK2 from the IFLS-5². Furthermore, we assign a score of 1 to each correct response, and add up all of the points for each respondent. Given this, minimum score of each respondent is zero, and the maximum score is 10. However, in order to ease the process of interpreting the results of this variable along with other psychological characteristics, we calculate the standardized score of the cognitive ability as the personality traits before applying them into the model.

3.2.1.3. Construction of Risk Preference Score

We construct risk and time preferences from Book IIIA section SI of the IFLS-5 data on risk preferences. In that section, the risk preference subsection comprises of fifteen questions about imaginary money, and respondents were asked to select the response that most accurately represents their preferred risk preference³. In order to calculate the risk preference score for each respondent, we employ a method proposed by Sanjaya (2013), which entails constructing two games based on 15 questions and various paths dependent on the

¹ for the IFLS-5 detail questions see Strauss, Witoelar, and Sikoki (2016). The score of the questions: “tends to be lazy”, “is reserved”, “is sometime rude to others”, and “is relaxed, handles stress well” will be reversed in the estimations.

² for the IFLS-5 detail questions see Strauss, Witoelar, and Sikoki (2016)

³ for the IFLS-5 detail questions see Strauss, Witoelar, and Sikoki (2016). This study adapts the methodology proposed by Sanjaya (2013), according to which SI12 identifies inaccurate translations. The response “1. Still picks option 1” should be translated as “1. Still picks option 2”; and “2. Switches to option 2” should be translated as “2. Switches to option 1”

respondent's answer choices. For example, in question SI01 and a respondent was asked, if he were offered money worth 800,000 Rupiah per month, whether he prefers the first option of that amount, or the second option worth 800,000 Rupiah per month with a condition that if he is lucky, he will receive 1.6 million Rupiah per month. If the respondent selects the first option, he will be asked SI02 to confirm whether to continue with the first option or switch to the second option. In contrast, if the respondent chooses the second option in SI01, he will be asked question SI03, which states that he has the same chance of earning either 1,600,000 or 400,000 Rupiah each month depending on his luck, and the respondent can select for the first option, which is to guarantee receiving 800,000 Rupiah per month, or he can try his luck with the second option, which is either 1.6 million or 400,000 Rupiah per month. There are 18 possible pathways in the first game, and 9 possible pathways in the second game⁴. The final risk preference score is then calculated by summing the scores for each game, and resulting in score 0: very risk averse; 1: risk averse; 2: neutral; 3: risk loving; 4: very risk loving. Further, the scores will be standardized in the models, as we do in terms of personality traits and cognitive ability.

3.2.1.4. Construction of Time Preference Score

In constructing the time preference score, we utilize questions in IFLS-5 in the risk and time preference section, specifically in SI21 question. In this regard, respondents were asked to answer a series of questions concerning fictitious lottery money⁵. This study also follows the method of Sanjaya (2013), who constructs the time preference score using item SI21 in the IFLS-4 that are comparable with the similar question in the IFLS-5. Further, we calculate the scores from six alternative pathways resulting in values ranging from 1 (very patient); 2 (patient); 3 (slightly impatient); 4 (impatient); and 5 (very impatient)⁶. For example, in the first question a respondent was asked if he won a lottery, would he choose one million Rupiah today or two million Rupiah next year. If he chooses the first option, the respondent will be asked a follow-up question: whether he wants to win one million Rupiah today or three million Rupiah in one year ahead. If the respondent sticks to the first option, then he or she will be asked another question: whether to choose one million Rupiah today or six million Rupiah one year later. If he still chooses one million Rupiah at this time, then he will be given a score of 5: very impatient. Later, the scores will be standardized in the empirical models, as other psychological scores or indexes above.

3.2.1.5. Intra-Household Monthly Savings Decision-Making

In this subsection, we refer to the questions on household decision-making in the IFLS-5 in Book IIIA section PK. In this regard, we employ point M, with the question "Who makes money decisions concerning money for monthly savings in your household?" It is worth noting that in this study, we restrict the respondents to the head of the household and spouse or husband and wife, presuming that the respondents have relevant knowledge in answering the question. Furthermore, we investigate the responses of the primary respondent who answered the question concerning household savings in Book II section HR, and in this scenario, each household has one primary respondent. As a consequence, in this approach we assume that husband and wife agree on who decides the amount of monthly savings.

However, according to a study conducted by Johnston, Kassenboehmer and Shields (2016), only about 70% of couples in Australia agree on who is the decision maker on household finances, which include savings, investment, loans, and large expenses. The similar result also found in a study by Elder and Rudolph (2003) that reveal that only around 63.5% of

⁴ see Appendix 1

⁵ for the IFLS-5 detail questions see Strauss, Witoelar, and Sikoki (2016)

⁶ see Appendix 2

couples agree on who make the major decisions in American households. In light of this, we attempt not to ignore the potential of disagreements between husbands and wives about who makes the decision of monthly household savings. Thus, following Johnston, Kasenboehmer and Shields (2016), we consider utilizing husbands' and wives' responses and exploring whether there are differences in response on this issue, as well as incorporating their responses into our model to investigate the consistency of the role of psychological aspects on the type of household monthly savings decision making.

3.2.1.6. Household Savings

We obtain data on household savings from IFLS-5, notably the Book II section of HR, which questions about the types of household assets possessed by each household. In this context, we take the answer to the question in point G regarding whether the household has savings, and if so, what is the current total savings. This question is aimed for the respondent, who is either the head of the household or an adult aged 18 and above who can answer it. As a result, we have one response for each household. Furthermore, given that the answer to the savings question in IFLS-5 is "yes" or "no," and that when a respondent replies "yes," the next question is about the total amount of current savings, and consider the answer "no" as zero savings.

3.2.1.7. Socio-Economic and Demographic Variables

As in the IFLS-5 Questionnaire Book IIIA, the respondents in this survey are aged 15 and above, indicating that all respondents are adults of working age. Regarding income, we employ two types of income in this study: personal income and household income. Personal income is utilized to investigate the monthly savings decision-making type as well as the involvement of husband and wife in the decision-making process. Here, we follow the method from the IFLS information by RAND Corporation (N.D.) – who conduct the IFLS for calculating personal and household income, which states that an individual's personal income is the total of labor and non-labor income. Meanwhile, household income is the total income from household business farm, non-farm, non-business assets, and non labor income, added with personal-level data on labor and non-labor income.

In terms of education level in the demographic aspect, we utilize the question from the education (Section DL) about "the highest level of education attended" by individuals combined with the "highest grade completed at that school," resulting in the years of schooling variable. We also take gender into account when assessing the role of cognitive and non-cognitive aspects on monthly savings decision-making as well as household savings. In this way, we classify 0 as male (husband) and 1 as female (wife).

3.2.2. Descriptive Analysis

This study will provide descriptive analysis as the background narration about the characteristics of socio-economic and demographic aspects, and psychological characteristics as the independent variables being incorporated in the models. The descriptive analysis is also being utilized for investigating the decision-making model, and the decision maker(s) of the household's monthly saving. Moreover, the description of household savings also being incorporated in this part. However, the descriptive analysis may not be sufficient to examine the process of intra-household decision making, and the role of personality traits, and cognitive aspects on household financial decision-making and savings behavior. Given this, we employ the empirical models to address the research questions as explained in the following subsection.

3.2.3. Empirical Model

A. Involvement in Intra-Household Monthly Savings Decision Making

In this study, we first analyze the role of psychological factors that may influence of involvement of the household members in the monthly savings decision-making process. First, we restrict household members to husband and wife, based on the intuition that the two people are often directly involved in decision-making. Following that, we also aim to restrict the psychological aspects of the husband and wife as explanatory components in the model. The idea behind this is based on the premise that particular household members have more relevant information in household decision making. In addition to this, we also incorporate personal income, age, and education – represents with years of schooling, which may influence individuals' chances of participating in household decision-making processes. Equation 3.2 presents the model for the involvement of intra-household decision making, estimated with a Linear Probability Model:

$$\begin{aligned} inv_i = & \beta_0 + \beta_1 conscientiousness_i + \beta_2 extraversion_i + & \text{Eq. 3.2} \\ & \beta_3 agreeableness_i + \beta_4 neuroticism_i + \beta_5 openness_i + \beta_6 cognitive_i + \\ & \beta_7 riskpref_i + \beta_8 timepref_i + \rho_j SD_{ij} + u_i \end{aligned}$$

where:

inv_i	:	Involvement in monthly savings decision-making (0 = not involved, 1 = involved, either unitarily or jointly)
$conscientiousness_i$:	Personality traits – conscientiousness (standardized)
$extraversion_i$:	Personality traits – extraversion (standardized)
$agreeableness_i$:	Personality traits – agreeableness (standardized)
$neuroticism_i$:	Personality traits – neuroticism (standardized)
$openness_i$:	Personality traits – openness to experience (standardized)
$cognitive_i$:	Cognitive (numeracy) ability (standardized)
$riskpref_i$:	Risk preference (standardized)
$timepref_i$:	Time preference (standardized)
SD_{ij}	:	Vector of socio-economic and demographic of respondent (log of personal income, age, and years of schooling)
u_i	:	Error term

Regarding who takes the savings decisions in the household, the first approach takes into account the responses of the primary respondents who answer the questions concerning household savings, as described in subsection 3.2.1.6, where each household has one respondent. However, as we mentioned in subsection 3.2.1.5, we will also consider the possibility of the disagreement issue in our study. Therefore, in the second approach, we will utilize the responses from couples (husband and wife) to assess whether the findings are consistent. In light of this, equation 3.2 will be utilized in both approaches to investigate the involvement issue.

B. Intra-Household Monthly Savings Decision-Making

Following our investigation of the involvement of husband and wife in the monthly household savings decisions, here, we intend to investigate the monthly savings intra-household decision making model – whether unitary (wife as the sole decision maker, or husband as the sole decision maker), or collective. Given this, we apply 1 as wife as the sole decision maker,

2 as husband as the sole decision maker, and 3 as collective model. Further, we incorporate all of the psychological factors into the model, following the study by Johnston, Kas-senboehmer and Shields (2016). In addition, we also take into account the possibility of any disagreement about who is or are the monthly savings decision maker(s) in the household by considering the responses from couples (husband and wife). Given this, the model for the intra-household decision making is as Eq. 3.3, and in this scenario, further, we employ a Multinomial Logit regression for this model.

$$\begin{aligned}
 DM_i = & \alpha_0 + \alpha_1 \text{conscientiousness}_{\text{husband}_i} + & \text{Eq. 3.3} \\
 & \alpha_2 \text{conscientiousness}_{\text{wife}_i} + \alpha_3 \text{extraversion}_{\text{husband}_i} + \\
 & \alpha_4 \text{extraversion}_{\text{wife}_i} + \alpha_5 \text{agreeableness}_{\text{husband}_i} + \\
 & \alpha_6 \text{agreeableness}_{\text{wife}_i} + \alpha_7 \text{neuroticism}_{\text{husband}_i} + \\
 & \alpha_8 \text{neuroticism}_{\text{wife}_i} + \alpha_9 \text{openness}_{\text{husband}_i} + \alpha_{10} \text{openness}_{\text{wife}_i} + \\
 & \alpha_{11} \text{cognitive}_{\text{husband}_i} + \alpha_{12} \text{cognitive}_{\text{wife}_i} + \alpha_{13} \text{riskpref}_{\text{husband}_i} + \\
 & \alpha_{14} \text{riskpref}_{\text{wife}_i} + \alpha_{15} \text{timepref}_{\text{husband}_i} + \alpha_{16} \text{timepref}_{\text{wife}_i} + \\
 & \gamma_j SD_{ij} + v_i
 \end{aligned}$$

where:

DM_i	:	Household monthly savings decision-making types (1=wife as the sole decision maker, 2=husband as the sole decision maker, 3=collective)
$\text{conscientiousness}_{\text{husband}_i}$:	Husband's conscientiousness(standardized)
$\text{conscientiousness}_{\text{wife}_i}$:	Wife's conscientiousness (standardized)
$\text{extraversion}_{\text{husband}_i}$:	Husband's extraversion (standardized)
$\text{extraversion}_{\text{wife}_i}$:	Wife's extraversion (standardized)
$\text{agreeableness}_{\text{husband}_i}$:	Husband's agreeableness (standardized)
$\text{agreeableness}_{\text{wife}_i}$:	Wife's agreeableness (standardized)
$\text{neuroticism}_{\text{husband}_i}$:	Husband's neuroticism (standardized)
$\text{neuroticism}_{\text{wife}_i}$:	Wife's neuroticism (standardized)
$\text{openness}_{\text{husband}_i}$:	Husband's openness to experience (standardized)
$\text{openness}_{\text{wife}_i}$:	Wife's openness to experience (standardized)
$\text{cognitive}_{\text{husband}_i}$:	Husband's cognitive (numeracy) ability (standardized)
$\text{cognitive}_{\text{wife}_i}$:	Wife's cognitive (numeracy) ability (standardized)
$\text{riskpref}_{\text{husband}_i}$:	Husband's risk preference (standardized)
$\text{riskpref}_{\text{wife}_i}$:	Wife's risk preference (standardized)
$\text{timepref}_{\text{husband}_i}$:	Husband's time preference (standardized)
$\text{timepref}_{\text{wife}_i}$:	Wife's time preference (standardized)
SD_{ij}	:	Vector of socio-economic and demographic of husband and wife (log of personal income, age and years of schooling)
v_i	:	Error term

C. Household Savings

In this part, we present the empirical model of the role of psychological characteristics on household savings. Referring to Borghans *et al.*, (2008, p. 975), “*Many aspects of personality are a consequence of cognition, and cognition depends on personality. Nonetheless, one can separate these two aspects of human Differences*”, that implied that we can choose to examine the role of the two aspects jointly or separately, and in this study, we aim to analyze them jointly following the approach by Ballinger *et al.*, (2011). As explained in our research motivation and conceptual framework, our model incorporates the type of household decision-making, whether it is determined solely by the husband or the wife, or collectively in the model. As in the model of intra-household monthly savings decision-making, we consider disagreement regarding the decision maker(s) by utilizing the responses from couples (husband and wife). Having this in mind, the model for household savings is as equation 3.4, and further, we employ Ordinary Least Squares (OLS) for estimating the results.

$$\begin{aligned}
 S_i = & \theta_0 + \theta_1 \text{conscientiousness}_{\text{husband}_i} + \theta_2 \text{conscientiousness}_{\text{wife}_i} + & \text{Eq. 3.4} \\
 & \theta_3 \text{extraversion}_{\text{husband}_i} + \theta_4 \text{extraversion}_{\text{wife}_i} + \\
 & \theta_5 \text{agreeableness}_{\text{husband}_i} + \theta_6 \text{agreeableness}_{\text{wife}_i} + \\
 & \theta_7 \text{neuroticism}_{\text{husband}_i} + \theta_8 \text{neuroticism}_{\text{wife}_i} + \theta_9 \text{openness}_{\text{husband}_i} + \\
 & \theta_{10} \text{openness}_{\text{wife}_i} + \theta_{11} \text{cognitive}_{\text{husband}_i} + \theta_{12} \text{cognitive}_{\text{wife}_i} + \\
 & \theta_{13} \text{riskpref}_{\text{husband}_i} + \theta_{14} \text{riskpref}_{\text{wife}_i} + \theta_{15} \text{timepref}_{\text{husband}_i} + \\
 & \theta_{16} \text{timepref}_{\text{wife}_i} + \theta_{17} \text{household income}_i + \\
 & \theta_{18} \text{household income square}_i + \theta_{19} \text{location}_i + \theta_{20} \text{DM}_i + \tau_j \text{SD}_{ij} + w_i
 \end{aligned}$$

where:

S_i	:	Log of household savings
$\text{household income}_i$:	Log of household income
$\text{household income square}_i$:	Square of log of household income
location_i	:	Location of the household (0=rural, 1=urban)
DM_i	:	Household monthly savings decision-making types (1=wife as the sole decision maker, 2=husband as the sole decision maker, 3=collective)
w_i	:	Error term

3.2.4. Identification of The Possibility of Endogeneity Problems

Various previous studies considered personality traits are exogenous in terms of financial decision-making and savings (Donnelly, Iyer and Howell, 2012; Gambetti and Giusberti, 2019; Lubis, 2020; Gerhard, Gladstone, and Hoffmann, 2018). Nevertheless, we cannot neglect the possibility of an endogeneity problem caused by the reverse causality between personality and savings, where it is possible that when a person has a relatively large savings, or as one may say, the wealthier someone is, his personality may change. The similar scenario may happen with cognitive abilities, where in this study cognitive ability is expected to affect savings, but an individual with large savings may have a greater chance, albeit not immediately, for growing his cognitive ability. In addition, the possibility of endogeneity may arise due to the possibility of measurement errors, particularly with regard to income, as it is frequently the case in Indonesia that respondents are hesitant to disclose their actual income. Bearing this in mind, one needs to interpret the results with caution.

Chapter 4 Descriptive Statistics

4.1. Socio-Economic and Demographic Aspects

As illustrated in Table 4.1, the socioeconomic and demographic factors are further subdivided into household characteristics and individual characteristics. In terms of household characteristics, we have total 6,352 households with the average income in the preceding 12 months before the survey is 6.74 million Rupiah. However, we find that more than 50% of households have zero Rupiah of household income. In this regard, we suspect that many households did not declare their income at the time of the survey. As a result, we believe that the average household income may be higher than the reported. The data also shows that around 60% of the surveyed households reside in urban areas. Meanwhile, regarding the individual characteristics, we have total 7,630 respondents of husband and wife. The average monthly personal income of the husband is about 5.21 million Rupiah, which is significantly higher than the wife, which is approximately 2.38 million Rupiah (Table 4.1). Furthermore, the husband has an education level of 9.1 years, which is also higher than the wife's 8.9 years. In terms of age, the average husband is 42, while the average wife is 39.

Table 4.1. Socio-Economic and Demographic Aspects of Households and Individuals

Description	Obs	Mean	Std. dev.	Min	Max
A. Household Characteristic					
Household Income	6,352	6,739,066	34,800,000	0	1,080,000,000
Location (0: rural, 1: urban)	6,352	0.6014		0	1
B. Individual Characteristics					
Husband					
Personal Income	4,424	5,212,204	33,500,000	0	2,000,000,000
Education (Years of Schooling)	4,424	9.1603	4.3439	0	23
Age	4,424	41.7405	11.2206	18	87
Wife					
Personal Income	3,206	2,384,740	6,578,563	0	152,000,000
Education (Years of Schooling)	3,206	8.9046	4.5905	0	22
Age	3,206	38.9230	10.6004	17	81

Source: author's calculation

4.2. Psychological Characteristics

Based on the psychological elements measured in the preceding chapter, we have information on the personality traits, cognitive ability, risk preference, and time preference of husband and wife, as shown in Table 4.2. In terms of personality traits, there is evidence that husbands are more likely to score higher in conscientiousness, agreeableness, and openness than the wives, whilst the wives scores higher in extraversion and neuroticism as the statistical significance test indicated in Appendix 3. Meanwhile, the cognitive ability of wives is comparable to that of the husbands. Furthermore, husbands have greater risk preference scores than wives, indicating that women are more risk averse than men. This is in line with the findings of Stanton, Lienen, and Schultheiss (2011), who discover that people with high testosterone levels are more likely to take risks than people with low testosterone levels. In this situation, men's testosterone levels are higher than women's, making the conditions in

Indonesia reasonable. Last, the average time preference score of husbands is lower than that of the wives, indicating that they are relatively more patient than the wives.

Table 4.2. Psychological Characteristics

Description	Obs	Mean	Std. Dev	Min	Max
Husband					
A. Personality Traits					
Conscientiousness	4,424	3.9083	0.5138	1.6667	5
Extraversion	4,424	3.3996	0.6550	1.3333	5
Agreeableness	4,424	3.9381	0.5077	1.3333	5
Neuroticism	4,424	2.5248	0.6463	1	5
Openness	4,424	3.7970	0.6425	1	5
B. Cognitive Ability	4,424	4.2084	2.5325	0	10
C. Risk Preference	4,424	0.9564	1.1383	0	4
D. Time Preference	4,424	4.6693	0.8113	1	5
Wife					
A. Personality Traits					
Conscientiousness	3,206	3.8632	0.5347	1.6667	5
Extraversion	3,206	3.5602	0.6494	1.6667	5
Agreeableness	3,206	3.9146	0.5129	1	5
Neuroticism	3,206	2.7102	0.6607	1	5
Openness	3,206	3.6708	0.6814	1	5
B. Cognitive Ability	3,206	4.2770	2.6006	0	10
C. Risk Preference	3,206	0.7289	0.9729	0	4
D. Time Preference	3,206	4.6990	0.7323	1	5

Source: author's calculation, the indexes/scores are not standardized, and will be standardized in the models

4.3. Intra-Household Monthly Savings Decision-Making

This section aims to identify the household decision-maker(s) of monthly savings. First, as discussed in the methodology section, we utilize responses from one primary respondent per household to determine who makes monthly savings decisions. Second, we attempt to provide decision-maker-related data derived from all of the responses from couples for investigating the possibility of disagreements between them. Furthermore, we intend to investigate how the husband and wife are involved in making these decisions, along with the intra-household monthly savings decision-making types based on these two approaches.

4.3.1. Involvement in the Household Monthly Savings Decision-Making

Using the two approaches described above, we aim to evaluate the involvement of husband and wife in household monthly savings in Indonesia as presented in Table 4.3. Based on the first approach, approximately 61.95% of husbands participate in monthly savings decisions, either solely or jointly with their partners. Meanwhile, the wives are more involved in savings decisions, with the involvement rate of 82.14 percent. It is worth to note that the second approach suggests that the involvement of husbands in decision-making is approximately 64.43%, and the involvement of wives is approximately 84.90%, which are both higher than the first approach, and hence this situation may tell us that based on the perspective of husband and wife, they are more involved in the second approach than the first one, and the data also reveals that there is disagreement in/within couples about who makes the decisions for household savings.

Table 4.3. Involvement of Husband and Wife in the Monthly Savings Decision-Making

Involvement	Based on Responses from Primary Respondents		Based on Responses from Husband and Wife	
	Husband	Wife	Husband	Wife
Not involved	38.05%	17.66%	35.57%	15.10%
Involved	61.95%	82.34%	64.43%	84.90%
Total	100.00%	100.00%	100.00%	100.00%

Source: author's calculation, the first approach relies on information from 6,352 primary respondent responses. Meanwhile, in the second approach, we consider households with a complete husband and wife pair, therefore the numbers are based on responses from 4,127 couples.

4.3.2. Intra-Household Monthly Savings Decision-Making Types

In the first approach, we utilize responses from the primary respondent of the household, where each respondent represents one household (Table 4.4.). In this context, we have 6,352 households, and the data shows that around 55.71 percent of Indonesian households utilize the unitary model, while approximately 44.29 percent adapt the collective model. Moreover, in the unitary households, the wife being the sole decision maker in monthly savings, accounting for around 38.05% of the total household. In addition, it is worth noting that women or wives play a big role in determining these decisions; where more than 70% of couples indicate that decision making is unitary, the wife is the decision maker of their monthly savings, with the involvement of wife also higher than the husband.

Table 4.4. Household's Monthly Savings Decision Maker(s) Based on Responses from Primary Respondents

Decision-making Model /Decision maker(s)	Freq	Percent of total
Unitary	3,539	55.71%
Wife as the sole decision maker	2,417	38.05%
Husband as the sole decision Maker	1,122	17.66%
Collective	2,813	44.29%
Total	6,352	100.00%

Source: author's calculation

Meanwhile, when we consider husband and wife responses, we observe that not all couples agree on who makes household financial decisions as shown in Table 4.5. According to statistics, only around 52.36% of couples agree, which is lower than the findings of Johnston, Kassenboehmer and Shields (2016) that show a percentage of around 70% of Australian households, and Elder and Rudolph (2003) that discover a percentage of 63.5% American households. In this situation, it appears that there is a communication issue between husband and wife, which is reflected in one of them in the financial aspect. In fact, regardless of who ultimately has the power to make decisions in the household, good communication may become essential in the family. Another notable finding is when we take into account all the couples who agree in Table 4.5, about 49.01% of the households adopted the unitary type, while the remainder are collective. Apart from this, based on the second approach, we find that in the unitary household model, the share of the wife as the sole decision maker is more than that of the husband, which is comparable to the first approach.

Table 4.5. Household's Monthly Savings Decision Maker(s) Based on Responses from Couples

Decision Making Types		Husband Responses			
		Wife as the sole decision maker	Husband as the sole decision maker	Collective	Total
Wife Responses	Wife as the sole decision maker	19.97%	5.31%	14.30%	39.57%
	Husband as the sole decision maker	3.46%	5.69%	5.94%	15.10%
	Collective decision making	12.14%	6.49%	26.70%	45.34%
	Total	35.57%	17.49%	46.93%	100.00%

Source: author's calculation, in this scenario, we only include households with a complete husband and wife pair, as a result, the statistics in this scenario based on 4,127 couples.

4.5. Indonesian Household Savings

Based on the IFLS-5 data, we have 6,352 households, with an average of household savings at present of 7.03 million Rupiah as presented in Table 4.6, and around 58.7% of households do not have savings. Furthermore, we observe that savings in urban are higher than savings in rural regions, which is not unexpected. The average household savings in the urban area are around 9.29 million Rupiah, or more than two times the average in the rural area of 3.63 million Rupiah.

Table 4.6. Household Savings in Indonesia

Variable	Obs	Mean	Std. dev.	Min	Max
Total Household Savings	6,352	7,033,885	35,500,000	0	1,000,000,000
No Savings	3,731	0	0	0	0
more than zero savings up to Rp 1 million	798	529,390	337,153	7,000	1,000,000
more than Rp 1 million up to Rp 5 million	783	3,260,100	1,356,737	1,010,000	5,000,000
more than Rp 5 million up to Rp10 million	329	8,758,942	1,581,252	5,110,000	10,000,000
more than Rp 10 million up to Rp100 million	650	34,100,000	23,100,000	10,500,000	100,000,000
more than Rp 100 million	61	273,000,000	207,000,000	101,000,000	1,000,000,000
Urban area	3,820	9,287,189	43,100,000	0	1,000,000,000
Rural area	2,352	3,634,352	17,700,000	0	500,000,000

Source: author's calculation

Chapter 5 Results and Discussion

5.1. Involvement on Monthly Savings Decision-Making

In this part, we would like to investigate the role of psychological characteristics on the involvement of husband and wife in the household monthly savings decision-making process. In this case, despite that our primary method is the second approach, which utilizes responses from couples – husbands and wives, we are also interested in discovering how the psychological aspect influences involvement in decision-making from the perspective of the primary respondents in the first approach. By employing Equation 3.2 utilizing Linear Probability Model in Stata 17, we obtain the results shown in Table 5.1.

Table 5.1 shows notable findings about the differences in perspectives between the views of the primary respondents, with the views of each husband and wife towards themselves, regarding what factors can affect the participation of a husband or a wife in household monthly savings decision-making. In this instance, the results from the male respondents in the second approach show that husbands' conscientiousness is important to increase their involvement in the monthly savings decision-making process, whereas the results based on the responses from primary respondents demonstrate that the level of extraversion of husbands is the important one, with a higher level of extraversion (indicated by pleasure seeking entertainment and a preference to spend rather than save) will reduce opportunity of husbands to participate in monthly savings decision-making. However, based on the first and second approaches, the higher a man or husband's personal income and numeracy ability, the higher his level of involvement. Furthermore, it appears that the older the husband is, the less likely he is to participate in determining the monthly savings.

Following that, we notice that the results of the first and second approaches are consistent in terms of several factors that can increase involvement of wife in monthly family saving decisions, one of which is openness to experiences. In light of this, it is expected that wives will continue to be open to change, learn, and explore new activities in order to promote enhanced family well-being. Based on the two approaches, we also find that neuroticism or emotional instability reduces the chance of the wife participating in the financial decision making. This makes sense given that neuroticism, which is associated with excessive worry and emotional instability, may contribute to an individual's incapacity to make decisions.

It is worth noting that the first and second methods have different perspectives on several factors that can influence the wife's participation. One of them is personal income; it can be seen from the first approach that personal income has a positive effect on the wife's opportunity to become a decision maker in the household; however, there is insufficient evidence in the second approach that this factor is significant on wife's participation, despite the fact that the sign is also positive with a relatively similar size. In this case, we argue that women still need personal income to increase their bargaining power in the household, which is consistent with the studies from Bertocchi, Brunetti, and Toricelli (2012) in Italy, Johnston, Kassenboehmer and Shields (2016) in Australia, and Sultana (2011) in Bangladesh that demonstrate this is important for increasing women's authority in the household's financial and non-financial decision-making processes. The next factor is age, with the older the woman, according to regression findings from main respondents, having a better chance of participating. However, in the second approach, there is insufficient data to show that this component is significant, even though the sign remains positive.

Table 5.1. The Role of Psychological Characteristics on the Involvement in the Monthly Savings Decision-making Process

	First Approach - Only from Primary Respondent Responses		Second Approach - Responses from Husband and Wife in the Household	
	Husband	Wife	Husband	Wife
<i>Dependent Variable: Involvement in the Monthly Savings Decision-making Process</i>				
Conscientiousness	0.0119 (0.0088)	0.0095 (0.0073)	0.0243* (0.0147)	0.0106 (0.0090)
Extraversions	-0.0175** (0.0076)	-0.0015 (0.0069)	-0.0110 (0.0124)	0.001 (0.0083)
Agreeableness	0.0017 (0.0080)	0.0041 (0.0070)	0.0052 (0.0130)	-0.0015 (0.0083)
Neuroticism	0.0068 (0.0079)	-0.0123* (0.0069)	0.0169 (0.0127)	-0.0158* (0.0083)
Openness	0.0133 (0.0084)	0.0252*** (0.0070)	0.0013 (0.0137)	0.0239*** (0.0083)
Cognitive ability	0.0176* (0.0090)	0.0026 (0.0080)	0.0321** (0.0144)	0.0032 (0.0098)
Risk preference	0.0016 (0.0068)	-0.0041 (0.0071)	0.0141 (0.0108)	0.0013 (0.0088)
Time preference	0.004 (0.0078)	-0.0097 (0.0082)	-0.0156 (0.0131)	-0.0077 (0.0102)
Log of personal income	0.0047** (0.0019)	0.0022* (0.0012)	0.0071*** (0.0028)	0.0018 (0.0014)
Age	-0.0013* (0.0007)	0.0014** (0.0007)	-0.0024** (0.0011)	0.0005 (0.0009)
Year of schooling	0.0062*** (0.0019)	0.0007 (0.0017)	-0.0002 (0.0030)	0.0027 (0.0021)
Constant	0.5654*** (0.0446)	0.7855*** (0.0353)	0.6234*** (0.0709)	0.8136*** (0.0442)
N	4,323	2,580	1,700	1,700
R ²	0.0141	0.0156	0.0189	0.0165
Prob (F Statistic)	0.0000	0.0000	0.0007	0.0031

Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01, in the second approach, we employ responses from 4,127 households that have complete husband and wife pairings. However, due to incomplete responses from respondents in some questions, the results are obtained from 1,700 couples, or 1,700 husbands and 1,700 wives.

Based on the findings from the two approaches, we may infer that several personality traits and cognitive abilities influence household members' participation in financial decision-making, particularly conscientiousness, neuroticism, and extraversion, which is consistent with the findings of Donnelly, Iyer, and Howell (2012) that the three factors influence money management and financial decision-making ability. Apart from this, the results also suggest that openness to experience particularly in women may increase their participation in decision-making process. In this regard, increasing conscientiousness, such as understanding of the need of savings, along with openness to new experiences, may encourage higher wife involvement in household decision-making. The findings, on the other hand, show that neuroticism has a negative influence on the likelihood of a wife participating in the decision-making process. Based on these findings, wives are also encouraged to have better self-control in order to have more negotiating power in family decisions. In addition, the results also suggest that more extraversion has a negative influence on the probability of husband involvement.

In addition, we observe the significance of numeracy in promoting participation in household financial decision-making. Although there is insufficient evidence to conclude that this factor has a significant impact on increasing wife participation, the sign is positive and consistent between the first and second approaches. This finding is in line with the findings of studies by Johnston, Kassenboehmer, and Shields (2016) and Lubis (2020), which suggest the similar conclusion. Furthermore, personal income is an essential influence in husband-and-wife involvement in household decisions, which is consistent with the findings of Bertocchi, Brunetti, and Toricelli (2012) in Italy, Johnston, Kassenboehmer, and Shields (2016) in Australia, and Sultana (2011) in Bangladesh.

5.2. Intra-Household Decision Making Model on Monthly Savings

As in the conceptual framework, we evaluate three forms of decision making in this context: unitary – wife or husband as the sole decision maker, unitary – husband as the sole decision maker, and collective decision-making type. Further, based on the empirical model in Equation 3.3, we utilize Stata17 to run a model evaluating the role of psychological characteristics on the type of intra-household monthly savings decision-making types, as shown in Table 5.2. In this regard, we apply the collective decision-making as our base of estimation. As mentioned at the beginning of this section, we employ a second approach using each of the couples' responses to evaluate the consistency of the findings.

According to Table 5.2, based on husband responses, the more agreeable the husband, the less likely the husband is to become the sole decision maker and promote collective decision making. This finding makes logical sense given that people who value collaboration and harmony with others are more likely to be compromised and prepared to participate on household financial matters. Surprisingly, based on female reports, the results also show that the higher the degree of agreeableness of the husband, the less likely the wife is to become the sole decision maker. Even so, based on the responses of the husbands, we believe that increasing this trait will promote the formation of a joint decision. In this scenario, we argue that when the husband is more cooperative and willing to pay attention to his wife's opinion, the wife is more likely to listen to her husband's perspective, allowing decisions to be made collectively. Furthermore, based on responses from both husbands and wives, the results show that the higher the level of agreeableness of a wife, the lower the probability of the wife being the sole decision maker and encouraging household decisions to be more collective, in which this finding is relatively similar to the findings on the agreeableness of the husband.

Next, higher neuroticism of wife (or in other words a woman's level of emotional instability) increases the likelihood of her husband being the sole decision maker for household monthly savings decisions. This is understandable since when the neuroticism level of a wife is higher (and the wife tends to be anxious, worrying excessively, and possibly having poor self-control), the husband will respond more to become household financial decision makers. This is supported by the significant influence of the wife's neuroticism on decreasing the likelihood of the wife being the sole decision maker based on the findings from the husband's responses. On the other hand, we only have sufficient evidence to suggest that higher conscientiousness in husbands increases the possibility of a husband being the sole decision maker compared to collective, and also decreases the likelihood of collective decision based on wife responses. We contend that this is reasonable, given that when a husband is attentive, disciplined, and target-oriented, it is more likely that he become the decision maker.

Table 5.2. Psychological Characteristics and Intra-Household Monthly Savings Decision-Making Types

Description	Husband Responses			Wife Responses		
	Wife as the sole decision maker	Husband as the sole decision maker	Collective	Wife as the sole decision maker	Husband as the sole decision maker	Collective
Conscientiousness husband (std)	-0.0222 (0.0145)	0.0132 (0.0107)	0.0090 (0.0151)	0.0196 (0.0148)	0.0205** (0.0103)	-0.0400*** (0.0149)
Conscientiousness wife (std)	0.0049 (0.0132)	0.0048 (0.0097)	-0.0097 (0.0136)	-0.0079 (0.0133)	-0.0117 (0.0086)	0.0196 (0.0135)
Extraversions husband (std)	0.0105 (0.0122)	0.0061 (0.0089)	-0.0166 (0.0127)	0.0140 (0.0124)	0.0014 (0.0083)	-0.0154 (0.0126)
Extraversions wife (std)	0.0105 (0.0122)	-0.0129 (0.0088)	0.0024 (0.0126)	0.0309** (0.0122)	-0.0037 (0.0082)	-0.0272** (0.0124)
Agreeableness husband (std)	-0.0015 (0.0129)	-0.0268*** (0.0092)	0.0283** (0.0133)	-0.0235* (0.0130)	0.0034 (0.0089)	0.0200 (0.0133)
Agreeableness wife (std)	-0.0300** (0.0120)	-0.0013 (0.0088)	0.0314** (0.0125)	-0.0304** (0.0122)	0.0009 (0.0080)	0.0295** (0.0125)
Neuroticism husband (std)	-0.0149 (0.0126)	0.0090 (0.0092)	0.0058 (0.0130)	0.0156 (0.0127)	-0.0078 (0.0088)	-0.0078 (0.0129)
Neuroticism wife (std)	-0.0243** (0.0122)	0.0204** (0.0088)	0.0038 (0.0126)	-0.0050 (0.0123)	0.0159** (0.0082)	-0.0109 (0.0125)
Openness husband (std)	-0.0045 (0.0136)	0.0084 (0.0101)	-0.0040 (0.0141)	-0.0108 (0.0137)	-0.0103 (0.0091)	0.0211 (0.0140)
Openness wife (std)	0.0103 (0.0121)	-0.0003 (0.0089)	-0.0100 (0.0125)	0.0084 (0.0123)	-0.0221*** (0.0078)	0.0137 (0.0125)
Cognitive ability husband (std)	-0.0386*** (0.0144)	0.0012 (0.0104)	0.0374** (0.0148)	-0.0207 (0.0145)	0.0174* (0.0098)	0.0034 (0.0147)
Cognitive ability wife (std)	0.0068 (0.0144)	0.0071 (0.0105)	-0.0139 (0.0149)	0.0291 (0.0145)	-0.0073 (0.0100)	-0.0218 (0.0147)
Risk preference husband (std)	-0.0137 (0.0109)	0.0035 (0.0077)	0.0102 (0.0111)	-0.0118 (0.0109)	0.0107 (0.0071)	0.0011 (0.0110)
Risk preference wife (std)	-0.0110 (0.0130)	-0.0020 (0.0095)	0.0131 (0.0134)	-0.0123 (0.0131)	-0.0012 (0.0089)	0.0135 (0.0132)
Time preference husband (std)	0.0159 (0.0135)	-0.0104 (0.0087)	-0.0056 (0.0136)	-0.0133 (0.0131)	0.0115 (0.0100)	0.0018 (0.0136)
Time preference wife (std)	-0.0254* (0.0149)	0.0370** (0.0154)	-0.0116 (0.0161)	-0.0288* (0.0149)	0.0060 (0.0106)	0.0228 (0.0157)
Log of personal income husband	-0.0086*** (0.0027)	0.0060** (0.0025)	0.0025 (0.0029)	-0.0048* (0.0028)	0.0059** (0.0023)	-0.0011 (0.0029)
Log of personal income wife	0.0074*** (0.0021)	-0.0009 (0.0014)	-0.0064*** (0.0021)	0.0071*** (0.0021)	-0.0021* (0.0013)	-0.0049** (0.0021)
Age husband	0.0051** (0.0024)	0.0017 (0.0017)	-0.0068*** (0.0025)	0.0038 (0.0024)	-0.0009 (0.0016)	-0.0029 (0.0025)
Age wife	-0.0028 (0.0026)	-0.0007 (0.0019)	0.0034 (0.0027)	0.0022 (0.0026)	0.0003 (0.0018)	-0.0025 (0.0027)
Education husband	-0.0062 (0.0038)	0.0055* (0.0029)	0.0007 (0.0040)	-0.0048 (0.0039)	0.0039 (0.0027)	0.0009 (0.0040)
Education wife	0.0053 (0.0040)	-0.0075** (0.0030)	0.0022 (0.0042)	-0.0008 (0.0041)	-0.0077*** (0.0028)	0.0085** (0.0041)
N	1,700			1,700		
Probability > Chi square	0.0000			0.0000		

Source: author's calculation, the results are marginal effects from multinomial logit models with collective type as the base. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01. In this approach, we employ responses from 4,127 households that have complete husband and wife pairings. However, due to incomplete responses from respondents in some questions, the results are obtained from 1,700 couples, or 1,700 husbands and 1,700 wives.

Relatively similar with conscientiousness, we only have sufficient data based on female reports showing the higher extraversion level of a wife, the higher her probability of being the sole decision-maker and the lower the possibility of jointly making decisions. In fact, this is unexpected, since the more extroverted an individual is, the greater his or her tendency to interact with others, seeking for enjoyment, and consequently spend rather than save money. However, we also consider that this attribute is connected to assertiveness and the confidence to express ideas, therefore we believe that this factor increases the wife's capacity to have voices in household decisions. Furthermore, based on female responses, the results suggest that the higher the openness to experience of a wife, the less likely the husband will decide on his own rather than deciding jointly. This finding is relatively in line with the results in table 5.1 indicating the higher the level of women's openness to experience (which means the higher their curiosity and willingness to learn new things), the higher their chances to participate in decision-making.

Moving on to cognitive ability, the findings show that based on the female responses, higher cognitive ability of a husband increases his chances of becoming the primary decision maker in setting family savings. Meanwhile, according to the male responses, when a husband's numeracy ability is higher, the likelihood of the wife becoming the sole decision maker decreases, and the probability that a decision is made collectively by husband-and-wife increases. On the other hand, based on responses from husbands and wives, we do not have sufficient evidence to imply that wife's cognitive ability, as well as husband and wife's risk preferences, influence the type of household decision-making in determining monthly savings. Meanwhile, higher time preference of a wife (or in other words, the more impatient the wife is) decreases her chances of being the sole decision maker, and raises the probability of her husband becoming the primary household savings decision maker, which is reasonable.

In terms of socioeconomic and demographic factors, an increase in the husband's personal income decreases the likelihood of the wife determining monthly savings by herself, and hence increases the husband's likelihood of being the sole decision maker. This is understandable, as in the descriptive statistics, the proportion of women who is the sole decision maker on household savings is greater than the proportion of men who make the decision. As a result, when the husband's personal income rises, so does his negotiating power. An increase in the wife's income, on the other hand, improves her chances of being the primary decision maker while decreasing the possibility of joint decisions. In light of this, personal income not only encourages participation in saving decisions, but also empowers husband and wife to become the sole decision makers. As a result, income is still one of the most important elements influencing the bargaining power and authority of individuals in the household.

Based on husband reports, the results demonstrate that the older a husband, the more likely the wife is the main decision maker for monthly savings, and the less likely that the decisions are made jointly. This finding is also consistent with the findings in the preceding involvement section, which show that the older a husband, the more likely his wife participates in the decision-making process, which in this situation turns out to be the wife as the primary decision maker. Furthermore, according to husband reports, the higher the education of a husband, the greater the likelihood of him being the main decision maker. Meanwhile, based on the responses from wives, the greater the education of a wife, the less likely the husband will become the sole decision maker, and hence, decisions are decided jointly.

5.3. Household Savings

In this subsection, we examine how the psychological factors influence household savings. Furthermore, as discussed in the conceptual framework, we intend to investigate the influence of the types of household decision-making pertaining to monthly savings on the

volume of household savings. We continue to utilize the second approach, which is based on the responses of husbands and wives. Using the Ordinary Least Squares regression in Equation 3.4, we obtain the findings presented in Table 5.3. Based on the remarkably similar sign and magnitude of the coefficients from the husband's and wife's responses, we may conclude that the results are relatively consistent. Although there are a few variances in significance level, the coefficients are always of relatively similar magnitude.

Table 5.3. Psychological Characteristics and Household Savings

Description	Husband Responses		Wife Responses	
	Coeff.	Std. Error	Coeff.	Std. Error
<i>Dependent variable: Log of household savings</i>				
Conscientiousness husband (std)	0.1861	0.2193	0.1809	0.2198
Conscientiousness wife (std)	0.3038	0.1976	0.3261*	0.1978
Extraversions husband (std)	0.2447	0.184	0.2422	0.1841
Extraversions wife (std)	0.2851	0.1822	0.268	0.1825
Agreeableness husband (std)	0.0456	0.1945	0.0096	0.1942
Agreeableness wife (std)	-0.2265	0.1821	-0.2121	0.1821
Neuroticism husband (std)	-0.5533***	0.1888	-0.5257***	0.1889
Neuroticism wife (std)	0.1621	0.1834	0.1773	0.1833
Openness husband (std)	-0.3318	0.2041	-0.302	0.2043
Openness wife (std)	0.0883	0.1817	0.1174	0.1822
Cognitive ability husband (std)	0.4407**	0.2158	0.4369**	0.2157
Cognitive ability wife (std)	0.5373**	0.2159	0.5501**	0.2162
Risk preference husband (std)	0.1206	0.162	0.114	0.1621
Risk preference wife (std)	0.3967**	0.1943	0.4021**	0.1943
Time preference husband (std)	-0.3172	0.1963	-0.3509*	0.1964
Time preference wife (std)	0.0865	0.2244	0.1247	0.2242
Age husband	0.0171	0.0361	0.0173	0.0361
Age wife	0.0121	0.0388	0.0123	0.0388
Education husband (years of schooling)	0.1619***	0.0589	0.1654***	0.0589
Education wife (years of schooling)	0.1924***	0.0603	0.1925***	0.0604
Log of household income	-0.7137***	0.1938	-0.7452***	0.194
Log of household income square	0.0457***	0.0121	0.0475***	0.0121
Location (0: rural, 1: urban)	1.9281***	0.407	1.8895***	0.4058
Decision-making types				
1: Wife as sole decision maker	-0.4720	0.3851	0.1198	0.3802
2: Husband as sole decision maker	1.1995***	0.5284	1.5413***	0.5639
Constant	0.9870	1.0461	0.7449	1.0477
N	1,700		1,700	
Probability > F Stat	0.0000		0.0000	
R-squared	0.1270		0.1262	

Source: author's calculation, * p<0.10, ** p<0.05, *** p<0.01

In terms of personality traits, the findings show that the worse the husband's self-control (indicated by higher level of neuroticism), the lower the household savings. This finding is in line with studies by Nyhus and Webley (2001) and Ballinger et al. (2011), with the results indicate that husband's neuroticism has a negative influence on household savings, whereas, wife's conscientiousness will promote household savings. Meanwhile, we only have

sufficient evidence to say that wife's conscientiousness has a positive influence on household savings based on the female responses; yet, the sign is also positive but not significant when evaluated based on the responses from husbands. Given this, it is reasonable to conclude that the wife's knowledge and discipline to save encourages the willingness to save.

Moving towards cognitive ability, the findings demonstrate that numeracy ability of husband and wife is essential and has a positive influence on household savings, which is consistent with the preceding hypothesis. Meanwhile, based on responses from husband and wife, higher risk appetite of a wife will increase household savings. Despite this finding is contrary to our initial hypothesis and the finding from Muhamad, Kusairi and Zamri (2021), first, we argue that risk-taking women may prefer to save their money temporarily before investing it in different forms in the future. Second, risk-takers may also be more entrepreneurial and thereby have a higher earnings potential and ability to accumulate financial assets. Third, household data savings in IFLS-5 include stocks in addition to deposits, so the more risk-loving an individual will be incentivized to store the individual's assets in the form of stocks. Meanwhile, based on the wife responses, there is sufficient evidence to conclude that the husband's impatience correlates with a decrease in household savings.

Furthermore, in terms of the socioeconomic and demographic factors, education level of husband and wife appears to have a positive relationship with household savings as expected. It is worth noting that household income does not influence household saving in a linear way. Based on our estimates, the income effect on savings reaches a turning point around 2,500 Rupiah, which is essentially zero income. We assume that this is due to many households apparently refusing to disclose their household income information at the time of the survey. Given this situation, it is expected that people will borrow or dissave in order to maintain their consumption level; consequently, we argue that it makes sense for the income effect on savings to be initially negative. Moreover, given the magnitude of the turning point, we expect that a rise in income will be followed by a rise in savings.

Regarding the relationship between residential location and savings, the findings demonstrate that household savings in urban area are higher than in rural regions, as also indicated in the descriptive statistics. Last, we discover that decision-making types influence the amount of household savings. Quite interestingly, based on the responses of husband and wife, the results reveal that household savings are greater when the husband is the main decision maker compared to when decisions are made collectively. Moreover, according to husband, if the wife makes the decisions, household savings will be smaller. In contrast, based on the results from wives' responses, if the wife makes the decision, household savings will be higher. Both findings are not statistically significant, however, these findings emphasize the circumstances of disagreement in the household.

On the basis of the above discussion, we may conclude that conscientiousness, neuroticism, cognitive ability, and risk preference are the most influential psychological characteristics on the willingness to save and household savings. In addition, we observe that education and household income are also essential components. Keeping this in mind, we consider a number of implications and recommendations. The first aspect is the needs to improve conscientiousness of households regarding the necessity to have savings for at least three months, as indicated by Despard, Friedline, and Martin-West (2020). Second, we encourage households to have a vision and financial target to improve their welfare, with the expectation that they will be more willing to save for a rainy day, for maintaining consumption, as well as arrange savings to be allocated as investment, assets, or other financial instruments in the future. However, in terms of cognitive ability, we also realize that developing numeracy skills may become difficult for adults; nevertheless, in the short term, we believe that promoting health literacy, as advocated by Serper *et al.*, (2014), is important, while from a financial standpoint including training on how to conduct simple household financial planning and set

savings goals. Besides, increasing cognitive capacities from childhood is advised for the long term, one of which is improving the quality of relationships between children and their fathers and mothers in early childhood, as recommended by Peng *et al.*, (2021), as well as improving the level and quality of education.

To implement a number of the aforementioned recommendations, we suggest the following programs: first, we argue that financial education to improve the awareness as well as training of household financial planning through seminars and workshops provided by the Indonesian government and financial authorities in collaboration with the banking industry are one approach to achieve this purpose, which is in line with the suggestion by Despard, Friedline and Martin-West (2020). Particularly in terms of raising households' awareness of the importance of savings, we also highlight the need to consider effective forms of communication, and we agree with Lusardi (2008) that sharing stories and testimonials about the importance of savings could increase participants' understanding for those with limited literacy, as opposed to providing tables and data. In addition, financial education can be performed through public service advertisements on social media and other mass media such as radio and television. We also advocate beginning financial education at a young age, such as in high school, by incorporating a household financial education curriculum and offering training for teachers on this topic, as supported by Danes, Rodriguez, and Brewton (2013).

The following recommendation, particularly connected to neuroticism and self-control, is that households may need to practice better self-control in managing their household finances and saving a portion of their income with discipline. We argue this can be implemented by adapting the intervention from a study by Thaler and Benartzi (2004) who propose the "Save More Tomorrow" program. In this scheme, employees are expected to commit to saving at a particular rate commencing prior to pay check if they wish to participate. After receiving a pay check, the employees are encouraged to continue increasing their savings rate until it reaches the targets indicated by financial advisors. We believe that it would be worthwhile for the government and financial authorities collaborating with formal sector businesses to pilot a similar strategy. Meanwhile, for households working in the non-formal sector or owning their own businesses, we recommend an intervention in the form of social comparison by encouraging households to compare with their peers, that is supported by Raue, D'Ambrosio and Coughlin (2020). Although this strategy is relatively difficult to adopt in urban areas, we believe it can be implemented in rural areas through collaboration with community leaders and community groups. We also believe that the government's program to promote the average years of schooling should be continued. In addition, the data indicates that the average household savings in rural areas is significantly lower than in urban areas, indicating the importance of government and financial industry efforts to encourage the provision of banking services in rural regions, as well as increasing knowledge about safe and easy-to-access savings features offered by the banking industry.

Chapter 6 Conclusions

Many factors influence whether a household needs to save and how much savings are required. However, there is ample evidence in Indonesia that savings play an essential role in maintaining or improving household well-being. The Covid-19 pandemic is one example of the need of savings, as the pandemic caused disruption of economic activities that have not yet fully recovered. Meanwhile, prior study from Noerhidajati *et al.*, (2021) discovered that when faced with a financial shock caused by insufficient savings, Indonesian households' financial resilience is relatively low. Aside from the issue of financial resilience, savings remain essential in Indonesia for education expenses, asset purchases, and other necessities such as marriage or other social activities. Based on the aforementioned, this study aimed to investigate two groups of issues. The first is to investigate the overall effect of psychological factors particularly personality traits, cognitive ability, risk and time preferences on household savings. Moreover, the second purpose is to analyze the psychological factors on savings through intra-household financial decision-making. Further, this study is intended to fill the gap from earlier research, by focusing on how psychological factors may impact the willingness to save.

Based on IFLS-5 data, we discovered that more than fifty percent of Indonesian households do not have savings; therefore, it is reasonable that previous research demonstrates that the financial resilience of Indonesian households is relatively weak. Moreover, based on the estimation results, it can be concluded that psychological characteristics influence household savings, particularly conscientiousness, neuroticism, cognitive ability, risk preference, and time preference. Moreover, we also found that decision-making types influence household savings, as we discovered that when husbands play a significant role in monthly savings, household savings tend to be higher. In this regard, we have investigated further the indirect effect of psychological factors on household savings via channels of intra-household financial decision-making. The results indicate that conscientiousness, extraversion, neuroticism, and cognitive ability also play a role on the involvement in the savings decision-making process. In addition to these four characteristics, agreeableness and time preference also play a role in determining how the decision-making process is carried out, whether the husband or wife is the sole decision maker or whether the decision is made jointly. Consequently, it may be concluded that psychological factors are important to consider in the study of savings.

In view of the foregoing, this study has several policy implications. First, we advocated that it be necessary to educate husbands and wives on the need of having at least three months' worth of household savings, as well as an education regarding the safe and convenient savings features offered by the banking industry. Second, we observed the significance of numeracy ability on household ability to manage income and improve their savings performance. In this scenario, we recognize that it may be challenging for adults to develop numeracy skills. However, training on how to conduct simple household financial planning and set savings goals may help to address this issue. In developing household knowledge about savings and implementing financial training, we propose a variety of channels, including seminars and workshops on financial literacy for husbands and wives, as well as the implementation of a high school curriculum on household financial management along with training session for teachers. In the longer term, it is also recommended to increase cognitive capacities from childhood, including by improving the quality of relationships between young children and their parents.

Apart from the aforementioned, the results indicate that the average household savings in rural areas is significantly lower than in urban areas, or nearly one-third of the total value of household savings in urban regions, indicating the importance of financial education in rural areas, including government and financial industry efforts to encourage the provision of banking services in that area. In the meantime, although "the ability to save" is not the focus of our study, we also recognize the need of strengthening the financial capacity of households, particularly in rural regions, since the income aspect is also crucial for encouraging the ability to save. In this regard, we agree with the governments and universities' continuous efforts to promote rural home-based industries and micro, small, and medium-sized businesses.

Our study contains a number of limitations especially regarding data and method that need to be taken into account and may be relevant for further research. First, the IFLS-5 questionnaire on household savings includes stocks, which in this case may indicate that several psychological elements may play distinct roles between one financial instrument and another. In this scenario, we expect that the next wave of IFLS data may address this issue, allowing the next household finance research to be more diversified. Second, due to the fact that personality data is only available in IFLS-5, we are unable to look into the role of these traits on savings over a bigger data set and longer time period, including whether parental personality influences the willingness to save for their children in the future. Third, we consider the possibility of measurement error, particularly in relation to household income data, given that more than half of households do not have income or only report a small number of incomes that are essentially identical to zero. One of our assumptions is that respondents were reluctant to declare their actual income. Fourth, we also taken into account the possibility of endogeneity on this study, thus, one should take caution in interpreting the results and drawing causal interpretations regarding the impact of psychological factors on household savings. Last, our study focuses only on the factors that influence total household savings, whereas an inclusive increase in household savings requires consideration of households that do not or do not wish to have savings, as well as the factors that influence these households to have no savings in the financial industry, such as religion factors. In this regard, those issues may be investigated as further research to enrich the literature on household savings in Indonesia.

Appendices

Appendix 1. Alternative of Risk Preference Pathways and Scores

Alternative of Pathways	Score
Game 1	
SI01 (option 1) → SI02 (option 1) → SI11 (option 1)	0
SI01 (option 1) → SI02 (option 1) → SI11 (option 2)	0
SI01 (option 1) → SI02 (option 2) → SI03 (option 1) → SI04 (option 1) → SI011 (option 1)	0
SI01 (option 1) → SI02 (option 2) → SI03 (option 1) → SI04 (option 1) → SI011 (option 2)	0
SI01 (option 1) → SI02 (option 2) → SI03 (option 1) → SI04 (option 2) → SI011 (option 1)	1
SI01 (option 1) → SI02 (option 2) → SI03 (option 1) → SI04 (option 2) → SI011 (option 2)	1
SI01 (option 1) → SI02 (option 2) → SI03 (option 2) → SI05 (option 1) → SI011 (option 1)	1
SI01 (option 1) → SI02 (option 2) → SI03 (option 2) → SI05 (option 1) → SI011 (option 2)	1
SI01 (option 1) → SI02 (option 2) → SI03 (option 2) → SI05 (option 2) → SI011 (option 1)	2
SI01 (option 1) → SI02 (option 2) → SI03 (option 2) → SI05 (option 2) → SI011 (option 2)	2
SI01 (option 2) → SI03 (option 1) → SI04 (option 1) → SI11 (option 1)	0
SI01 (option 2) → SI03 (option 1) → SI04 (option 1) → SI11 (option 2)	0
SI01 (option 2) → SI03 (option 1) → SI04 (option 2) → SI11 (option 1)	1
SI01 (option 2) → SI03 (option 1) → SI04 (option 2) → SI11 (option 2)	1
SI01 (option 2) → SI03 (option 2) → SI05 (option 1) → SI11 (option 1)	1
SI01 (option 2) → SI03 (option 2) → SI05 (option 1) → SI11 (option 2)	1
SI01 (option 2) → SI03 (option 2) → SI05 (option 2) → SI11 (option 1)	2
SI01 (option 2) → SI03 (option 2) → SI05 (option 2) → SI11 (option 2)	2
Game 2	
SI11 (option 1) → SI13 (option 1) → SI14 (option 1)	0
SI11 (option 1) → SI13 (option 1) → SI14 (option 2)	1
SI11 (option 1) → SI13 (option 2) → SI15 (option 1)	1
SI11 (option 1) → SI13 (option 2) → SI15 (option 2)	2
SI11 (option 2) → SI12 (option 1)	0
SI11 (option 2) → SI12 (option 2) → SI13 (option 1) → SI14 (option 1)	0
SI11 (option 2) → SI12 (option 2) → SI13 (option 1) → SI14 (option 2)	1
SI11 (option 2) → SI12 (option 2) → SI13 (option 2) → SI15 (option 1)	1
SI11 (option 2) → SI12 (option 2) → SI13 (option 2) → SI15 (option 2)	2

Source: author's adaptation from Sanjaya (2013)

Appendix 2. Alternative of Time Preference Pathways and Scores

Alternative of pathways	Score
SI21A (option 1) → SI21B (option 1) → SI21C (option 1)	5: Very impatient
SI21A (option 1) → SI21B (option 1) → SI21C (option 2)	4: Impatient
SI21A (option 1) → SI21B (option 1) → SI21D (option 1)	3: Somewhat impatient
SI21A (option 1) → SI21B (option 1) → SI21D (option 2)	2: Patient
SI21A (option 2) → SI21E (1)	1: Very patient
SI21A (option 2) → SI21E (option 2) → SI21B (option 1) → SI21C (option 1)	5: Very impatient

Source: author's adaptation from Sanjaya (2013)

Appendix 3. The Mean Difference of Individual Characteristics of Husband and Wife

Variable	Husband	Wife	Ha: The difference is not equal to zero
A. Socio-Economic & Demographic			
Personal income	5,212,204	2,384,740	2,827,464***
Years of schooling	9.1603	8.9046	0.2557**
Age	41.7405	38.9230	2.8175***
B. Personality Traits			
Conscientiousness	3.9083	3.8631	0.0451***
Extraversions	3.3996	3.5602	-0.1606***
Agreeableness	3.9381	3.9146	0.02350**
Neuroticism	2.5248	2.7102	-0.1854***
Openness to Experience	3.7970	3.6708	0.1262***
C. Cognitive Ability	4.2084	4.2770	-0.0686
D. Risk Preference	0.9563	0.7289	.2274***
E. Time Preference	4.6693	4.6990	-0.0297*

Source: author's estimation, * p<.01, ** p<.05, *** p<.001

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