SOCIAL UNCERTAINTY

Personality and Trust

Master Thesis

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ABSTRACT

This thesis studied about whether people with differences in personality react differently to social uncertainty. Two domains of Big Five personality traits are examined: extraversion and neuroticism. 102 anonymous participants filled in online questionnaires which randomly assigned 51 participants to a hypothetical extravert partner in trust game while another 51 participants faced a hypothetical introvert partner. The result shows that trustor's extraversion level does not affect ambiguity aversion, perception of others' trustworthiness as well as the intensity of trust. On the other hand, neuroticism is found to have positive effect on perception of others' trustworthiness, but no significant effect is found on ambiguity aversion and intensity of trust. However, trustee's extraversion level is found to significantly affect trustor's perception of others' trustworthiness as well as the intensity of trust given by trustor.

CHAPTER 1

INTRODUCTION

"Man is by nature a social animal" is what Aristotle once said. Social interaction is inseparable from humans' daily life in which it is a biologically determined process and a means of survival (Dunbar, 1992; Holt-Lunstad, Smith, and Layton, 2010). However, social interaction often involves uncertainty. There is often a possibility to be exploited during social interaction which makes a chance of suffering loss is most likely to be noticeable (Yamagishi, Cook, and Watabe, 1998). In this case, trust plays an important role. Trust decisions are often made without knowing the probabilities of others being trustworthy, hence one's "expectation of intentions" (Yamagishi, 2011, p.25) acts significantly in shaping trust.

On the other hand, Ellsberg (1961) finds that when facing two prospects with known probability and unknown probability human tends to naturally choosing the one with known probability. This implies that human are often averse to uncertain situations. However, in uncertain situations, the level of aversion depends on decision makers' perceived information or understanding over the event (Frisch and Baron, 1988; Heath and Tversky, 1991). In the context of social interaction, trust is determined by the evaluation of counterpart's trustworthiness. Furthermore, distinctive characteristics of people generate unique evaluation process which lead to different decision to trust (Yamagishi, 2011).

Personality is described as one of individual differences. This means differences in human personality affect their perception of others and consequently affect how they interact. Personality commonly divided into five big categories called "The Big Five" which consists of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (e.g., Fiske, 1949; Tupes and Christal, 1961; Norman, 1963; Borgatta, 1964). Among these dimensions, extraversion is related to propensity to feel positive emotions (Costa and McCrae, 1992) and sociability (DeYoung and Gray, 2009; Weisberg, DeYoung, and Hirsh, 2011), which is considered as one of the strongest factors in determining the intensity of human interactions (Wiggins and Pincus, 1989). Extraverts are people who are assertive, active, energetic, enthusiastic, outgoing, talkative, and excitement seeking (McCrae, Costa, and Busch, 1986; John, 1989; Costa, McCrae, and Dye, 1991) whereas the opposite of it are called introverts (McCrae and John, 1992) who tend to withdraw from social interaction

(Freyd, 1924). Another important big five personality that may be related to how people handle uncertainty is neuroticism. Neuroticism is related with emotional reaction (Goldberg, 1993), stability (Denissen and Penke, 2008), and often associated with anxiety (Weisberg, DeYoung, and Hirsh, 2011). Neuroticism is often understood as the representation of threat-punishment sensitivity while extraversion is the representation of rewards sensitivity (Depue and Collins, 1999; Clark and Watson, 2008). Hirsch and Inzlicht (2008) shows that people with high level neuroticism are more averse to uncertainty compared to people with low level neuroticism. As the assessment of whether a person is trustworthy or not, personality is expected to play a role in this by affecting the perceptual process. Based on this assumption, the following research question is formulated:

"Do people with different personalities have different attitude towards social uncertainty?"

This study will be structured in a way to answer the research question. The next chapter of this study is literature review which will provide theoretical basis of this study. The theoretical basis consists of important findings and constructed in a way to develop hypotheses of this study. Afterwards, the third chapter will serve as a part to explain methodology of this study. In this chapter experimental design of this study is explored and a brief explanation on the statistical model of this study is presented. Chapter four will cover the detailed analysis of this study and chapter five consists of conclusion, limitation, and recommendation of this study.

CHAPTER 2

LITERATURE REVIEW

2.1 Uncertainty

Uncertainty has been studied for quite a long time. The most notable pioneer in this study is Frank Knight. Knight (1921) defines uncertainty based on its probability measurement. The one that has measurable probability is called *measurable uncertainty* or *risk*. The other one has unmeasurable probability and called *unmeasurable uncertainty*. Knight (1921) asserts that risk is much different than unmeasurable uncertainty which leads him to classify uncertainty strictly to unmeasurable one. When decision maker encounters uncertainty, decision has to be made before uncertainty is resolved. In this situation, rather than relying on unknown objective probability, decision maker relies on subjective probability (Kahneman and Tversky, 1982).

One famous study about uncertainty is written by Daniel Ellsberg which is known as Ellsberg Paradox. Ellsberg (1961), inspired by Frank Knight's distinction between risk and uncertainty, proposed a thought experiment to measure the impact of risk and uncertainty on individual decision making. In the experiment, there are two urns filled with both red and black balls. The decision makers are informed that they will get a prize ($100) if they draw a ball with the right color and they have to choose from which urn they will bet on in four following choices: (1) Draw red ball from first urn or black ball from first urn, (2) Draw red ball from second urn or black ball from second urn, (3) Draw red ball from first urn or red ball from second urn, (4) Draw black ball from first urn or black ball from second urn. Additionally following information are given: (1) First urn has both red and black balls but there is no further statement about the ratio, and (2) Second urn has 50% chance for them to draw a red ball and 50% chance to draw a black ball. The result from this experiment is decision makers are indifferent whether to bet on red or black ball in each urn, but they prefer to bet on the second urn compared to the first. This thought experiment challenges Knight's view of risk, uncertainty, and probability measurement. This also gives an implication to Subjective Expected Utility by Savage (1954, 1972) that two urns provides a possibility of winning and therefore should be treated equally. However, people subjectively attach more weight to the known probability and prefer known risk than uncertain one. Ellsberg (1961) comes with the term *ambiguity* to refer to unmeasurable uncertainty. Hence, this study will apply the term ambiguity as unmeasurable uncertainty and use them interchangeably.

The attachment of probability relies on decision maker confidence on information related to the events (Ellsberg, 1961). Keynes (1921) argues that probability is subjective in the sense that it depends on decision maker's perceived knowledge. Perceived knowledge here is emphasized to imply that (1) existing knowledge in reality is being evaluated and interpreted in the mind of decision maker and executed in his/her subjective manner, and (2) this subjective manner is not purely subjective but an interaction between what the knowledge as it is and how he/she personally think this knowledge can be used to measure the outcome of ambiguity (Lawson, 1988). Ambiguity happened because the lack of information makes probability of such event far from precise to be used as an outcome measurement (Epstein,1999) and more importantly this missing information is perceived as a relevant tool in determining the outcome (Frisch and Baron, 1988). Subsequently it becomes one of the reasons why people subjectively attach more weight to the known probability compared to the ambiguous one. This leads to the most important finding of Ellsberg (1961) that people are averse when they encounter ambiguous situation or, most common term, *ambiguity aversion*.

This finding triggers deeper studies on the nature of ambiguity aversion, whether it is inseparable from ambiguity or not and what factors are behind it. Fox and Tversky (1995) argue that ambiguity aversion is gone when there is no comparative setting and decision maker evaluates risky and ambiguous prospect separately. They conduct an experiment to investigate deeper into Ellsberg Paradox. They conduct similar Ellsberg experiment with three treatment groups: (1) Noncomparative clear, (2) Noncomparative vague, and (3) Comparative. Each group has a task to bet on a bag of poker chips and will win $100 prize if their selected color are drawn. Each person has to state their willingness to pay for the ticket to win the prize. Different from Ellsberg experiment, each group has different tasks. Noncomparative clear has to evaluate their willingness to pay for a bet whether a black chip or red chip will be drawn from a bag that contain 50 red chips and 50 black chips. Noncomparative vague has to evaluate their willingness to pay for a bet whether a black chip or red chip will be drawn from a bag that contain red chips and black chips with unknown ratio. Comparative group has to evaluate their willingness to pay for both bags. The result shows that in average there is a far gap between the willingness to pay for both bags of comparative group ($24.34 for clear bag and $14.85 for vague bag) compared to willingness to pay for noncomparative clear ($17.94) and noncomparative vague ($18.42). However, they

further assert that discrepancy between comparative and noncomparative setting is assessed in the mind of decision maker.

Chow and Sarin (2001) further investigate the matter by conducting a series of studies similar to the experiments that Fox and Tversky (1995) did. The result of the studies show that ambiguity aversion is not completely gone and in both comparative and noncomparative setting clear bet is priced higher than vague bet. They further argue that the larger discrepancy in comparative setting than in noncomparative setting is due to information salience. In comparative setting the information of clear bet is more salient than vague bet. Additionally the distinction in comparative setting is clearer than in noncomparative setting thus makes both act as reference point to evaluate each other.

Previous studies suggest that people are averse to ambiguity and prefer a situation where they are more informed than where they are not. On the other hand, the existence of ambiguity and ambiguity aversion could not be separated. Ambiguity aversion could not be dismissed completely, but possible to reduce. This implies there are various situation where people's attitude to ambiguity vary depending on the salience of perceived information.

2.2 Trust

In reality, majority of decisions made by human are under unmeasurable uncertainty condition (Williams and Balláž, 2015). Especially in social context, as human cannot live completely without other individuals, interaction between individuals is unavoidable. When knowledge about another individual is essential to predict his/her intention and when that knowledge is lacking, this situation is categorized as social uncertainty (Yamagishi, 2011) in which uncertainty in this context means unmeasurable uncertainty or ambiguity.

Akerlof (1970) in his paper illustrate uncertainty and quality in a description of market for automobiles. In his paper, secondhand car market is categorized as unmeasurable uncertainty. Buyer knows for sure that there are some good cars and lemons (term for bad cars). But in this situation, the lack of information made his/her calculated probability getting lemons imprecise. Aware of this situation, buyer will include this knowledge into the bargaining process because from his/her perspective even though the probability cannot be justified precisely there is a probability of getting a bad car. From the seller perspective, the proposed price from buyer will generate a high profit if he/she sold a bad car but low or no profit if he/she sold a good car. Considering that buyer will bargain with potential bad car in mind, seller has to sell a 'good-looking' car with unseen problems to maximize profit.

Subsequently, this will result in a higher probability of getting bad car and cause buyer to lower their bargaining even more. As this cycle turns into an endless loop, then three things will happen: (1) Secondhand automobiles market is crowded with bad cars, (2) It will be hard for buyers to get a good car, and (3) It will be hard for sellers to find buyers. From this description, Akerlof (1970) emphasizes that trust has an important role in this process. Yamagishi (2011) claims that 'market for lemons' depiction is not only happening in business context, it indicates how social interaction looks like. Ambiguous situation happened as buyer lacks of information on seller's intention and vice versa. Additionally, information about their counterparts' intention is perceived as important in order to make a better decision. Yamagishi (2011) explains that trust and social uncertainty are like two sides of a coin where one cannot act significantly without the presence of the other and trust acts as significant determinant to decide the outcome of social uncertainty. Hence, as social uncertainty is the ambiguous situation, decision to trust represents people attitude towards social uncertainty.

Lewicki and Wiethoff (2000) define *trust* as "an individual's belief in, and willingness to act on the basis of, the words, actions, and decisions of another" (p. 87). Deutsch (1962) defines trusting as an act of willingness to put one's faith in another whose behavior is not under one's control in which the losses one feels if another deviates will be greater than the gains one feels if another does not deviate. Deciding to trust means that the decision maker takes the risk of being betrayed which will otherwise not happen. Based on this, to trust another individual means to expect that individual not to act selfishly which will lead to losses experienced by decision maker. This expectation is formed before decision made and derived from the counterpart observed behaviour (Yamagishi, 2011).

Trust based on the expectation of another individual's behaviour is different from the situation where expectation of the outcome is determined by natural order (Yamagishi, 2011). Bohnet, et al. (2008) investigate how willing individuals are to take risk in a socially uncertain condition. They use three experiment settings (trust game, risky dictator game, and decision problem) to measure subjects betrayal, risk, and social preferences. In each setting subjects are asked their minimum acceptable probabilities (MAP) which make them willing to choose risky prospect over the certain one. The result shows that MAPs from trust game (where the payoff is determined by another individual trustworthiness) are significantly higher than MAPs from risky dictator game (where the payoff is determined by nature). This

result indicates the state of 'betrayal aversion' where people are less willing to take a risk when the outcome is determined by another individual.

Fetchenhauer and Dunning (2012) also study the difference of willingness to take risk in financial and social settings. Lottery method is used in financial setting while trust game is used in social setting. In both settings, two situations are given: (1) When probability is high (80%), and (2) when probability is low (46%). In trust game, subjects have to choose whether to keep $5 for sure or entrust it to a trustee with the said probability (80% and 46%) to have $10 in the end. In lottery setting, there is an urn filled with red balls and white balls which subjects have an opportunity to bet their $5. If white ball is drawn, subjects can get $10. The two lottery situations had 80% and 46% white balls, respectively. From these experiments, in 80% level the majority of subjects in both experiments were choosing risky options (77.5% for lottery setting and 70% for trust game). In 46% level there is a significant gap between two settings with 28.6% in lottery setting choose risky option and 54.3% in trust game choose risky option. This study has quite different result from previous study by Bohnet et al. (2008). They argue that the difference may be resulted from their differences in methods. Fetchenhauer and Dunning (2012) directly place subjects into the trust game and give them a choice whether to trust another person or not whereas in Bohnet et al. (2008) prior to the experiment subjects are given several hypothetical questions to indicate their trust with different hypothetical chance to get the payoff while at the same time wondering who their possible partners will be. This difference indicate several conclusions: (1) In Bohnet et al. (2008) study betrayal aversion indicates they are less willing to be put in a situation where another individual determine their outcome, (2) They are more averse in declaring their distrust once put in that situation but does not necessarily mean they are more willing to be put in a situation where another person determine the outcome, and (3) Fetchenhauer and Dunning (2012) suggest differences in the structure of situation may affect how trust is expressed and how decision is made thus implies the dynamic of social uncertainty and its actors may drive the decision to trust or not to trust.

Eckel and Wilson (2004) and Houser, Schunk, and Winter (2010) investigate the relationship between risk preference and trusting behavior. They find that there is no significant relationship between risk attitude and trusting behavior. Houser, Schunk, and Winter (2010) argue that there is an essential distinction between evaluating possible outcomes determined by financial and social factors. They further argue that betrayal aversion is possibly one of many other unexplored factors behind this evaluation process.

Eckel and Wilson (2004) state in deciding whether to trust the opponent or not, individual relies on perceived information about the opponent. Sapienza, et al. (2013) claim that in trust game, as a tool to measure trust, belief is correlated with the behaviour of trustor. These previous studies imply that observed behaviour and systematic information processing in the mind of decision maker affect the decision to trust or not. Trust development is caused by three factors: (1) Rules and norms of society, (2) experiences, and (3) personality as systematic perspective (Lewicki and Wiethoff, 2000), in which personality will be reviewed deeper in the following section.

2.3 Personality

Personality is defined as "the dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations, and behaviors in various situations" (Ryckman, 2013, p. 4). Pervin, Cervone, and John (2005) refer personality as individual characteristics which act as underlying reasons behind consistent system of feeling, thinking, and behaving. Both definitions emphasize that personal attributes influence evaluation process in every decision individual made in the course of his or her life.

Leung and Bond (2001) investigate the relationship between personality and interpersonal communication. The experiment lasts for three months with the indicator of personality and communication styles are taken in a form of self-perception in the beginning of experiment and in a form of others' perception in the end of experiment. The result shows that personality foretell communication styles strongly in both self and other's perception. This result implies personality affect how oneself conduct interpersonal interactions with others. On the other hand, personality also affect the way individual process information from their social environment (Baumert and Schmitt, 2012) which makes personality affect individuals' behavioural action and reaction.

Personality is generally divided into five groups: neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience (Fiske, 1949; Tupes and Christal, 1961; Norman, 1963; Borgatta, 1964). Goldberg (1990) measures the generalizability of these "Big Five" factors. He measures whether these factors generalizable to 1,431 trait adjectives (first study) and to 479 generally used trait adjectives in self-description report (second study). The result shows that practically most English terms to describe individual traits are covered in the Big Five which indicates the robustness of Big Five model.

Among these five dimensions of Big Five, extraversion is related to the ability in social interaction (DeYoung and Gray, 2009; Weisberg, DeYoung, and Hirsh, 2011). Extraverts and introverts have different view in their social interaction (Jung, 1923). Referring to their characteristics, extraverts are described as people that social, talkative, and outgoing (Goldberg, 1990). The opposite of extraverts called introverts (Costa and McCrae, 1992) which described as people that unsocial, untalkative, and shy (Goldberg, 1990).

One reason for extraverts sociability is the likelihood to feel positive emotions (Costa and McCrae, 1992; Whelan and Zelenski, 2012) in which positive emotions promote sociability (Whelan and Zelenski, 2012). Extraverts tend to have higher accessibility to pleasant information compared to introverts (Rusting and Larsen, 1998; Borkenau and Mauer, 2007) which cause positivity to be more salient in their cognitive information processing. The state of individual's emotions is subsequently affect trust in a way that positive emotions (e.g., happiness, gratitude) increase trusting behaviour (Dunn and Schweitzer, 2005). This implies, through their cognitive information processing and the likelihood to feel positive emotions, extraverts tend to be less averse in social uncertainty and more trusting to others while introverts tend to be more averse in social uncertainty and less trusting to others.

Hypothesis 1a: Introverts are more averse to social uncertainty than extraverts.

Hypothesis 1b: Introverts are more pessimistic about others' trustworthiness than extraverts.

Hypothesis 1c: Introverts send less money to partners in the trust game than extraverts.

Brown and Hendrick (1971) study about subjective perceptions of introverts and extraverts. Using three studies they measure introverts and extraverts real and ideal perception of themselves, introverts perception of extraverts, and extraverts perception of introverts. The result shows that extraverts ideal perception of themselves to be extraverted while introvert ideal perception of themselves are also extraverted. They suggest this result is related to interpersonal perception with one possible reason is lower perceptual visibility of introverts where there is a possible discrepancy between their actual and desired self. Another possible reason is introverts tend to be attracted to extraverts more than fellow introverts (Hendrick and Brown, 1971). Considering that situational structure of social uncertainty may affect decision to trust, when introverts are paired with extraverts, the salience of positive information (feeling attracted) may affect how decision to trust is made. In this case, when

the opponent of introverts are extraverts they are predicted to be less averse and more trusting than when the opponents are introverts.

Hypothesis 2a: When the opponents of introverts are extraverts, they will be less averse than when the opponents are fellow introverts.

Hypothesis 2b: When the opponents of introverts are extraverts, they will be more optimistic than when the opponents are fellow introverts.

Hypothesis 2c: When the opponents of introverts are extraverts, they will send more money to partners than when the opponents are fellow introverts.

Another important personality dimension to consider when individuals put in social uncertainty is neuroticism. Neuroticism is related with the likelihood to feel negative emotion, sensitivity to threat and punishment (Weisberg, DeYoung, and Hirsh, 2011) and closely related with anxiety (Eysenck, 1967, 1987, 1992). Individuals with high score of neuroticism are described as people who are unstable, unconfident, fearful, and timid, whereas individuals with low score of neuroticism are described as people that stable, confident, worriless, and calm (Goldberg, 1990).

Hirsh and Inzlicht (2008) investigate relationship between the level of neuroticism and response under uncertainty. Time-estimation task is used to measure participants' responses to their performances' feedback. The result shows that people with high level neuroticism react more intensely to uncertain feedback compared to negative feedback. On the other hand, people with low level of neuroticism react more intensely when they are exposed to negative feedback compared to uncertain feedback. Based on the authors' argument, this difference implies that people with higher level of neuroticism respond to uncertainty more intensely and find it uncomfortable to be in that situation. Furthermore, in relation to information accessibility, people with high level of neuroticism have higher accessibility to negative information (Rusting and Larsen, 1998) and have higher reactivity towards negative emotionality (Larsen and Ketelaar, 1991). The states of individual's emotions affect trust in a way that negative emotions decrease trust (Dunn and Schweitzer, 2005). This implies people with high level of neuroticism tend to be less trusting to other individuals compared to people with low level of neuroticism. Considering their aversion to ambiguity and their tendency to be less trusting, the following sub-hypotheses are formulated.

H3a: People with high level of neuroticism are more averse to social uncertainty than people with low level of neuroticism

H3b: People with high level of neuroticism are more pessimistic about others' trustworthiness than people with low level of neuroticism.

H3c: People with high level of neuroticism send less money to partners in the trust game than people with low level of neuroticism.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Previous chapter serves as the foundation of hypothesis development for this study. From the literature review, a total of nine sub-hypotheses are tested:

H1a: Introverts are more averse to social uncertainty than extraverts.

H1b: Introverts are more pessimistic about others' trustworthiness than extraverts.

H1c: Introverts send less money to partners in the trust game than extraverts.

H2a: When the opponents of introverts are extraverts, they will be less averse than when the opponents are fellow introverts.

H2b: When the opponents of introverts are extraverts, they will be more optimistic than when the opponents are fellow introverts.

H2c: When the opponents of introverts are extraverts, they will send more money to partners than when the opponents are fellow introverts.

H3a: People with high level of neuroticism are more averse to social uncertainty than people with low level of neuroticism.

H3b: People with high level of neuroticism are more pessimistic about others' trustworthiness than people with low level of neuroticism.

H3c: People with high level of neuroticism send less money to partners in the trust game than people with low level of neuroticism.

These hypotheses are tested in order to know whether differences in personality affect people attitudes toward social uncertainty. As previously stated in the literature review, trust is acting as significant role in the context of social uncertainty.

3.2 Experimental Design

This study utilized both within and between-subjects experimental design. Data were gathered by distributing online questionnaires. One advantage of questionnaire is its ability to gather fact-based data (Matthews and Ross, 2010). Besides, online platform enables a cost-efficient and geographically limitless way to gather data (Matthews and Ross, 2010),

allowing this study to collect authentic data from larger sample size. The online platform used in this study is Qualtrics. There are 2 kinds of questionnaires: (1) consists of trust game without personality information and trust game with information that the trustee is extravert, and (2) consists of trust game without personality information and trust game with information that the trustee is introvert. These questions were randomly asked by the system.

The questionnaires were distributed from 24 May 2016 to 29 June 2016. In total, I, collected responses from 100 people. To keep the data balanced between respondents whose partners are extraverts and respondents whose partners are introverts, the survey was reopened for 7 hours on 5 July 2016 and collected two additional responses. In conclusion, the total respondents are 102 people which consists of 51 respondents whose partners are extraverts and 51 respondents whose partners are introverts. The series of questions are formulated in the following sequence:
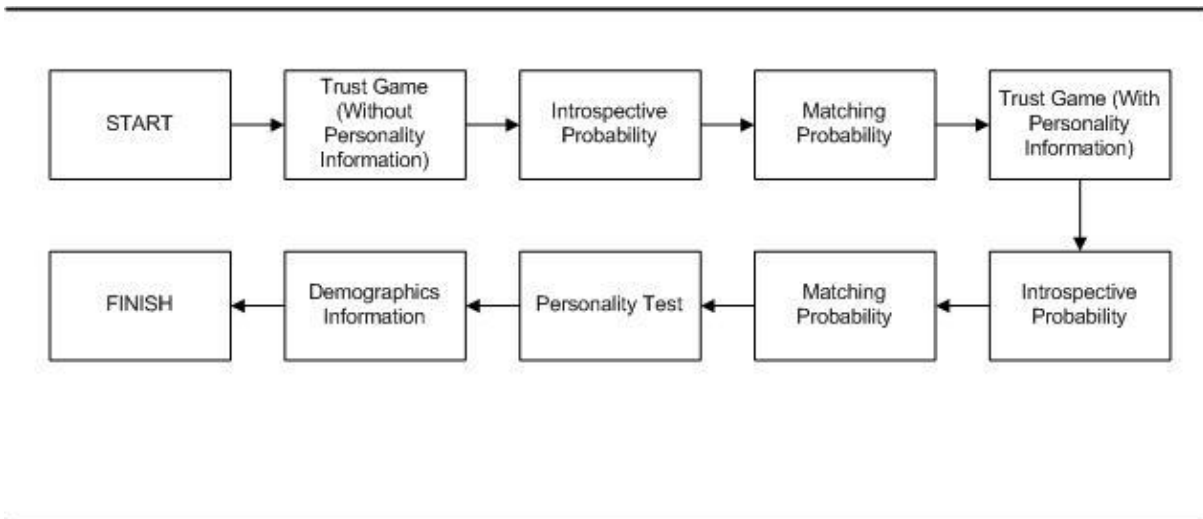
Figure 1: Questionnaires' Sequence

To present a meaningful analysis in this study, each part of the questionnaire serves as an important tool to collect suitable data. The importance of trust game, introspective probabilities, matching probabilities, personality test, and demographic information are explained further in the following section.

3.2.1 Trust Game

Trust game is first used in Berg, Dickhaut, and McCabe (1995) study about trust and its role in investment setting. The game consists of two actors: trustor and trustee. Trustor and trustee are anonymously paired. Both trustor and trustee are given money by experimenter as comissions to join the experiment. Two choices are offered to trustor: (1) He/she can keep

their money right away, or (2) He/she can give *x* amount of his/her comission to an anonymous trustee and increase it into three-times the initial amount (*3x*). The *3x* amount is held by trustee and of the tripled amount received by trustee, the amount to be sent back to trustor is fully decided by trustee. Trustor may receive zero to full *3x* amount.

The trust game used in this study is hypothetical. This means payoffs were hypothetical and all respondents acted as trustors where their trustees were also hypothetical. Respondents encountered two trust games in the questionnaire where in the first one they had no information about their trustees and in the second one they were informed about their trustees' personality traits. The information about personality traits were divided into two categories, extraverts and introverts, which led to two different questionnaires and two analysis groups.

<div align="center">

Table 1: Sub-Sample Division

</div>

	Trustee Personality	
Respondents	Extravert Trustee	Introvert Trustee

Once facing the trust game, respondents were exposed to a question:

> *Imagine that you will be paired with another participant. We will refer to this participant as your "partner". Both you and your partner have received a participation fee of €10 (€10 is equivalent to US$ 11,40 or IDR 150.000). You have the opportunity to send none, a part of, or your entire participation fee to your partner. Each amount sent will be tripled, for example if you send €3, it will become €9 and be sent to your partner. Similarly, if you send €9, it will become €27. Then your partner will decide how much to send back to you and how much to keep.*

> *Will you send your participation fee? If you choose option 1, please specify how much you will send (€1-€10).*

For the second trust game, there were additional information about trustee personality traits based on McCrae and John (1992) description. Trustee with extravert personality was framed as follows:

> *Your partner is known as a person who's outgoing, sociable, and assertive.*

And trustee with introvert personality was framed as follows:

Your partner is known as a person who's quiet, shy, and unconfident.

Based on the question, trust game used in this study represent ambiguous situation considering that trustor did not know what the exact move of trustee. In this case capturing trustor belief and ambiguity aversion are important to know what trustor had in mind when he/she was exposed to the ambiguous situation and what their expectations were toward their trustees. These are expected to play a role in explaining trustor decision to trust or not, where trust acts significantly in social uncertainty situation.

3.2.2 Introspective Probability and Matching Probability

To measure respondents' belief and ambiguity aversion, this study used introspective probability and matching probability of ambiguous events. Degree of belief represents the balance of proof in favor of event while degree of ambiguity represents the entire information in regard to the events (Keynes, 1921; Baillon et al., 2013). Respondents' belief here is measured according to Savage's (1954) definition where the term subjective probabilities are used to define the quantification of belief in a form of degree of conviction over respective events. The relation between probabilities are comparative in a way that one event is more, at least similarly, or less probable than another (Fishburn, 1986). One way to elicit belief is using introspective belief. In this case, one question was exposed in which respondents were directly asked about the possibility of trustee gives back more than the amount sent. As there were two options in the previous trust game (Yes and No), respondents faced different questions according to their choices. The phrasing of these questions refers to the question Trautmann and van de Kuilen (2015) used. Suppose, a respondent chose option 1 in trust games and decide on the amount of €x to send to his/her trustee, then the question was as follows:

In the previous question, you decided to send €x to your partner. Please write the probability that you think your partner will give back more than €x. The probability should be in percentages, ranging from 0% to 100%. For example, if you are sure that your partner will give back more than €x, you should write 100%. If you are not sure that your partner will give back more than €x, you should write a number between 0% and 100%.

And if a respondent chose option 2 in trust games, he/she faced this question:

Suppose, you decide to send €5 to your partner. Please write the probability that you think your partner will give back more than €5. The probability should be in percentages, ranging from 0% to 100%. For example, if you are sure that your partner will give back more than €5, you should write 100%. If you are not sure that your partner will give back more than €5, you should write a number between 0% and 100%.

The answer to this question implied respondents' strength of belief. Because the relation between probabilities are comparative, the answers inferred respondents' degree of conviction which event was more likely compared to another.

The question after introspective probability was matching probability. Matching probability is the probability that make decision maker indifferent in choosing between winning a bet from ambiguous source and risky (event with objective probability) source (Wakker, 2010; Dimmock et al., 2013; Dimmock, Kouwenberg, and Wakker, 2016). Matching probability is used because of its ability to directly capture ambiguity attitude without first having to separate risk and ambiguity attitude (Dimmock et al., 2013). This study used the same method Dimmock, Kouwenberg, and Wakker (2016) propose. However, rather than covering for all elements of ambiguity attitude, this study only measured one component of ambiguity attitude: ambiguity aversion.

Based on their choice in trust games, they faced different categorization of events. When a respondent answered yes in trust games and decided to send €x to his/her trustee, then their events division would be:

E1: trustee will give back more than €x

E2: trustee will give back no more than €x

When their answers were no in trust games, respondents were put in a scenario where they were assumed to give €5 to their trustees.

E1: trustee will give back more than €5

E2: trustee will give back no more than €5

Considering that matching probabilities are based on indifference level between ambiguous and risky prospects, these probabilities was elicited using a procedure. In this procedure, the value switched in level and another option was made to be more attractive. These questions were also made and exposed according to their choices in the trust games.

Suppose, a respondent chose yes in the trust games and decided to send €*x* to his/her trustee, he/she is then exposed to the first question, where their matching probability towards event 1 (trustee gives back more than €*x*) was elicited:

> *In the previous question, you decided to send €x to your partner. You are now faced with two options. Which option do you prefer:*
>
> *Option 1: You win €10 if your partner gives back more than €x*
>
> *Option 2: You win €10 with 50% chance*

Similarly, when a respondent chose no in the trust games, the question was framed in a way to elicit his/her matching probability towards event 1:

> *Suppose, you decide to send €5 to your partner. You are now faced with two options. Which option do you prefer:*
>
> *Option 1: You win €10 if your partner gives back more than €5*
>
> *Option 2: You win €10 with 50% chance*

When choosing either option, the system automatically generated next question in which the other option became more attractive. For example, If a respondent chose option 1 (ambiguous option), the next question had similar options, ambiguous and risky prospects, with higher probability of winning on risky prospect. This would continue until the respondent chose option 2 (risky prospect). Similar sequence happened with another scenario when respondent chose option 2 (risky prospect). The next question would show similar options with a modification on risky prospect in which it had lower probability of winning. This would continue until respondent chooses option 1 (ambiguous prospect).
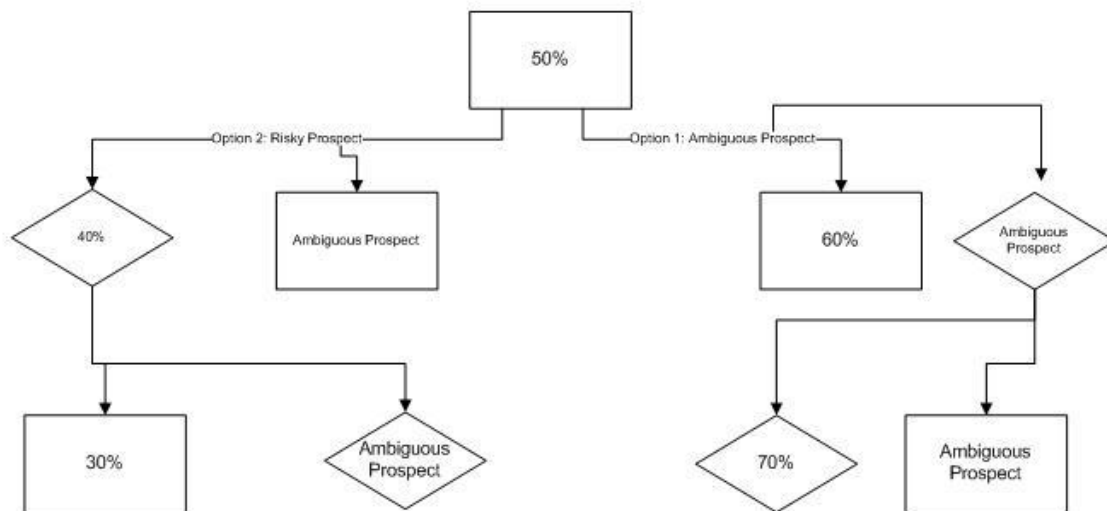
A similar method was employed when the respondent faced the second question, in which ambiguous prospect was framed with respect to event 2.

In the previous question, you decided to send €x to your partner. You are

now faced with two options, which option do you prefer:

Option 1: You win €10 if your partner gives back no more than €x

Option 2: You win €10 with 50% chance

Or

Suppose, you decide to send €5 to your partner. You are now faced with two

options, which option do you prefer:

Option 1: You win €10 if your partner gives back no more than €5

Option 2: You win €10 with 50% chance

The matching probabilities were taken from the middle value of switching interval. For example, based on the diagram, when a respondent chose option 1 in the first two stages and option 2 in the third (or last) stage, the matching probability would be 35%. And then matching probability for event 1 (q_{e1}) and event 2 (q_{e2}) would be added. When $q_{e1} + q_{e2}$ resulted in total of 100%, the respondent would be categorized as ambiguity neutral person. A measure of ambiguity aversion is defined as: $1 - (q_{e1} + q_{e2})$. The higher the measure, the more ambiguity averse a subject is. Hence, when matching probabilities were smaller than

ambiguity neutral probabilities (<100%), respondents would be categorized as more ambiguity averse and less ambiguity averse if the results were higher than 100%.

The questions concerning introspective probabilities and matching probabilities were asked after both trust games. In addition to know what respondents had in mind when deciding to trust or not, this was done in order to capture whether there will be a change in belief and ambiguity attitude after respondents are exposed to certain personality information.

3.2.3 Personality

After capturing decision to trust, belief, and ambiguity aversion of respondents, personality test was used in order to confirm the hypotheses developed. As the indicator of extraversion and neuroticism, four aspects from Big Five Aspect (BFA) developed by DeYoung, Quilty, and Peterson (2007) were used. BFA scale consists of ten aspects with each personality consists of two aspects. The aspects are developed by performing factor analysis over a total of fifteen facets of two widely used personality test, Revised NEO Personality Inventory (NEO-PI-R) developed by Costa and McCrae (1992) and Abridged Big Five Circumplex scales from the International Personality Item Pool (AB5C-IPIP) developed by Goldberg (1999). These aspects have the ability to identify traits which are influenced by both genetic and environmental factors (DeYoung, Quilty, and Peterson, 2007). BFA scale is more convenient to use as it consists of a total 100 items compared to NEO-PI-R and AB5C-IPIP which consist of 240 items and 485 items respectively. The aspects for extraversion are assertiveness and enthusiasm while neuroticism uses volatility and withdrawal. Each aspect consists of ten items which will be answered using 5-points Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Each aspect has normal statements (i.e. make friends easily) and reversed statements (i.e. keep others at distance). For normal statements, scores are calculated based on the choosen scale (i.e. if respondents answered 4 for a statement then their score will be 4 for that statement). For reversed statements, scores are calculated based on the reversed Likert-scale (i.e. if respondents answered 4 for a statement then their score will be 2 for that statement). The range of total scores within one aspect are 0 to 50. Afterwards, the total scores of two aspects within each personality were added and averaged in order to know respondents' extraversion and neuroticism level. Rather than produces a categorical result (i.e. individual A is extravert while individual B is introvert) this scale presents a continuous result (i.e. individual A has higher score in extraversion compared to individual B).

3.2.4 Demographics Information

In the last part of questionnaire, respondents were asked about their demographic information such as age, gender, and education. These three demographic inputs acted as control variables with each of them has its own impact on trust. Age affects trust in a way that an increase in age yields more trusting attitude despite the fact that the increase is in declining rate (Alesina and La Ferrara, 2002). Gender differences also tend to affect trust attitude. Sharing a similar group membership is an important attribute in developing trust for men, while women consider shared relationship links to be an important attribute (Maddux and Brewer, 2005). In another situation, following trust violation acts, women hardly lose their trust and more likely to restore their trust on their counterpart to the original level compared to men (Haselhuhn et al., 2015). Lastly, different educational background also yields different trust attitude, which an increase in individual and average education lead to an increase in trust (Helliwell and Putnam, 2007).

3.3 Framework of Analysis

3.3.1 Models

This study used panel data analysis. The regressions were based on four different dependent variables: Amount sent (random effects model), amount sent (logistic regression), ambiguity aversion, and self-reported belief. Each dependent variable was estimated by running several models of regression. The following are the equations which were run and will be described in details in chapter 4:

Table 2: Models for Amount Sent (Random Effects)

Amount sent

(1) $Amount\ sent_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + u$

(2) $Amount\ sent_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} + u$

(3) $Amount\ sent_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 belief_{it} + u$

(4) $Amount\ sent_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} + \beta_6 belief_{it} + u$

(5) $Amount\ sent_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} +$

$\beta_4 round2introv_{it} + \beta_5 ave_{it} + \beta_6 belief_{it} + \beta_7 age_{it} + \beta_8 male_{it} + \beta_9 educ_{it} + u$

(6) $Amount\ sent_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} +$

$\beta_4 round2introv_{it} + \beta_5 ave_{it} + \beta_6 belief_{it} + \beta_7 age_{it} + \beta_8 male_{it} + \beta_9 educ_{it} +$

$\beta_{10} extra * round2extrav_{it} + \beta_{11} extra * round2introv_{it} + u$

Table 3: Models for Amount Sent (Logistic Regression)

Amount sent

---

(7) $\text{Pr}\ (amount\ sent > 0 | extra, neuro, \dots, round2introv) = \beta_0 + \beta_1 extra_{it} +$

$\beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + u$

(8) $\text{Pr}\ (amount\ sent > 0 | extra, neuro, \dots, ave) = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} +$

$\beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} + u$

(9) $\text{Pr}\ (amount\ sent > 0 | extra, neuro, \dots, belief) = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} +$

$\beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 belief_{it} + u$

(10) $\text{Pr}\ (amount\ sent > 0 | extra, neuro, \dots, belief) = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} +$

$\beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} + \beta_6 belief_{it} + u$

(11) $\text{Pr}(amount\ sent > 0 | extra, neuro, \dots, male) = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} +$

$\beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} + \beta_6 belief_{it} + \beta_7 age_{it} +$

$\beta_8 male_{it} + u$

(12) $\text{Pr}(amount\ sent > 0 | extra, neuro, \dots, educ) = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} +$

$\beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} + \beta_6 belief_{it} + \beta_7 age_{it} +$

$\beta_8 male_{it} + \beta_9 educ_{it} + u$

(13) $\text{Pr}(amount\ sent > 0 | extra, neuro, \dots, round2introv * extra) = \beta_0 +$

$\beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 ave_{it} +$

$\beta_6 belief_{it} + \beta_7 age_{it} + \beta_8 male_{it} + \beta_9 educ_{it} + \beta_{10} extra * round2extrav_{it} +$

$\beta_{11} extra * round2introv_{it} + u$

Ambiguity aversion

(14) $Ambiguity\ aversion_{it} = \beta_0 + \beta_1 belief_{it} + u$

(15) $Ambiguity\ aversion_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 age_{it} + \beta_6 male_{it} + \beta_7 educ_{it} + u$

(16) $Ambiguity\ aversion_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 age_{it} + \beta_6 male_{it} + \beta_7 educ_{it} + \beta_8 extra * round2extrav_{it} + \beta_9 extra * round2introv_{it} + u$

Table 5: Models for Self-Reported Belief

Self-reported belief

(17) $Belief_{it} = \beta_0 + \beta_1 ave_{it} + u$

(18) $Belief_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + u$

(19) $Belief_{it} = \beta_0 + \beta_1 extra_{it} + \beta_2 neuro_{it} + \beta_3 round2extrav_{it} + \beta_4 round2introv_{it} + \beta_5 age_{it} + \beta_6 male_{it} + \beta_7 educ_{it} + u$

Amount sent, as the dependent variables in random effects model, were the amount of money respondents decide to give to trustee which were the proxies of their trust. On the other side, trust as dependent variables in logistic regression models were decoded into 0, (reluctance to send money) and 1 (willingness to send money). *Ave* were respondents' ambiguity aversion elicited using matching probabilities. These were continuous variables in which the higher the score, the more ambiguity averse a person was. *Belief* were respondents' self-reported belief. These were respondents' introspective probabilities toward their trustees. *Round2_extrav* were dummy variables, it took value 1 when respondents were in round 2 and paired with extravert trustee and 0 when respondents were in round 1 and had no information about their trustee. Similarly, *round2_introv* were dummy variables with the only difference

was the value would be 1 if they were paired with introvert trustee in round 2. *Extra* and *neuro* were respondents' extraversion and neuroticism level. These were calculated in accordance to the scoring system of DeYoung, Quilty, and Peterson (2007). *Male* were respondents' gender. These were categorical variables with the value of 1 (male) and 0 (female), while *age* and *educ* were respondents' age and years of formal education possessed.

CHAPTER 4

RESULTS

This chapter serves as the statistical analysis of this study. First, characteristics of respondents as well as the distribution of their responses to trust games, introspective probabilities, and matching probabilities will be described in details.

4.1 Respondents' Demographics and Responses

The total amount of respondents are 102 people. Respondents' age ranged from 18 to 38 years old with average age being 23.73 years old. Most respondents are 21 to 26 years old (**Figure 3**) and received 15-18 years of formal education (**Figure 4**). 69 respondents (67.65%) out of 102 respondents are female.
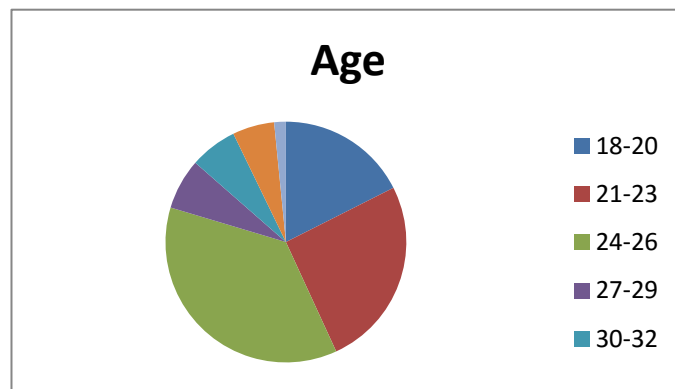
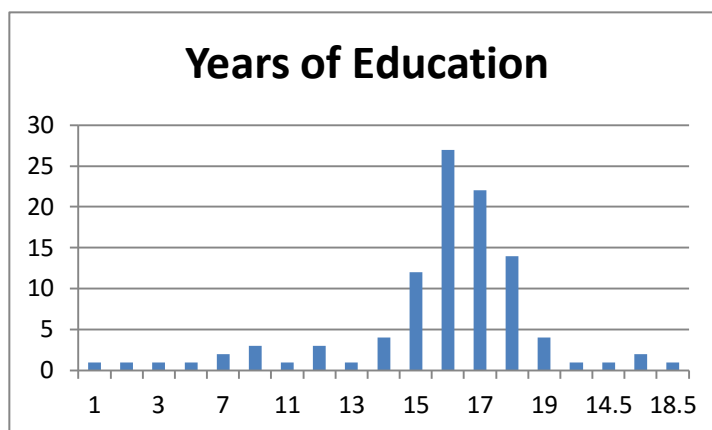**Figure 3: Distributions of Respondents' Age**

Figure 4: Distributions of Respondents' Educational Background

Respondents gave various answers to the first trust game, ranged from €0 to €10 with the average of € 4.69. Among 102 respondents, 51 people who then have extravert partners gave €5.14 on average and 51 people who then have introvert partners gave €4.24 on average. After trustee personality traits were revealed, respondents whose partners were extraverts gave €5.98 in average and respondents whose partners were introverts gave €4.1 in average (**Figure 5**).
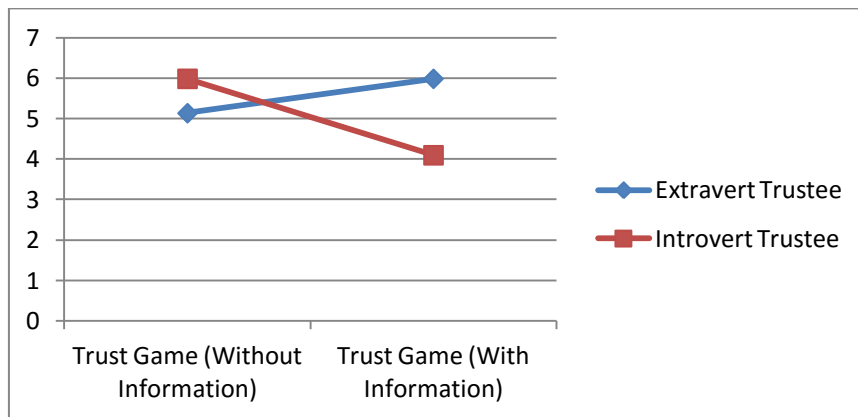
Figure 5: Average Amount Sent in Trust Games

There were also some changes found in respondents' self-reported belief and ambiguity aversion. Before they were given information about trustee, respondents' introspective probabilities in average were 0.566. After they were informed about trustee's personality traits, the average introspective probabilities slightly increased to 0.580. Specifically, self-reported belief between respondents whose partners are extravert were increased from on average 0.5722 to 0.6167 while within respondents whose partners are introvert were slightly decreased from on average 0.5598 to 0.5425 (**Figure 6**). This change was also found in ambiguity aversion. Before the information was given, respondents' ambiguity attitude in average were -0.035 and increased to -0.009 after personality traits were disclosed. Within each sub-sample, an increase in ambiguity aversion were discovered in respondents with extravert trustee, in the first round of trust game the ambiguity aversion level on average were 0.0216 which then increased to 0.0765 in second round of trust game. On the other side, ambiguity aversion level within respondents with introvert partner, on average, were found to be quite stagnant, changed only from -0.0922 to -0.0941 (**Figure 7**).
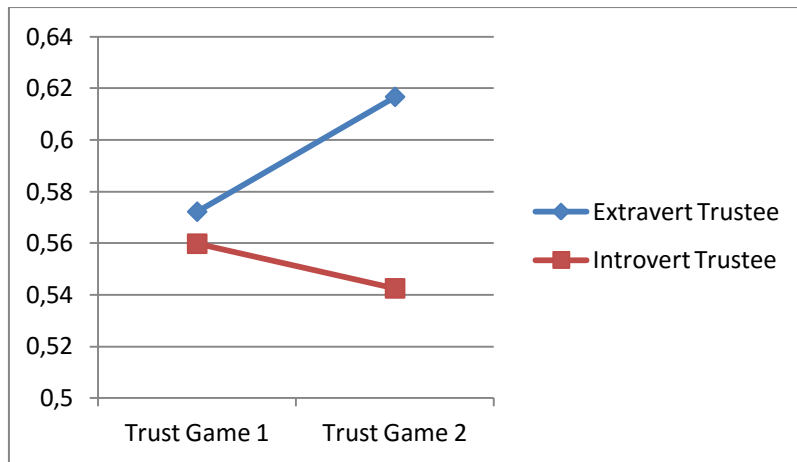
Figure 6: Self-Reported Belief (Sub-Sample: Extravert Trustee and Introvert Trustee)
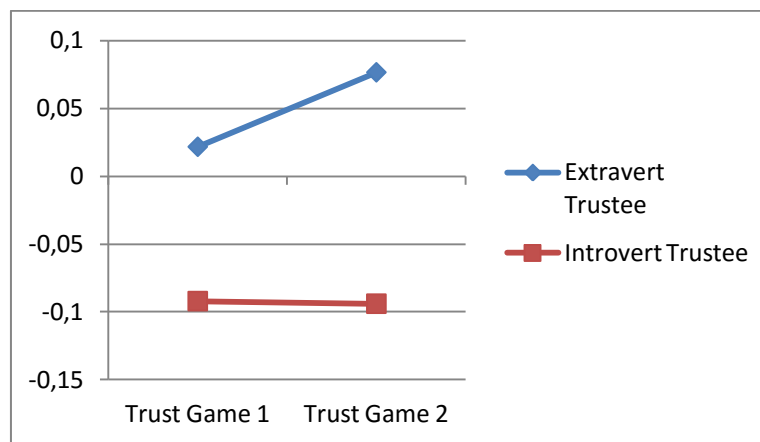
Figure 7: Ambiguity Aversion (Sub-Sample: Extravert Trustee and Introvert Trustee)

Further descriptive statistics of each and all variables are in **Appendix 1**. The explanation about the participants' responses above serve as a raw materials before being transformed as variables into several regression models.

4.2 Statistical Analysis

The regression models were run based on the mentioned equations in chapter 3. Before proceeding to the regression, each model was tested whether the assumptions are met or not. To run panel the regressions, Hausman test (**Appendix 3**) were used in order to see whether there are any systematic differences between fixed effect and random effects models. Fixed effects holds the assumption that time invariant unobservables are correlated with independent variables while random effects assumes that time invariant unobservables are not correlated with independent variables. Random effects will be inconsistent if the assumption is violated but fixed effects will still work. The null hypothesis of Hausman test advises that there is no systematic differences between fixed effects and random effects, meaning that the

time invariant unobservables are not correlated with the independent variables, thus random effects is more efficient. Most results show that random effects were more efficient with the exception of **Equation 15** in which fixed effects was revealed to be more consistent. Additionally, both random effects and fixed effects models were run in a condition that is robust to heteroskedasticity and within-group correlation.

According to **Table 6**, there are no significant impact of extraversion level to the amount sent. However, in all models except for **Equation 6**, there are significant relations between being paired with extravert trustee to the amount sent. One example from **Equation 5**, trustors sent significantly higher amount (+€0.795) to trustees when they found out that their partners are extravert in comparison to the first round. Across all models, except for **Equation 6**, self-reported belief are found to have positive effect on the amount sent. Finally, there is no significant effect of extraversion level, conditional on being paired with extravert or introvert trustee, to the amount sent.

Surprisingly, results in **Table 7** predict that an increase in neuroticism score will increase the probability to send positive amount of money. However, similar to previous table, there is no significant relation between extraversion level and the probability to send positive amount of money. **Equation 7** and **8** predict that by being paired with introvert trustee in round 2 will decrease the probability to send positive amount of money, even though the effect disappears after belief is added into the model (**Equation 9**). Most models, aside of **Equation 7** and **13**, show that by being paired with extravert partner in second round increases the probability to send positive amount of money compared to being paired to unknown trustee in first round. Similar to results presented in the previous table, there is also no significant relation of extraversion level, conditional on being paired with extravert or introvert trustee, to the probability of giving positive amount of money (**Equation 13**). **Model 8** predict that an increase in ambiguity aversion level significantly decrease the probability to give positive amount of money even though the effect was gone after more variables were added. Lastly, similar with previous table, all models in **Table 7** predict that an increase in self-reported belief increases the probability to send positive amount of money.

Table 6: Amount Sent (Random Effects)

VARIABLES	Amount Sent (1)	Amount Sent (2)	Amount Sent (3)	Amount Sent (4)	Amount Sent (5)	Amount Sent (6)
Extraversion	0.0297	0.0309	0.0535	0.0479	0.0281	0.0522
	(0.0609)	(0.0609)	(0.0549)	(0.0535)	(0.0642)	(0.0730)
Neuroticism	-0.00155	-0.00189	-0.0220	-0.0207	-0.0455	-0.0460
	(0.0534)	(0.0533)	(0.0468)	(0.0472)	(0.0588)	(0.0594)
Round 2 (extravert trustee)	1.031***	1.041***	0.8549***	0.799***	0.795**	0.7282
	(0.287)	(0.288)	(0.3066)	(0.309)	(0.312)	(2.0673)
Round 2 (introvert trustee)	-0.325	-0.329	-0.2613	-0.242	-0.232	2.9584
	(0.422)	(0.422)	(0.3901)	(0.390)	(0.396)	(3.4217)
Ambiguity aversion		-0.112		0.613	0.540	0.6261
		(0.671)		(0.628)	(0.615)	(0.6350)
Self-reported belief			4.1288***	4.254***	4.212***	4.2270
			(1.0521)	(1.052)	(1.086)	(1.0818)
Age					0.0264	0.0267
					(0.0807)	(0.0820)
Male					-0.704	-0.7094
					(0.640)	(0.6473)
Education					-0.0374	-0.0399
					(0.0696)	(0.0699)
Extraversion*Round 2 (extravert trustee)						0.0017
						(0.0602)
Extraversion*Round 2 (introvert trustee)						-0.0910
						(0.0980)
Constant	3.692	3.658	1.0997	1.2102	2.794	1.9960
	(3.066)	(3.082)	(2.7676)	(2.7517)	(4.222)	(4.4274)
Observations	204	204	204	204	204	204
Number of participants	102	102	102	102	102	102

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

VARIABLES	Amount sent (logistic regression) (7)	Amount sent (logistic regression) (8)	Amount sent (logistic regression) (9)	Amount sent (logistic regression) (10)	Amount sent (logistic regression) (11)	Amount sent (logistic regression (12)	Amount sent (logistic regression) (13)
Extraversion	0.0637	0.0821	0.0634	0.0816	0.101	0.108	0.194**
	(0.0625)	(0.0694)	(0.0856)	(0.0812)	(0.0851)	(0.0840)	(0.0973)
Neuroticism	0.122**	0.120**	0.193**	0.149**	0.143	0.141*	0.152*
	(0.0518)	(0.0525)	(0.0820)	(0.0753)	(0.0887)	(0.0850)	(0.0809)
Round 2 (extravert trustee)	1.078	1.274**	1.074*	1.288*	1.205**	1.229**	-0.768
	(0.667)	(0.576)	(0.653)	(0.725)	(0.569)	(0.558)	(3.288)
Round 2 (introvert trustee)	-0.669*	-0.732*	-0.511	-0.544	-0.592	-0.610	5.504
	(0.377)	(0.377)	(0.545)	(0.508)	(0.534)	(0.515)	(4.321)
Ambiguity aversion		-1.446*		-0.908	-0.881	-0.918	-1.189
		(0.854)		(0.977)	(0.975)	(1.020)	(1.068)
Self-reported belief			6.182***	5.740***	5.619***	5.481***	5.527***
			(2.000)	(1.716)	(1.678)	(1.673)	(1.676)
Age					0.134*	0.108	0.0850
					(0.0796)	(0.0783)	(0.0796)
Male					-0.140	-0.0618	-0.105
					(0.863)	(0.861)	(0.829)
Education						0.0471	0.0712
						(0.103)	(0.0931)
Extraversion* Round 2 (extravert trustee)							0.0583
							(0.0923)
Extraversion* Round 2 (introvert trustee)							-0.176
							(0.119)
Constant	-3.524	-4.117	-8.085*	-7.464*	-11.02**	-11.32**	-14.42***
	(2.989)	(3.291)	(4.745)	(4.406)	(5.509)	(5.347)	(5.591)
Observations	204	204	204	204	204	204	204
Number of resp	102	102	102	102	102	102	102

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

The effects of extraversion, neuroticism, demographic variables to ambiguity aversion (**Table 8**) and self-reported belief (**Table 9**) were also examined. In the case of ambiguity aversion, Hausman test indicates that for **Equation 15** fixed effects model is more consistent compared to random effects model ($p = 0.0920$). Based on **Equation 16** there is no effect of individual's extraversion to the ambiguity aversion level. On the other hand, being paired with extravert trustee negatively affect ambiguity aversion only if extraversion level equals to zero.

Another interesting finding is in regard to self-reported belief and ambiguity aversion. **Equation 14** and **17** estimate the effect of belief in ambiguity aversion and the effect of ambiguity aversion in belief. The results present that belief and ambiguity aversion are negatively correlated. For instance, one point increase in belief decreases ambiguity aversion level by 0.1910 point while one point increase in ambiguity aversion level decreases self-reported belief by 0.1634 point.

Table 8: Ambiguity Aversion (Random Effects and Fixed Effects Models)

VARIABLES	Ambiguity aversion (14)	Ambiguity aversion (15)	Ambiguity aversion (16)
Self-reported belief	-0.1910**		
	(0.0761)		
Extraversion		-	0.0021
			(0.0080)
Neuroticism		-	-0.0051
			(0.0059)
Round 2 (extravert trustee)		0.0549	-0.382*
		(0.0368)	(0.211)
Round 2 (introvert trustee)		-0.0020	-0.442
		(0.0338)	(0.343)
Age		-	0.0018
			(0.0047)
Male		-	-0.0595
			(0.0587)
Education		-	0.0006
			(0.00614)
Extraversion* Round 2 (extravert trustee)			0.0132**
			(0.00612)
Extraversion* Round 2 (introvert trustee)			0.0119
			(0.00952)
Constant	0.0873*	-0.0353***	0.0009
	(0.0500)	(0.0125)	(0.440)
Observations	204	204	204
Number of resp	102	102	102
R-squared		0.024	

Robust standard errors in parentheses (*** $p<0.01$, ** $p<0.05$, * $p<0.1$)

VARIABLES	Self-reported belief (17)	Self-reported belief (18)	Self-reported belief (19)
Ambiguity aversion	-0.1634***		
	(0.0628)		
Extraversion		-0.0057	-0.0044
		(0.0054)	(0.0056)
Neuroticism		0.0049	0.0062
		(0.0046)	(0.0050)
Round 2 (extravert trustee)		0.0464	0.0475
		(0.0353)	(0.0357)
Round 2 (introvert trustee)		-0.0192	-0.0203
		(0.0290)	(0.0288)
Age			0.0084
			(0.0059)
Male			-0.0031
			(0.0504)
Education			0.0006
			(0.0089)
Constant	0.5692***	0.628**	0.338
	(0.0213)	(0.270)	(0.340)
Observations	204	204	204
Number of resp	102	102	102

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0

4.3 Discussion

This study is conducted in order to see whether personality of people affect the willingness to trust in ambiguous situation or not. Trust game exhibits the situation where people have to decide to trust (in this case, the proxy of trust is signified by giving positive amount of money) based on little or no information about the counterpart. First three sub-hypotheses specifically propose that introverts (people with lower extraversion level) are more averse to social uncertainty than extraverts, introverts are more pessimistic about others' trustworthiness than extraverts, and introverts send less money to partners in the trust game than extraverts. The results show that there are no significant relation between extraversion level to the ambiguity aversion as well as probability of exhibiting trusting behaviour and amount sent. This result gives a proposition that there might be evidence that trustor's extraversion level does not affect either ambiguity aversion or decision to trust.

The second set of sub-hypotheses (H2a, H2b, and H2c) proposes that when introverts notice that their counterpart is extravert they will be less averse, more optimistic, and send more money compared to when their counterpart is introvert. A negative effect of being paired with extravert trustee to ambiguity aversion level is found, even though the effect is

present when extraversion level equals to zero. On the other hand, the other results show that there are significant effects of having extravert trustee to the probability of trusting and the amount sent. Having extravert partner increases the amount sent by €0.795 in comparison to round one where there is no information about trustee. Being paired with extravert trustee increases the probability to trust compared to the situation where there is no information about the trustee. For respondents with introvert trustee, being paired with introvert trustee decreases the probability of trusting behaviour even though the effects are only present in **Equation 7** and **8**. Additionally, the results show that there are no significant effect of having extravert or introvert partner to probability to trust and amount of trust conditional on trustor extraversion level. To conclude, the results show that there are positive relations between having extravert trustee to the decision to trust and amount of money sent in the second round compared to the first round. This findings present supporting evidence that by being paired with extravert trustee encourage trustor to be more optimistic and send more money. However there is no specific evidence to support the proposition that introverts will be less averse and less trusting when their counterpart is extravert compared to when their counterpart is introvert.

The third set of sub-hypotheses (H3a, H3b, and H3c) proposes that people with high level of neuroticism are more averse to social uncertainty, more pessimistic about others' trustworthiness, and send less money in the trust game compared to people with low level of neuroticism. However, from the regression analysis, even though there are no significant relations are found between neuroticism to ambiguity aversion as well as amount sent, neuroticism is positively related to the probability to trust. This result shows a contrast evidence to the proposed sub-hypothesis. This results suggests that people with high level of neuroticism to be more optimistic toward others' trustworthiness compared to the people with low level of neuroticism.

Aside of the major findings related to the main hypotheses, there are also some interesting findings. Several fascinating results are found between ambiguity aversion and belief. In **Table 7**, before the inclusion of belief, ambiguity attitude uniquely affect the probability of trusting behaviour. However, the impact disappeared after belief is entered into the model. Upon further research, belief and ambiguity attitude have significant effect on each other. An increase in belief lead to a decrease in ambiguity aversion, vice versa. Furthermore, belief is also significantly present in decision to trust and amount of trust given. The higher self-

reported belief is the more likely decision to trust is achieved and the higher is the amount of money sent.

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CHAPTER 5

CONCLUSION, LIMITATION, AND RECOMMENDATION

5.1 Conclusion

Several studies have been conducted to examine the impact of individual characteristics in trust (Eckel and Wilson, 2004; Croson and Gneezy, 2009). This study is specifically examines the role of trustor and trustee personalities in deciding to trust in the context of social uncertainty. The classification of personality is based on Big Five Personality and focused only on two dimensions: extraversion and neuroticism.

Based on the result of this study, extraversion level does not independently affect ambiguity aversion, perception of trustworthiness or the amount of trust in the context of social uncertainty. However, trustee personality traits are found to significantly affect perception of trustworthiness and amount of trust. These are supported by the findings that having extravert trustee increases the probability for trustor to trust. On top of that, it also increases the amount sent. On the other hand, being paired with introvert trustee decreases the probability to trust. One possible reason might be because extraverts more likely to have positive affect (Rusting and Larsen, 1997) which lead to higher frequency of explicitly exhibiting positive actions (Clark and Watson, 1997). Encountering extravert counterpart,who normally shows positive actions, might induce people to regard their counterpart more favourably.

Another personality dimension in this study, neuroticism, surprisingly positively affects probability to trust. This finding is different from previous study by Hirsch and Inzlicht (2008) which shows that people with high level of neuroticism react more negatively to uncertainty. One possible reason is it might be because the difference between ambiguity aversion and ambiguity intolerance. Neuroticism is found to be positively correlated with ambiguity intolerance (inconvenience to ambiguous situation) but ambiguity intolerance is not found to be correlated with ambiguity aversion (Tanaka et al., 2014). This might indicate even though people with high level of neuroticism find ambiguous situation inconvenient, does not mean that they will prefer risky situation to ambiguous one when they are faced with both options.

Along with other findings, self-reported belief is found to be positively related in predicting the probability to trust and the amount of trust given during both trust games. This finding supports previous studies by Costa-Gomes, Huck, and Weizsäcker (2014) and Sapienza, et al. (2013) that stated beliefs in regard to the counterpart trustworthiness is significantly explaining decision to trust. One interesting finding is how ambiguity aversion and belief affect each other. This is in line with the previous results (Heath and Tversky, 1991; Fox and See, 2003) that belief affects preferences in ambiguous settings. On the other side, one possible reason to explain the effect of ambiguity aversion to belief is the existence of experience in which experience affect both belief and preferences in ambiguous settings (Ert and Trautmann, 2014). This might help to establish the effect of ambiguity aversion to belief, however a further study is needed to examine this relation.

Based on this study, personalities are found to have no effect on ambiguity aversion and amount of money sent (as the proxy of trust) to others. Even though there is a positive effect of neuroticism to individual's perception about others' trustworthiness, but this effect is not discovered in the domain of extraversion. On the other hand, differences in other people personality traits significantly affect individual's perception about others' trustworthiness as well as the intensity of trust.

5.2 Limitation

First of all, this study used hypothetical payoff in the trust game. Real payoff was not involved thus there was no real incentive for them to behave like in actual setting using actual money. Therefore this study suffers from the lack of external validity.

Second, trustee personality traits in this study were explicitly explained. In the actual setting of social uncertainty, trustee personality traits are not explicitly known. Trustor can only derive what trustee personality traits are like based on observed behaviours.

Third, the sample size of this study. This study took only 102 respondents and most respondents were around 20 to 24 years old and received 15 to 18 years of formal education. This sample only examined the effect of personality on the willingness to trust and the amount of trust for these categories of people. Therefore this study cannot be generalized to larger population with various characteristics.

Fourth, this study cannot explain the independent effects of age, gender, and education level on trust in which previous studies (Alesina and La Ferrara, 2002; Maddux and Brewer, 2005; Haselhuhn et al., 2015; Helliwell and Putnam, 2007) found. The only exception is the

effect of age in the probability of trusting in **Equation 11**, but there are no other significant relations found aside of this model.

5.3 Recommendation

This study has been conducted to see whether personality affect the willingness to trust and the amount of trust given in the context of social uncertainty. As it focused on the trustor extraversion level, trustor neuroticism level, and trustee extraversion level (extravert and introvert), this study did not examine the effect of trustee neuroticism level (high and low neuroticism level) on trustor decision to trust. Therefore, the additional treatment of showing trustee neuroticism level may lead to a new insight in studies about the effect of personality to decision to trust.

Another interesting variable to study would be physical features. Based on previous study by Tingley (2014) using digital avatar in the trust game, participants tend to choose avatar that shows trustworthiness when they act as trustor and sent higher amount to trustee who they considered as trustworthy. As decision to trust in the context of social uncertainty is based on the individual perceived information, in this case, the interaction between physical features and personality traits to decision to trust may present new information in trust studies.

Lastly, the experimental setting about the effect of personality to decision to trust using actual payoff may improve the external validity of this study. Hopefully, by using real payoffs, participants will be incentivized to behave closer to the actual setting. Additionally, the sample size can be increased and involves participants with different demographic backgrounds.

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APPENDIX

Appendix 1

Variable	Observation	Mean	Std. Dev.	Min.	Max
Trust Game 1	102	4.6863	2.8847	0	10
Trust Game 2	102	5.0392	3.1211	0	10
Trust Game 2 (Extravert Trustee)	51	5.9804	2.8177	0	10
Trust Game 2 (Introvert Trustee)	51	4.0980	3.1512	0	10
Belief (Trust Game 1)	102	0.5660	0.2399	0	1
Belief (Trust Game 2)	102	0.5796	0.2625	0	1
Ambiguity Aversion (Trust Game 1)	102	-0.0353	0.2771	-0.9	0.9
Ambiguity Aversion (Trust Game 2)	102	-0.0088	0.2901	-0.9	0.9
Extraversion	102	34.9069	4.2733	24	44.5
Neuroticism	102	28.0539	5.1150	16.5	39.5
Age	102	23.7255	3.9077	18	38
Male	102	0.3235	0.4701	0	1
Education	102	15.4020	3.4663	1	22

Table 11: Descriptive Statistics (Panel Data)

Variable		Mean	Std. Dev.	Min	Max	Obs.
Trust Game	Overall	4.8627	3.0030	0	10	N = 204
	Between		2.6824	0	10	n = 102
	Within		1.3632	-0.1373	9.8627	T = 2
Trust Game (Introvert)	Overall	4.0980	3.1356	0	10	N = 102
	Between		3.1512	0	10	n = 51
	Within		0	4.0980	4.0980	T = 2
Trust Game (Extravert)	Overall	5.9804	2.8037	0	10	N = 102
	Between		2.8177	0	10	n = 51
	Within		0	5.9804	5.9804	T = 2
Belief	Overall	0.5728	0.2509	0	1	N = 204
	Between		0.2205	0	1	n = 102
	Within		0.1208	0.0728	1.0728	T = 2
Extraversion	Overall	34.9069	4.2628	24	44.5	N = 204
	Between		4.2733	24	44.5	n = 102
	Within		0	34.9069	34.9069	T = 2
Neuroticism	Overall	28.0540	5.1024	16.5	39.5	N = 204
	Between		5.1150	16.5	39.5	n = 102
	Within		0	28.0540	28.0540	T = 2
Age	Overall	23.7255	3.8981	18	38	N = 204
	Between		3.9077	18	38	n = 102
	Within		0	23.7255	23.7255	T = 2
Male	Overall	0.3235	0.4690	0	1	N = 204
	Between		0.4701	0	1	n = 102
	Within		0	0.3235	0.3235	T = 2
Education	Overall	15.4020	3.4577	1	22	N = 204
	Between		3.4663	1	22	n = 102
	Within		0	15.4020	15.4020	T = 2
Ambiguity Aversion	Overall	-0.221	0.2833	-0.9	0.9	N = 204
	Between		0.2540	-0.9	0.9	n = 102
	Within		0.1266	-0.4721	0.4279	T = 2

Round 2 (Introvert Trustee)	Overall	0.25	0.4341	0	1	N = 204
	Between		0.2512	0	0.5	n = 102
	Within		0.3544	-0.25	0.75	T = 2
Round 2 (Extravert Trustee)	Overall	0.25	0.4341	0	1	N = 204
	Between		0.2512	0	0.5	n = 102
	Within		0.3544	-0.25	0.75	T = 2

Appendix 2

	Trust Game	Trust Game 2 (Introvert Trustee)	Trust Game 2 (Extravert Trustee)	Self-Reported Belief	Extraversion	Neuroticism
Trust Game	1.0000					
Trust Game 2 (Introvert Trustee)	0.7401***	1.0000				
Trust Game 2 (Extravert Trustee)	0.8506***	.	1.0000			
Self-Reported Belief	0.3885***	0.3419***	0.3935***	1.0000		
Extraversion	0.0397	0.1001	-0.1286	-0.1386**	1.0000	
Neuroticism	-0.0135	-0.0436	-0.0063	0.1414**	-0.3893***	1.0000
Age	0.0502	-0.0970	0.2234**	0.1176*	-0.1083	-0.1424**
Male	-0.1135	0.0278	-0.0429	-0.0287	-0.1623**	-0.3099***
Education	-0.0072	0.1514	-0.1040	0.0482	0.0422	-0.0417
Ambiguity Aversion	0.0303	0.1321	-0.0694	-0.2132***	0.1723**	-0.1094
Round 2 (Introvert Trustee)	-0.1474**	0.0000	.	-0.0698	0.0180	-0.0284
Round 2 (Extravert Trustee)	0.2154***	.	0.0000	0.1012	-0.0180	0.0284

(*** p<0.01, ** p<0.05, * p<0.1)

	Age	Male	Education	Ambiguity Aversion	Round 2 (Introvert Trustee)	Round 2 (Extravert Trustee)
Age	1.0000					
Male	0.0865	1.0000				
Education	0.3781***	-0.0016	1.0000			
Ambiguity Aversion	0.0110	-0.0980	0.0257	1.0000		
Round 2 (Introvert Trustee)	0.0466	0.0605	0.0033	-0.1472**	1.0000	
Round 2 (Extravert Trustee)	-0.0466	-0.0605	-0.0033	0.2013***	-0.3333***	1.0000

(*** p<0.01, ** p<0.05, * p<0.1)

Appendix 3

Equation	Hausman Test (Prob > Chi2)
1	0.2851
2	0.4183
3	0.2657
4	0.4648
5	0.5120
6	0.1564
14	0.2863
15	0.0920
16	0.2949
17	0.4091
18	0.9858
19	0.9655