Cultures, Worldviews, and Intergenerational Altruism[1]

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August 30, 2012

Abstract

This paper presents empirical evidence concerning effects of cultural differences on parents' attitudes toward children from unique U.S. and Japanese survey data. These data sets have been collected by Osaka University, and contain questions concerning worldviews and religions, hypothetical questions about parental behavior, and questions about socioeconomic variables. The data show that U.S. parents tend to be tougher than Japanese parents toward young children. Our evidence suggests that contents of worldview beliefs held by parents affect parents' attitudes toward children. Our empirical evidence also indicates that people who are confident about worldview beliefs tend to show tough attitudes toward their children. Because U.S. parents are much more confident than Japanese parents in worldview beliefs on the average, this cultural difference helps explain a substantial portion of the difference in parental attitudes between U.S. and Japanese parents.

Key Words: Culture, Worldview, Intergenerational Altruism, Temptation, Religion

1 Introduction

This paper presents empirical evidence concerning effects of cultural differences on parents' attitudes toward children from unique U.S. and Japanese

[1]We thank Charles Horioka for his initial collaboration, Paola Giuliano, Michihiro Kandori and seminar and session participants at the 2011 National Bureau of Economic Research Japan Project Meeting, Chapman University, City University of Hong Kong, Hong Kong University of Science and Technology, Kadir Has University, Koc University, National Graduate Institute for Policy Studies, Sabanci University, Seoul National University, Universit di Milano-Bicocca, University of Tokyo, Otaru University of Commerce for comments. The research is supported by Grants-in-Aid for Scientific Research (B) 22330062 from Japan Society for the Promotion of Science.

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survey data. These data were collected by the Osaka University 21st Century Center of Excellence (COE) program. These data contain questions concerning worldviews and religions and hypothetical questions about parental behavior as well as socioeconomic variables.

What a parent views as important can affect his children's economic behaviors and outcomes. This type of effect can happen at the individual level and at the aggregate level of a culture. For example, Guiso, Sapienza and Zingales (2006) show that countries with higher percentages of people who say that it is important to encourage children to learn thrift and savings tend to have higher national saving rates.

For the purpose of considering effects of culture, we use the concept of worldviews. Here we use the word "worldview" as the explicit and implicit beliefs, norms, logic, and emotions that underlie a culture. The word "worldview" was first used by a book published by Kant in 1790 (Kant, 1987) according to Naugle (2002). Since then the word has been used by many philosophers such as Hagel (1961, first published in 1807), Kierkegaard (1966), and Heidegger (1982). These philosophers tended to use the word for the cognitive aspect of how a person views the world. In Anthropology, the word has been used in a broader way to encompass the cognitive, normative, and emotional aspects as reviewed by Hiebert (2008). Hiebert models a culture in three layers. Inspired by Hiebet's model, we model the surface of a culture as the sensory level that includes cultural behavior such as rituals and economic behavior. The next level is explicit belief systems that can include religious belief systems. The deepest level is implicit and contains different ways that people categorize and carry out logic. In the current world with globalization, each person is exposed to different cultures and their underlying worldviews. So each person is thought to attach subjective probabilities to different worldviews.

This paper focuses on parents' "tough love" attitudes that allow children to suffer in the short-run when there are long-run benefits. This is motivated by models of preference formation (e.g., Bisin and Verdier 2001, Akabayashi 2006, and Bhatt and Ogaki 2012abc), models of temptation (e.g., Gul and Pesendorfer 2001, Krusell, Kuruşç, and Smith 2010, and Bhatt and Ogaki 2012b), and the empirical puzzle found in the companion paper, Kubota, Kamesaka, Ogaki, and Ohtake 2012.

In the companion paper, we sought to examine whether or not parents' time discount factors affect their attitude toward their children as predicted by Bhatt and Ogaki's (2012a) tough love model. In that paper, we used

the Osaka University Global COE survey data for Japan and the United States, which continued the survey data we use in the present paper. The main question we asked in the companion paper was how parents' tendencies for tough love behavior depend on various measures of time discounting for parents' own lending and borrowing over different time horizons. We found evidence that is consistent with the tough love model. One empirical puzzle we found was that proportionately more U.S. parents show tough love to young children before the school age than Japanese parents even after controlling for time discounting and other economic and demographic factors. This is especially puzzling because more patient parents tend to show tough love, and Japanese parents are more patient than U.S. parents. A possible solution to this puzzle is cultural differences between the two countries, and so we examine effects of differences in worldviews on parents' attitudes in this paper.

When a parent feels that it is better in the long run to discipline a child, he is often tempted not to do so because he does not want to see her suffer now. We use Bhatt and Ogaki's (2012b) temptation model to organize our thoughts on how worldviews affect parents' tough love attitudes and behavior. Worldviews can affect his tough love behavior by changing his view on the rate of return for the behavior, which depends on the probability distribution of the long-run benefit to the child.

One way is through the confidence of parents in a worldview and beliefs and values associated with it. If a parent is very confident in a worldview, then the parent is more likely to be tough on the child because the long-run benefit is surer. Thus the confidence in worldviews affects the riskiness of the long run benefit of the tough love behavior. As we will see, our data show that people in the United Sates are much more confident than people in Japan. Hence this difference can help explain the puzzle.

Another way is related to how suffering is viewed in different worldviews. Some people think that suffering has a positive meaning such as promoting personal development. We call this the positive view of suffering. Other people think that suffering has a negative meaning such as a consequence of past bad behavior. We call this the negative view of suffering. The neutral view of suffering holds that suffering is meaninglessly random. Comparing with the neutral and negative views of suffering, the positive view encourages parents to do a tough love behavior by increasing the expected value of the long-run benefit. So, other things being equal, a parent with the positive view of suffering should find it easier to fight against the temptation than a

person with the neutral or negative view.

The worldview of suffering is related to religions. The positive view is often held by Christians who believe that all knowing, almighty God allowed His only Son to suffer on the cross for the purpose of saving the world. Christians often conclude that their own suffering and other people's suffering were allowed by God for a purpose such as personal development. The negative view is often held by Buddhists who believe in the doctrine of reincarnation. Without the doctrine of reincarnation, it is difficult to hold the negative view of suffering when babies and young children suffer from illnesses and accidents. It is hard to believe that they have done sinful behavior to deserve the suffering during their short lives. However, with the doctrine of reincarnation, it is easy to explain that their illnesses and accidents are consequences of their behavior in previous lives. Buddhism has the doctrine of reincarnation and typically emphasizes deliverance from suffering, and so tends to promote the negative view of suffering. There are many Buddhists in Japan while there are many Christians in the United States. Hence this difference can help explain the puzzle.

However, it is often observed that people who belong to the same religion holds very different worldviews and that people who belong to different religions have some similar worldview beliefs. Hence worldview differences may be more important than religious differences in determine parental attitudes. It should be noted that one's worldview about suffering is related to how randomness is viewed at least unconsciously. In the probability theory of time series of random variables, a whole history can be viewed as determined by a point in the probability space. If the point was chosen meaninglessly by the nature as in the Naturalistic worldview, then accidents, illnesses, natural disasters occur meaninglessly randomly. Hence the neutral view of suffering is appropriate. If the point was chosen with a meaning, for example by God as in the theistic worldview, then the positive or negative views of suffering are more appropriate. If one believes that God exists, then he is more likely to take the positive or negative views of suffering. If one believes in the evolution theory, he is more likely to take the neutral view of suffering. There are differences in these worldview beliefs between the United States and Japan, and they can help explain the puzzle.

The rest of this paper is organized as follows. Section 2 gives a literature review. Section 3 explains a model of temptation. Section 4 contains concluding remarks.

2 Related Literature

This paper is part of the literature on effects of culture (including religion) on economic outcomes. There are differences in economic outcomes such as saving rates and growth rates across countries and individuals. Recently, many economists are studying culture as a possible determinant of these differences. Guiso, Sapienza, and Zingales (2006) gives an insightful survey of this literature. Until recently, economists have been reluctant to use culture to explain economic phenomena. This is mainly because the notion of culture is broad and vague. As a result, it is difficult to formulate refutable hypotheses about culture. For this reason, it is important to carefully define culture. Guiso, Sapienza, and Zingales (2006) defines culture as "those customary beliefs and values that ethic, religious, and social groups transmit fairly unchanged from generation to generation." This definition is intentionally narrow in order to overcome this difficulty. Since their definition involve beliefs and values that are important components in worldviews, it is closely related to the definition of culture as three layers of behavior, belief systems, and the core worldview. Norms are part of worldviews, and identify economics of Akerlof and Kranton (2000, 2005) can be viewed as examples of how worldviews affect behavior. Effects of culture on economic behavior are confirmed in lab experiments. For example, Herrman, Thoni, and Gacheter (2008) and Benjamin, Choi, and Fisher (2010) show that contributions in public goods can depend on cultures and norms. Some researchers are finding effects of culture on economic decisions are related to activities of different brain regions (e.g. Berns et al. 2012).

Another element is the development of behavioral economics. In traditional economics, the methodology to exclusively focus on outcomes of behavior without paying attention to psychological and emotional process in decision makings became prevalent in the years after World War II. Because of this methodology, economists have been reluctant to use data collected by questions using hypothetical situations and questions about subjective feelings. However, these types of questions have been used in other social science disciplines such as psychology and sociology. Behavioral economics, which incorporates methodologies form other disciplines, has developed and successfully used data involving these types of data. Using these types of data has been important in the literature in economics on culture.

For example, Guiso, Sapienza, and Zingales (2003) use questions with the subjective nature in the World Value survey to measure attitudes that are

considered to affect economic performance. One such attitude is the parental attitude to teach children about thriftiness. They show that people who were raised religiously are more likely to have this attitude. Guiso, Sapienza, and Zingales (2006) show that countries which have the stronger attitude to teach thriftiness to children have higher national savings.

This paper is also related to the literature of cultural preference formation that started by Bisin and Verdier (2001). In the theoretical models of this literature, preferences are endogenous, and parents affect formation of children's formation. In some models (e.g. Doepke and Zilibotti 2008), parents are purely altruistic in their decisions to affect children's preferences. In other models (e.g., Bisin and Verdier 2001, Akabayashi 2006, and Bhatt and Ogaki 2012ac), parents are also paternalistic in the sense that they try to affect children's preferences in the way that the parents prefer. These models can be consistent with recent empirical evidence on pecuniary and non-pecuniary parental punishments (see Weinberg (2001), Hao, Hotz, and Jin (2008), and Bhatt (2011) for empirical evidence). In contrast, the standard intergenerational altruism model by Barro (1974) and Becker (1974) do not predict parents' discipline behavior in situations in which we expect parents in our real lives to discipline their children. For example, a striking implication of the standard altruism model is that when the child becomes impatient, transfers from the parent to the child do not change when the child is borrowing constrained as Bhatt and Ogaki (2012a) showed.

Bhatt and Ogaki (2012a) modified the standard model to develop the tough love model of intergenerational altruism, so that it implies that the parent lowers transfers to the child when the child exogenously becomes impatient under a wide range of reasonable parameters. They modeled parental tough love by combining the two ideas that have been studied in the literature in various contexts. First, the child's discount factor is endogenously determined, so that low consumption at young age leads to a higher discount factor later in her life. This was based on the endogenous discount factor models of Uzawa (1968) except that the change in the discount factor is immediate in Uzawa's formulation whereas a spoiled child with high consumption progressively grows to become impatient in our formulation. Recent theoretical models that adopt the Uzawa-type formulation include Schmitt-Grohé and Uribe (2003) and Choi, Mark, and Sul (2008). Second, the parent evaluates the child's lifetime utility function with a constant discount factor that is higher than that of the child. Since the parent is the social planner in our simple model, this feature is related to recent mod-

els (see, e.g., Caplin and Leahy (2004); Sleet and Yeltekin (2007); Phelan (2006), and Farhi and Werning (2007)) in which the discount factor of the social planner is higher than that of the agents. This model provides a basic guidance for our empirical work to look at parental attitudes to discipline children with time discounting even though it does not cover all aspects of our empirical work.

Another literature related to this paper is the theory of temptation (e.g., Gul and Pesendorfer 2001). The model explained in the next section is most closely related to a model of Krusell, Kuruşç, and Smith's (2010), which nests Laibson's (1997) quasi-hyperbolic discounting model as a special case.

3 A Model of Temptation

This section explains Bhatt and Ogaki's (2012b) temptation model of intergenerational altruism, which we use to interpret our empirical results. Imagine a two-period model economy with two agents, the parent and the child. The timing of the model is assumed to be such that the life of the parent and the child overlap in the first period of the child's life. The parent is altruistic toward the child. He assigns a weight of η to his own utility, where $0 < \eta < 1$. The parent is endowed with exogenous income denoted by Y_p in period 1, the last period of his life. Then, given this income, the parent optimizes by choosing how much to consume (C_p), transfer to the child in period 1 (T), and leave as bequest (B) that the child will receive in period 2. Fourth, following Gul and Pesendorfer (2004) and Krusell et al (2010), temptation and self-control issues are incorporated in the parent's decision making. Fifth, the child is assumed to be non-altruist and have no temptation problem. The child is assumed to derive utility only from her own consumption stream $\{C_t\}_{t=1}^{2}$.[6] Sixth, we assume that the child has no income in period 1 and is also borrowing constrained in period 1 of her life. Finally, the child's second period income is assumed to be exogenously given and is denoted by Y_k.

We now introduce parental worldviews into the above framework. Suppose there are two types of worldviews. Under the first view, parent believes that succumbing to temptation to spoil the child will lead a cost to the child in terms of lower income in the second period of her life. We formalize this

[6]In this simple consumption good economy, we view consumption as a composite good that may include leisure activities such as TV time, video game time etc.

cost by assuming it to be a quadratic and increasing function of the difference between actual transfers (T) and the *norm* for transfers denoted by (T_0):

$$d(T - T_0) = \alpha \times (T - T_0)^2 \quad ; \ \alpha > 0, T > T_0 \tag{1}$$

The cost is 0 if T is less than or equal to T_0. Let p denotes the subjective probability attached to this worldview. Under the second worlview, there is no such cost and $(1 - p)$ is the probability attached to this worldview.

The budget constraints in period 1 are:

$$Parent: \ C_1^p = Y_p - T - B \tag{2}$$

$$Child: \ C_1^k = T \tag{3}$$

The budget constraint for the child in period 2 depends on the parental worldview.

$$C_{21}^k = Y_2^k + RB - \alpha \times (T - T_0)^2 \ with \ probability \ p \tag{4}$$

$$C_{22}^k = Y_2^k + RB \ with \ probability \ 1 - p \tag{5}$$

The parent's decision problem solves

$$\max_{(C_1^p, T, B)} \Big[p\{u_1(...) + v_1(...)\} + (1-p)\{u_2(...) + v_2(...)\} \Big] - \max_{(\widetilde{C}_1^p, \widetilde{T}, \widetilde{B})} \{p \ v_1(...) + (1-p)v_2(...)\} \tag{6}$$

where $u(.)$ is commitment utility, $v(.)$ is temptation utility. Using functional-form assumptions that are similar to Krusell et al. (2010) and substituting out all the budget constraints, we specify:

$$u_1(...) = \frac{(Y_p - T - B)^{1-\sigma}}{1-\sigma} + \eta \left(\frac{T^{1-\sigma}}{1-\sigma} + \delta \frac{(RB + Y_k - \alpha(T - T_0)^2)^{1-\sigma}}{1-\sigma} \right)$$

$$v_1(...) = \gamma \left[\frac{(Y_p - T - B)^{1-\sigma}}{1-\sigma} + \beta^* \eta \left(\frac{T^{1-\sigma}}{1-\sigma} + \delta\beta \frac{(RB + Y_k - \alpha(T - T_0)^2)^{1-\sigma}}{1-\sigma} \right) \right]$$

$$u_2(...) = \frac{(Y_p - T - B)^{1-\sigma}}{1-\sigma} + \eta\left(\frac{T^{1-\sigma}}{1-\sigma} + \delta\frac{(RB + Y_k)^{1-\sigma}}{1-\sigma}\right)$$

$$v_2(...) = \gamma\left[\frac{(Y_p - T - B)^{1-\sigma}}{1-\sigma} + \beta^*\eta\left(\frac{T^{1-\sigma}}{1-\sigma} + \delta\beta\frac{(RB + Y_k)^{1-\sigma}}{1-\sigma}\right)\right]$$

where δ is the discount factor, β^* is a parameter capturing the strength of the parent's self interest, and $\beta < 1$ regulates temptation impatience relative to commitment impatience. γ is a parameter capturing the strength of temptation, and α captures the strength of the cost of deviating from norm transfers.

They perform two types comparative statistics for this model by simulations. For each type, T_0 is set to be equal to the optimal transfer for the commitment utility function. The first type is concerned about how the optimal transfer responds when p changes. It is observed that the parent transfers less to the child as p increases. The parent who is confident in the first worldview (p=1) transfers less to the child compared with the parents who are less confident in that worldview ($p < 1$). The parent who is confident in the second worldview ($p = 0$) transfers more to the child compared with the parents who are less confident in that worldview ($p > 0$). The second type is concerned about how the optimal transfer responds when R becomes larger. It is observed that as R increases, parents transfer less to the child.

4 Data

The analyses in this paper are based on data from two questionnaire surveys: (1)Osaka University 21st Century Center of Excellence Program entitled "Preference and Life Satisfaction Survey" conducted in Japan(PLiSS-JAP); and the same survey conducted in the US (PLiSS-US).

A brief description of each survey follows. PLiSS-US and PLiSS-JAP is a panel study, which started in February 2004 as part of the Osaka University 21st Century Center of Excellence Program. PLiSS-JAP has been conducted annually since 2004 using a random sample drawn from 6,000 individuals by a placement@(self-administered) method. A new sample of 2,000 people which were traced was added to the 2006 survey. The 2008 survey also added a

new sample of 3,000 people by mailing method. This research will use only the 2008 survey data because the cross-sectional sample size is the largest since 2004 in the PLiSS-JAP that contain worldview questions. The number of respondents was 3,975.

In order to evaluate the tough love attitudes of parents, we use the following two questions. We call these "Fever" and Concert" questions, respectively.

The Fever Question: Imagine that you have a 5-year old child that has a high fever and is in pain. The child's doctor tells you that both the fever and pain are harmless. He can give you a medicine that cures the sickness but slightly weakens the child's immune system when the child becomes 50 years old. What would you do? (X ONE Box)

1 □ I would give the medicine to the child if the sickness is known to last for one day.

2 □ I would give the medicine to the child if the sickness is known to last for two days.

3 □ I would give the medicine to the child if the sickness is known to last for one week.

4 □ I would give the medicine to the child if the sickness is known to last for one month.

5 □ I would not give the medicine to the child.

The Concert Question: Imagine that you have a 19-year old child that has been working at a restaurant for the last month. The child has been doing so to earn money to buy a concert ticket. You agreed that it would be all right for the child to buy the ticket as long as the child earns the necessary money. The child just got fired, and asked you to help by providing one tenth of the necessary money. The tickets will be sold out if you do not provide the money. What would you do in this situation? (X ONE Box)

X ONE Box)

1 □ I would provide the money regardless of the reason why the child got fired.

2 □ I would provide the money if the child is not at fault for being fired.

3 □ I would not provide the money because it is not good for my child.

4 □ I would not provide the money because it will be a waste of money.

We report the distributions of answers to the "Fever" question in Figure 1. For the "Fever" question, we interpret Answers 1-4 as parents' behaviors

motivated by spoiling love with tougher love indicated by a higher numbered answer and Answer 5 as parents' behaviors motivated by tough love. With these interpretations, we conclude that 53% of American parents show tough love, while only 30% of Japanese parents show tough love to a 5-year old child. This result is not surprising given casual observations relatively little discipline children receive in Japan in their pre-school ages compared with children in the United States: it is relatively more often in Japan than in the United States to find pre-school children running around in stores while their parents do not do anything, for example.

In the companion paper, Kubota et al. (2012), we reported that there is not striking difference between U.S. and Japanese respondents for the "Concert" question. Because we are interested in the cultural differences in the present paper, we focus on the "Fever" question. However, we cannot distinguish between selfish parents who just do not want to use their time or money to give the medicine from tough love parents who truly are concerned about the long-run happiness of their children if we only use the "Fever" question. For this reason, we use the "Concert" question to classify some respondents as selfish. Given that the parent's behavior is the same for Answer 3 and Answer 4, the only difference is the motivation. Answer 3 indicates that the motivation is for the good of the child, while Answer 4 indicates that the motivation is about the money. After removing the respondents who are classified as selfish by the "Concert" question, we classify the remaining respondents as "tough love" or "spoiling love" according to the "Fever"' question. The results are in Figure 2. The fraction of people who chose Answer 4 is 5.7% in the United States, while the fraction is 1.3% in Japan. The international difference in the fraction of the respondents who are classified as "tough love" is 23% in Figure 1, and the difference is 20% in Figure 2. Thus we have smaller international difference in Figure 2, but the difference is still striking.

We think that most parents are tempted to give the medicine in the situation of the question even if they think that it is better not to give the medicine. A parent needs to have a strong conviction about his decision not to give the medicine if he is to fight against the temptation for one month. So we think that a type of a person who tends to have strong conviction is more likely to choose Answer 5. We constructed variables called "Confidence about spiritual questions" and "Confidence about non-spiritual questions" to measure degrees of confidence for spiritual and non-spiritual dimensions. In order to construct these variables, we give points to answers to certain

questions. For the "Confidence about spiritual questions" variable, we gave one point to either Answer 1 "You totally disagree to it." or Answer 5 "You totally agree to it." for each of the following statements: "Life after death exists," "God or gods exist," "God knows about all wrong we've done," "Spirits and Ghosts exist," "Heaven exists."

For the "Confidence about non-spiritual questions" variable, we gave one point to either Answer 1 or Answer 5 for each of the following statements: "I will never be robbed," "I always keep my promise," "I know a lot about politics," "What is written in science text books is true," "I have a good memory," and "Human beings evolved from other living things." We then construct another variable called "Confidence" by adding these two variables.

We report the distributions of these three variables in the United States and Japan in Figure 3,4, and 5, and their descriptive statistics in Table 1. Figure 3 is for the "Confidence" variable, Figure 4 is for the "Confidence about spiritual questions" variable, and Figure 5 is for the "Confidence for non-spiritual questions" variable. Figure 3 shows that the fraction of the U.S. people who scores 0 point for the "Confidence" variable is about 8%, the fraction of the people peaks for 6 points at the level of about 14%, and then the fraction gradually declines with the fraction of 1% people scoring the full 11 points. The fraction of the Japanese people who scores 0 point for this variable is about 32%, and it gradually declines to about 1% for 9 points. No one in Japan scored 10 or 11 points. This variable shows a sharp cultural difference in the two countries. The distributions of the "Confidence for spiritual questions" and the "Confidence for non-spiritual questions" variable show similar cultural differences except that the U.S. distribution of the "Confidence for spiritual questions" variable is bimodal with two peaks at 0 point and 4 points.

Table 1 reports descriptive statistics of answers for questions related to worldviews and religions. Appendix 1 lists these questions that were common to both countries.[7] Appendix 2 explains religious affiliation questions used in each of these two countries. Because there are many more Protestant Christians in the United States than in Japan, the U.S. survey asked more detailed denomination affiliation questions within the category while the Japanese survey combined all Protestant denominations in one category.

[7]For the purpose of clearer presentation, we reversed the ordering of the answers. In the original questions, Answer 1 was "You totally agree to it" or "It is particularly true for you."'

Scientology was an option to the question only in the U.S. survey because there has virtually been no one affiliated with Scientology in Japan. In our analysis, for each of these variables, we constructed the "Yes" dummy by assigning the value of 1 to Answers 4 and 5 and zero otherwise. We also constructed the "No" dummy by assigning the value of 1 to Answers 1 and 2 and zero otherwise. We report descriptive statistics only for selected world-view beliefs in order to save space. The section criterion is explained later when we explain results for Table 4.

If we assume that parents with higher discount factors for their own financial decisions use their higher discount factors to evaluate their children's life time utilities, then the tough love model predicts tougher parental behaviors toward their children for parents with higher discount factors for their own financial decisions. To test this hypothesis, we need data for parents' patience. PLiSS-US and PLiSS-JAP contains the questions about patience of respondents. We use the hypothetical questions to ask the attitude of intertemporal choices of receiving cash. There are 5 different questions in this type. These questions are for different settings about the timing of receiving (or paying) cash and the amount of receiving (or paying) cash and are in Appendix 3.

We call the first of these five questions the "Impatience(1)" question. The question starts with "Let's assume you have two options to receive some money. You may choose Option "A", to receive $100 in two days; or Option "B", to receive a different amount in nine days. Compare the amounts and timing in Option "A" with Option "B" and indicate which amount you would prefer to receive for all 8 choices." Then it lists a table of 8 choices for the two options and the corresponding interest rate for each choice (see Appendix 1 for more complete descriptions of these five questions.) Option B ranges from $99.81 to $105.74. These eight options correspond with the annual interest rates of -10%, 0%, 10%, 20%, 50%, 100%, 200%, and 300%, respectively. The "Impatience(2)" question starts with "Now let's assume that you have the option to receive $100 in ninety days or receive a different amount in ninety-seven days." For this question, the eight choices of Option B and the corresponding interest rates are the same at the "Impatience(1)" question. The "Impatience(3)" question starts with "Now let's assume that you have the option to receive $100 in one month or receive a different amount in thirteen months." For this question, Option B ranges from $95 to $140. These eight choices correspond with the annual interest rates of -5%, 0%, 2%, 4%, 6%, 10%, 20%, and 40%. The "Impatience(4)" question starts with

"Now let's assume that you have the option to receive $10,000 in one month or receive a different amount in thirteen months." For this question, Option B ranges from $9,500 to $11,000. These eight choices correspond with the annual interest rates of -5%, 0%, 0.1%, 0.5%, 1%, 2%,6%, and 10%. The "Impatience(5)" question starts with "Now let's assume that you have the option to receive $10,000 in one month or pay a different amount in thirteen months." For this question, Option B ranges from $9,500 to $11,000. These eight choices correspond with the annual interest rates of -5%, 0%, 0.1%, 0.5%, 1%, 2%,6%, and 10%.

Thus the "Impatience(1)" question is about discounting between two days later and nine days later. The "Impatience(2)" question is about discounting between ninety days later and ninety-seven days later. The "Impatience(3)" question is about discounting between one month later and thirteen months later for $100. The "Impatience(4)" question is about discounting between the same time points in time, but for $10,000. The "Impatience(5)" question is about discounting between the same time points in time for $10,000 as the "impatience(4)" question, but is for paying rather than receiving.

From these five questions, we constructed five patience proxies, which are calculated from the expected values of the range of designated in the questions. The calculation procedure is described in Appendix 4. For our regression analyses, we used a standardized mean of the first four patience proxies called "Impatience(1)", "Impatience(2)", "Impatience(3)", and "Impatience(4)" as our measure of patience. We took the mean to mitigate the measurement error problem. We used the difference between "Impatience(5)" and "Impatience(4)" as a measure of debt aversion. The descriptive statistics of these patience proxies are summarized in Table 1.

Table 1 also reports descriptive statistics for the socioeconomic variables, which are respondent's sex, age, race (only in the U.S. survey), education years, having children dummy, log of household's income, and log of household's financial asset. The questions about income and asset are in Appendix 3.

5 Empirical Results

We estimate the probit model because the dependent variables from the "Fever" question are discrete choice variables. The independent variables are religious and worldview variables, "Confidence" variables, patience proxy

variables, and socioeconomic variables. The results are presented in Tables 2-4 that report the marginal effects.

Table 2 reports the results from the "Fever" question. Regressions (1) and (2) are when we construct the dependent variable by setting it to be 1 if Answer 5 is chosen and 0 otherwise for the "Fever" question. Here we are using our interpretation that Answer 5 indicates the tough love attitude as discussed in the last section. In all regressions, we include the impatience and the debt aversion measures that were found to have statistically significant effects in the companion paper as well as socio economic variables such as the male dummy, age, education years, having children dummy, and log of per capita household income. Also included in all regressions are the product of the dummy variable for being deeply religious and the dummy variables for affiliations of religions. In addition to these variables, we added "Confidence," variables.

First, we focus our discussion on the marginal effects of the "Confidence" variable in Regressions (1). In this regression, the sign of the coefficient for the "Confidence" variable is positive, and the coefficient is statistically significant at the 1% level. If the parent is of the confident type, he tends to show the tough love attitude. Even if a parent judges that being tough on the child is good for the child in the long run, it is tempting to be soft in the short run. A parent who is confident in his judgment can more easily regist this temptation. This confidence, however, may turn out to be overconfidence in some cases as we discussed above. So being tough because the parent is of the confidnet type may or may not be good for the child in the long run. Our focus in this paper is the effect of the type on the disciplin behavior rather than on judging whether or not being tough is good for the child. When we remove the "Confidence" varialbe and add the "Confidence in spiritual questions" and "Confidence in non-spiritual quesitons" variables in Regression (2), the effect of the "Confidence in non-spiritual quesitons" variable is more important in terms of both the statitical significnce level and the magnitude of the point estimate.

Second, we focus on the marginal effect of the religious variables. The sign of the coefficient for the product of "Buddhism" affiliation dummy variable and the "deeply religious" dummy is positive, and the coefficient is statistically significant at the 5% level. Thus, people who belong to Buddhism and are deeply religious are less liekely to have a tough love attitude. This is consistent with our discussion in the Introcution that it is more difficult for a parent to regist the temptation to remove suffering in the short-run in the

Buddhism worldview.

Table 3 reports results for the separate contributions of international differences in various characteristics such as "Confidence" and "Impatience" to the difference in the parental attitudes. The non-linear Blinder-Oaxaca decomposition was conducted by the method for the probit model in Fairlie (2005). The results for Regression (1) for the tough love attitude in Table 2 are reported in column (1). The contribution of the "Confidence" variable is statistically significant at the 1% level. The contribution is 27% of the total explained by the international differences in the explanatory variables. This contribution is by far the largest among the explanatory varialbes. The contribution of the "Buddhism" varialbe is also siginficant at the 1% level. However, the magnitude of the contirbution is very small compared with the "Confidence" varialble. The mganitude of the marginal effect of the Buddhism varialbe is estimated to be large as in Talbe 2, but the contribution of the variable is small because there are few Buddhists who are deeply religious even in Japan. The contribution of the "Confidnece" variable is large and statistically significant for the choice of Answer 1 as reported in column (2) of the table.

Table 4 presents results of a multinomial probit regression when when we we construct the dependent variable for three values: Answer 1, Answers 2-4, and Answer 5 for the "Fever" question. Here our interpretation is that Answer 1 indicates an extremely spoiling love attitude, Answer 5 indicates tough love attitude, and Answers 2-3 mean that the parent is tempted to be spoiling. For Answer 5, both the point estimates and standard errors for the "Confidence" variable are similar to those in Table 2. For Answer 1, the marginal effect of "Confidence" is positive and significant at the 5 % level. In terms of the model in Section 3, this can be interpreted that the parent places a high probability that the rate of return is low becaise the long-run benefit is low when tough love behavior is chosen. Turning to religious varaibles, we observe that for Answer 5 the results for Buddhism are similar to those in Table 2. The sign of the coefficient for the product of "Christianity" affiliation dummy variable and the "deeply religious" dummy is negative for Answer 1, and the coefficient is statistically significant at the 5% level in many regressions. Thus, people who belong to Christianity and are deeply religious are less liekely to show an extremely spoiling love attitude.

Because binomial probit and multinomial probit results are similar in most cases, Table 5 reports the probit regression results when we include both the confidence variable and "Yes" and "No" dummy variables for worldview

beliefs as independent variables. We only report the results for a particular worldview belief when at least one effect of the "Yes"' or "No" dummy variables is significant at the 5% level for either "tough love" or "extremely spoiling love." The effect of the confidence variable remains to be significant at the 1 percent level when a set of "Yes" and "No" dummy variables is included for various worldview beliefs.

Panel A of Table 5 reports results when the dependent variable is the "tough love" dummy variable. The effect of "No" dummy variable for "I always keep my promise" is positive and significant for tough love. Given that no human being has an ability to always keep one's promise, we interpret this result to mean that respondents who do not have the tendency for overconfidence after controlling for the level of confidence are more likely to show tough love. The effect of "No" dummy variable for "Human beings evolved from other living things" is positive and significant at the 5% level. Our interpretation of this result is based on differences in the worldviews of suffereing. Other things being equla, the evolution theory seems to tend to encourage people to think that the origin of human beings is meaninglessly random. So people who reject the evolution theory are more likely to have the positive view of suffering.

Panel B of Table 5 reports results when the dependent variable is the "extremely spoiling love" dummy variable. Both the effect of "No" dummy variable for "God or gods exit" and the effect of "Yes"' dummy variable for "What is written in science textbooks is true" are negative and statistically significant at the 5% level. For each regression, the

Table 6 is for the non-linear Blinder-Oaxaca decomposition for the regression models in Table 5. Panel A reports results when the dependent variable is the "tough love" dummy variable. The contribution of the "confidence" variable is significant at the 1% level, and its size as measured by the fraction of the toal explained is stable between 21% and 26%. The contribution of "No" dummy variable for "I always keep my promise" is significant at the 1% level, and its size is even larger than the "confidence" variable. We also note that adding the "Yes" and "No" dummy varaibles to the regression increases the total explained from 51% in Talbe 3 to 73%. The contribution of "No" dummy variable for "Humand beings evolved from other living things" is significant at the 1% level, and its size is about 40% of that of the "confidence" varialbe. Comparing with the size of the contribution of the Buddhism variable in Table 3, the effect of the worldview belief about the evolution theory is much more important. Panel B reports results when the dependent vari-

able is the "extremely spoiling love" dummy variable. No worldveiw belief variable is significant at the 5% level, and the point estimates of the size of the contribution are small.

Table 7 reports the results when we combine the "Fever" with the classification of selfish respondents from the "Concert" question as explained in the last section. With the three possible values for the dependent variable, we ran a multinomial probit regression. With this modification, the results for tough love are similar to those of Table 2. The effect of the confidence variable is significant at the 1% level in each of the regressions.

6 Concluding Remarks

Because the "Confidence" variables we constructed exhibit striking differences between Japan and the United States, these variables seem to succeed in quantifying a large cultural difference in Japan and the United States for the dimension of confidence in beliefs. Our empirical evidence indicates that these variables have explanation power for individual and cross-country differences in parents' attitudes toward children, an important economic behavior. Our evidence also suggests that worldviews and religions affect tough love and spoiling love attitudes. The magnitude of the contribution of the "Confidence" variable to the difference in parental attitudes is larger than the contribution of other variables including the dummy variable for being deeply religious in Buddhism.

It should be noted that cultural differences are differences in distributions of characteristics in two cultures, while individuals who belong to a culture may not show the characteristic of the culture. U.S. people tend to be much more confident in worldview beliefs than Japanese people as shown by the mode of 6 in U.S. and the mode of 0 in Japan for the "Confidence" variable. However, some U.S. individuals score 0 for the "Confidence" variable, and some Japanese individuals score 6 or more for the variable. In each culture, an individual who is more confident is more likely to show tough love.

Effects of some of the religious variables were statistically significant with sizable marginal effects in probit regressions. However, in terms of the contribution to explain international differences in parental attitudes, the "Confidence" variable and some worldview belief variables were much more important than the religious variables.

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Table 1. Descriptive Statistics

	United States			Japan		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Worldview						
God or Gods exists						
Yes dummy	1470	0.79	0.41	2477	0.40	0.49
No dummy	1470	0.07	0.26	2477	0.21	0.41
I always keep my promise						
Yes dummy	1468	0.21	0.41	2479	0.84	0.37
No dummy	1468	0.52	0.50	2479	0.02	0.15
What is written in science text books is true						
Yes dummy	1487	0.28	0.45	2477	0.47	0.50
No dummy	1487	0.30	0.46	2477	0.06	0.24
Human beings evolved from other living things						
Yes dummy	1460	0.39	0.49	2472	0.57	0.49
No dummy	1460	0.39	0.49	2472	0.10	0.30
Confidence						
Confidence about spiritual questions	1356	4.54	2.68	2444	1.95	2.18
Confidence about non-spiritual questions	1484	4.16	1.12	2478	3.02	1.02
Religions						
Christian × Deeply religious dummy	1492	0.32	0.47	2482	0.01	0.09
Protestant × Deeply religious dummy	1492	0.15	0.36			
Catholic × Deeply religious dummy	1492	0.12	0.32			
Other Christian × Deeply religious dummy	1492	0.05	0.21			
Buddhism × Deeply religious dummy				2482	0.04	0.20
Otherwise × Deeply religious dummy	1492	0.03	0.17	2482	0.02	0.13
Preference and socioeconomic variables						
Impatience	1492	0.07	0.84	2482	0.06	0.88
Debt aversion	1492	0.04	0.08	2482	0.03	0.04
Respondent is male dummy	1492	0.49	0.50	2482	0.49	0.50
Respondent's age	1492	46.09	16.03	2482	49.66	13.08
Respondent's years of schooling	1492	14.00	2.61	2482	13.31	2.16
Having children dummy	1492	0.68	0.47	2482	0.80	0.40
Log of per capita household's income	1492	5.34	0.95	2482	5.17	0.67
White dummy	1492	0.90	0.30			
Non-white dummy	1492	0.10	0.30			

Table 2. Results Confidence and Religions

Dependent variable:	Tough love dummy		Spoiling love dummy	
Model:	(1)	(2)	(3)	(4)
Confidence	0.015***		0.003**	
	(0.003)		(0.001)	
Confidence about spiritual questions		0.009*		0.004*
		(0.005)		(0.002)
Confidence about non-spiritual questions		0.025***		0.003
		(0.007)		(0.003)
Christian × Deeply religious dummy	-0.012	-0.004	-0.020**	-0.020**
	(0.028)	(0.029)	(0.009)	(0.009)
Buddhism × Deeply religious dummy	-0.118**	-0.115**	0.015	0.015
	(0.047)	(0.048)	(0.024)	(0.024)
Otherwise × Deeply religious dummy	0.112**	0.118**	0.000	0.000
	(0.056)	(0.056)	(0.021)	(0.021)
Japanese dummy	-0.178***	-0.178***	-0.008	-0.008
	(0.021)	(0.021)	(0.009)	(0.009)
Impatience	-0.044***	-0.043***	0.006	0.006
	(0.012)	(0.012)	(0.005)	(0.005)
Debt aversion	0.516***	0.508***	0.012	0.013
	(0.167)	(0.167)	(0.063)	(0.063)
Having children dummy	-0.032	-0.032	-0.002	-0.002
	(0.021)	(0.021)	(0.010)	(0.010)
Years of schooling	0.004	0.004	-0.008***	-0.008***
	(0.004)	(0.004)	(0.002)	(0.002)
Log of per capita household's income	0.027**	0.027**	-0.013***	-0.013***
	(0.011)	(0.011)	(0.004)	(0.004)
Male dummy	0.041**	0.043***	0.020***	0.020***
	(0.017)	(0.017)	(0.007)	(0.007)
Age	0.002***	0.002***	0.001***	0.001***
	(0.001)	(0.001)	(0.000)	(0.000)
African-American dummy	0.020	0.024	0.133***	0.133***
	(0.051)	(0.051)	(0.042)	(0.042)
Otherwise dummy	0.021	0.020	-0.016	-0.016
	(0.101)	(0.101)	(0.037)	(0.037)
Log likelihood	-2385	-2384	-803	-803

Note: Number of observations are 3800 in each models. Tough love dummy is one if respondent answers choice 5 in "Fever" and zero if otherwise. Extremely spoiling love dummy is one if respondent answers choice 1 in "Fever" and zero if otherwise. This is estimated by probit model. The figures are marginal effect. Standard errors are shown in the parentheses. *, **, and *** indicate the variables are significant at 10%, 5% and 1% significance level, respectively.

Table 3. Non-linear decomposition of U.S./Japan gaps in tough love attitudes

	Tough love dummy			Extremely spoiling love dummy		
	(1)			(2)		
Confidence	0.063	(0.008)	***	0.009	(0.003)	***
Christian × Deeply religious dummy	0.020	(0.008)	**	-0.006	(0.003)	*
Buddhism × Deeply religious dummy	0.005	(0.001)	***	-0.001	(0.001)	
Otherwise × Deeply religious dummy	0.002	(0.001)	**	0.000	(0.000)	
Impatience	-0.001	(0.000)	*	-0.001	(0.001)	
Debt aversion	0.008	(0.002)	***	0.000	(0.001)	
Having children dummy	0.005	(0.002)	**	0.000	(0.001)	
Years of schooling	0.004	(0.002)		-0.007	(0.002)	***
Log of per capita household's income	0.007	(0.002)	***	-0.002	(0.001)	***
Male dummy	0.000	(0.000)		0.000	(0.000)	
Age	-0.004	(0.002)	**	-0.007	(0.001)	***
African-American dummy	0.007	(0.004)	*	0.018	(0.004)	***
Otherwise dummy	0.002	(0.002)		0.000	(0.001)	
Prob (dependent var.=1 | Japanese dummy=0)	0.524			0.066		
Prob (dependent var.=1 | Japanese dummy=1)	0.295			0.057		
Difference	0.229			0.009		
Total explained	0.118			0.004		
% of total explained	51%			43%		
% of Confidence explained	27%			104%		

Note: Number of observations are 3800 in each models. Tough love dummy is one if respondent answers choice 5 in "Fever" and zero if otherwise. Extremely spoiling love dummy is one if respondent answers choice 1 in "Fever" and zero if otherwise. Standard errors are shown in the parentheses. *, **, and *** indicate the variables are significant at 10%, 5% and 1% significance level, respectively.

Table 4. Results of worldviews

Dependent variable:	Tough love dummy				Extremely spoiling love dummy			
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
God or Gods exists								
Yes dummy	0.004				-0.003			
	(0.021)				(0.009)			
No dummy	0.043				-0.020**			
	(0.027)				(0.009)			
I always keep my promise								
Yes dummy		0.005				-0.009		
		(0.023)				(0.010)		
No dummy		0.063**				-0.006		
		(0.028)				(0.011)		
What is written in science text books is true								
Yes dummy			0.007				-0.015**	
			(0.018)				(0.007)	
No dummy			0.023				-0.004	
			(0.026)				(0.010)	
Human beings evolved from other living things								
Yes dummy				0.030				-0.003
				(0.019)				(0.008)
No dummy				0.059**				0.003
				(0.027)				(0.011)
Confidence	0.013***	0.014***	0.014***	0.013***	0.004***	0.004**	0.004**	0.003**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.001)	(0.001)	(0.002)
Log likelihood	-2384	-2382	-2385	-2383	-801	-803	-801	-803

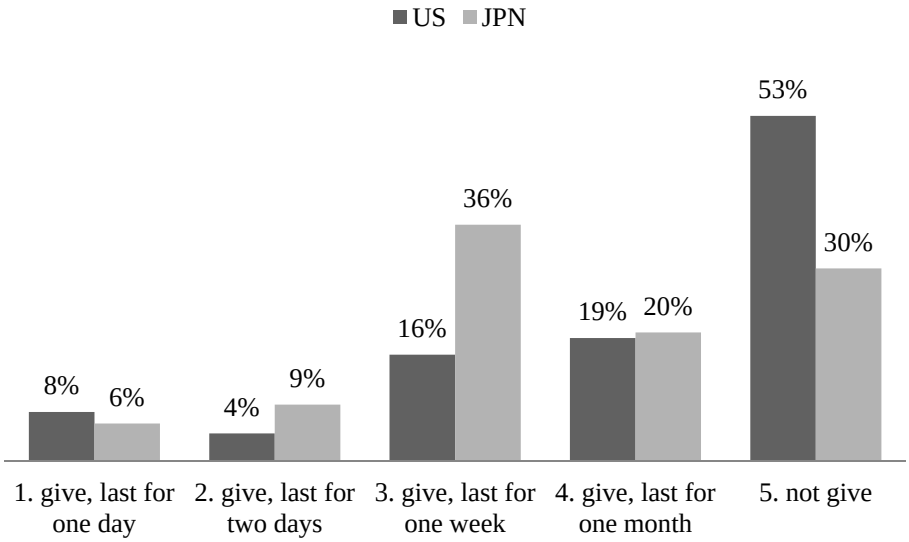
Note: Number of observations are 3800 in each models. Tough love dummy is one if respondent answers choice 5. in "Fever" and zero if otherwise. Extremely spoiling love dummy is one if respondent answers choice 1. in "Fever" and zero if otherwise. We add the control variables concerning to religious, Japanese dummy, and preference and socioeconomic variable in like manner of estimation models in Table 2. This is estimated by probit model. The figures are marginal effects. Standard errors are shown in the parentheses. *, **, and *** indicate the variables are significant at 10%, 5% and 1% significance level, respectively.

Table 5. Results of "Fever" with "Concert"

Choice:	Tough love			Spoiling love			Selfish		
Confidence	0.015	(0.004)	***	-0.015	(0.004)	***	0.001	(0.001)	
Religions									
Christian × Deeply religious dummy	-0.015	(0.028)		0.020	(0.029)		-0.005	(0.006)	
Buddhism × Deeply religious dummy	-0.065	(0.179)		0.141	(0.056)	**	-0.076	(0.175)	
Otherwise × Deeply religious dummy	0.112	(0.053)	**	-0.122	(0.054)	**	0.010	(0.010)	
Japanese dummy	-0.162	(0.021)	***	0.186	(0.021)	***	-0.024	(0.008)	***
Impatience	-0.038	(0.012)	***	0.040	(0.012)	***	-0.002	(0.003)	
Debt aversion	0.463	(0.169)	***	-0.555	(0.170)	***	0.093	(0.043)	**
Having children dummy	-0.030	(0.021)		0.041	(0.021)	*	-0.011	(0.006)	**
Years of schooling	0.005	(0.004)		-0.005	(0.004)		0.000	(0.001)	
Log of per capita household's income	0.026	(0.011)	**	-0.020	(0.011)	*	-0.007	(0.003)	**
Male dummy	0.040	(0.016)	**	-0.043	(0.017)	**	0.002	(0.004)	
Age	0.002	(0.001)	***	-0.002	(0.001)	***	0.000	(0.000)	**
African-american dummy	0.026	(0.050)		-0.020	(0.051)		-0.006	(0.010)	
Other race dummy	0.075	(0.102)		-0.070	(0.103)		-0.005	(0.020)	

Note: Number of observations is 3789. This is estimated by multinominal probit model. Log of simulated-likelihood is -2727. The figures are marginal effect. Standard errors are shown in the parentheses. *, **, and *** indicate the variables are significant at 10%, 5% and 1% significance level, respectively.

Figure 1. Distribution of "Fever"



Note: The choice number indicates the following:

1. I would give the medicine to the child if the sickness is known to last for one day.
2. I would give the medicine to the child if the sickness is known to last for two days.
3. I would give the medicine to the child if the sickness is known to last for one week.
4. I would give the medicine to the child if the sickness is known to last for one month.
5. I would not give the medicine to the child.

Figure 2. Distribution of “Fever” with “Concert”

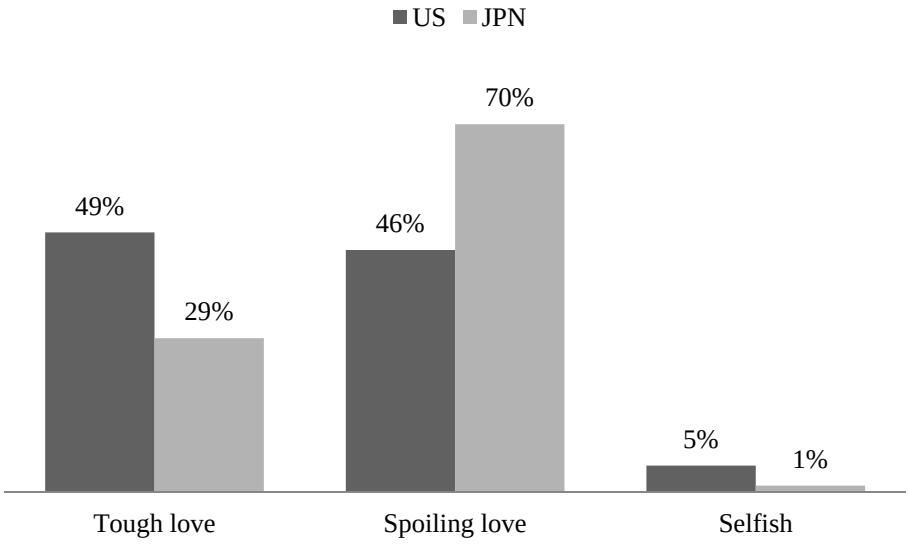
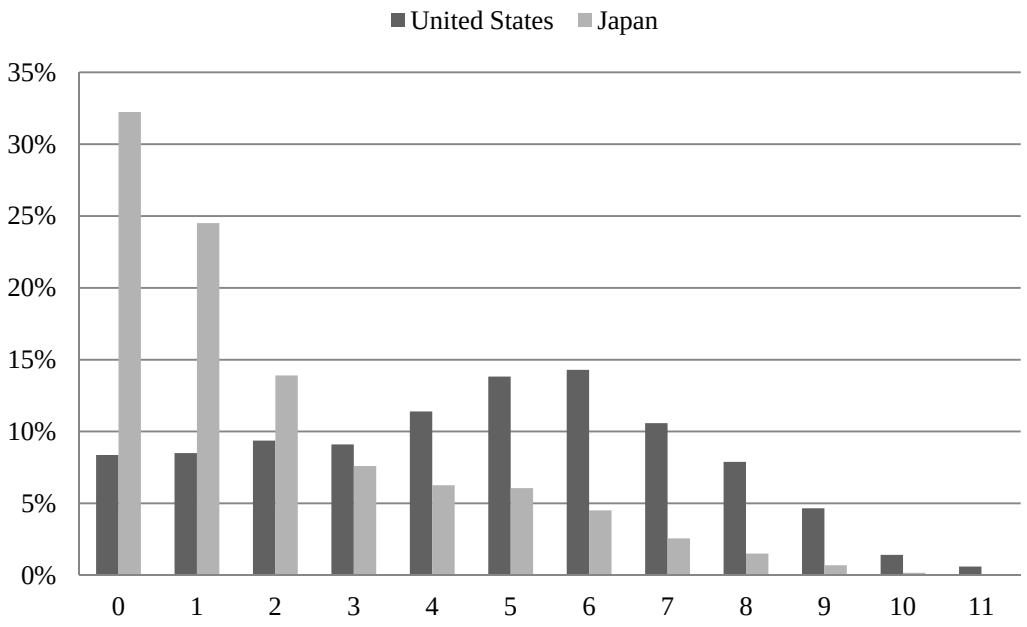
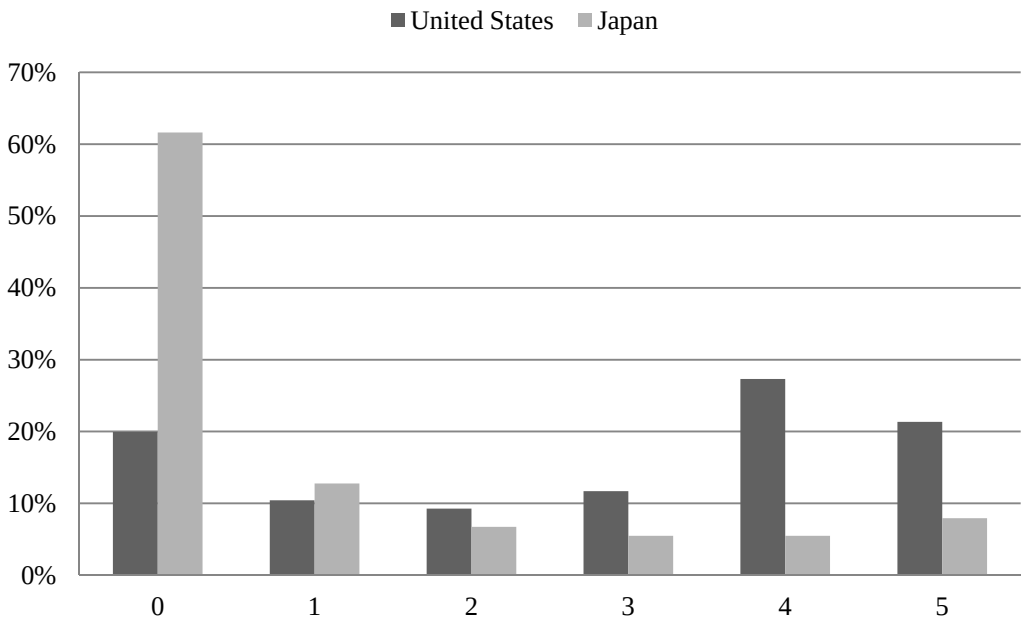


Figure 3. Distribution of "Confidence"



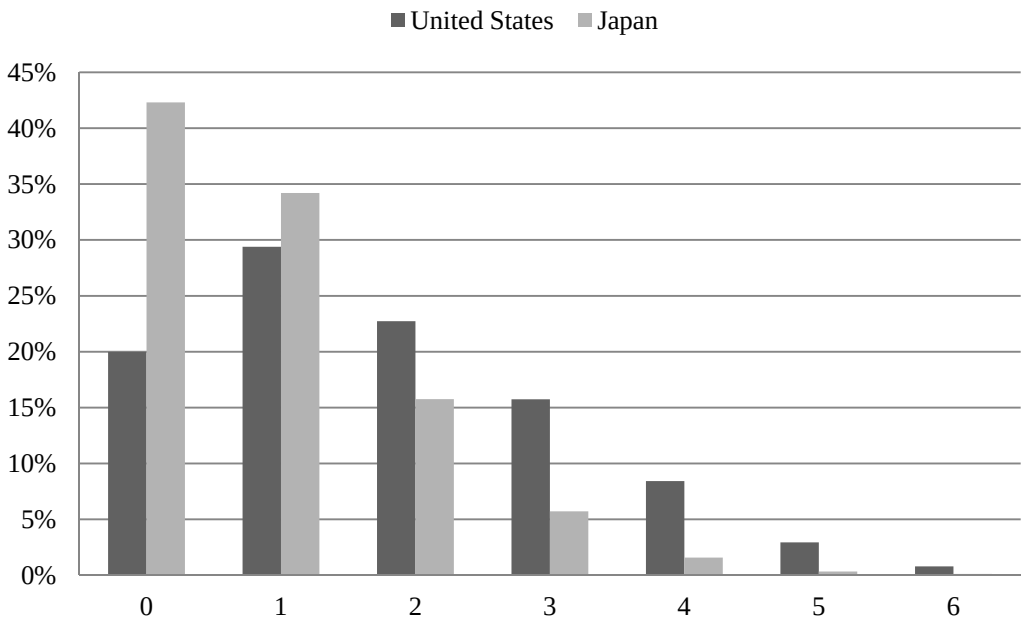
Note: "Confidence" is constructed by summing up the points of "Confidence about spiritual questions" and that of "Confidence about non-spiritual questions."

Figure 4. Distribution of "Confidence about spiritual questions"



Note: In order to construct "Confidence about spiritual questions", we give points to answers to certain questions. We gave 1 point to either Answer 1 "You totally disagree to it." or Answer 5 "You totally agree to it." for each of the following 5 statements: "Life after death exists," "God or gods exist," "God knows about all wrong we've done," "Spirits and Ghosts exist," and "Heaven exists."

Figure 5. Distribution of "Confidence about non-spiritual questions"



Note: In order to construct "Confidence about non-spiritual questions", we give points to answers to certain questions. We gave 1 point to either Answer 1 "You totally disagree to it." or Answer 5 "You totally agree to it." for each of the following 6 statements: "I will never be robbed," "I always keep my promise," "I know a lot about politics," "What is written in science text books is true," "I have a good memory," and "Human beings evolved from other living things."

Appendix 1

Household income

Approximately how much was the annual earned income before taxes and with bonuses included of your entire household for 2007? *(If you are student, please answer the income of your parents' entire household.)*

(X ONE Box)

01 Y Less than $10,000	07 Y $100,000 to less than $120,000
02 Y $10,000 to less than $20,000	08 Y $120,000 to less than $140,000
03 Y $20,000 to less than $40,000	09 Y $140,000 to less than $160,000
04 Y $40,000 to less than $60,000	10 Y $160,000 to less than $180,000
05 Y $60,000 to less than $80,000	11 Y $180,000 to less than $200,000
06 Y $80,000 to less than $100,000	12 Y More than $200,000

Household financial asset

Approximately how much would the balance of financial assets (savings, stocks and insurance, etc.) of your entire household be? *(If you are a student, please answer the balance of financial assets of your parents' entire household.)* **(X ONE Box)**

01 Y Less than $25,000	06 Y $150,000 to less than $200,000
02 Y $25,000 to less than $50,000	07 Y $200,000 to less than $300,000
03 Y $50,000 to less than $75,000	08 Y $300,000 to less than $500,000
04 Y $75,000 to less than $100,000	09 Y $500,000 to less than $1,000,000
05 Y $100,000 to less than $150,000	10 Y $1,000,000 or more

Impatience(1)

Let's assume you have **two options** to receive some money.
You may choose Option "A", to receive $100 in **two days**; or Option "B", to receive a different amount in **nine days**. *Compare the **amounts** and **timing** in Option "A" with Option "B" and indicate which amount you would prefer to receive for all 8 choices.*

Option "A" Receiving In 2 Days	*or*	**Option "B"** Receiving In 9 Days	***Includes An Annual Interest Rate Of:***	→	**Which ONE do you prefer? (X ONE Box For EACH Row)** Option "A"	Option "B"
$100.00		$99.81	-10%		1 Y	2 Y
$100.00		$100.00	0%		1 Y	2 Y

$100.00	$100.19	10%..... 1	Y	2 Y
$100.00	$100.38	20%..... 1	Y	2 Y
$100.00	$100.96	50%..... 1	Y	2 Y
$100.00	$101.91	100%..... 1	Y	2 Y
$100.00	$103.83	200%..... 1	Y	2 Y
$100.00	$105.74	300%..... 1	Y	2 Y

Impatience(2)

Now let's assume that you have the option to receive $100 in **ninety days** or receive a different amount in **ninety-seven days**. *Compare the **amounts** and **timing** in Option "A" with Option "B" and indicate which amount you would prefer to receive for all 8 choices.*

Option "A" Receiving In 90 Days	*or*	**Option "B"** Receiving In 97 Days	***Includes An Annual Interest Rate Of:***	→	**Which ONE do you prefer? (X ONE Box For EACH Row)** Option "A"	Option "B"
$100.00		$99.81	-10%..... 1		Y	2 Y
$100.00		$100.00	0%..... 1		Y	2 Y
$100.00		$100.19	10%..... 1		Y	2 Y
$100.00		$100.38	20%..... 1		Y	2 Y
$100.00		$100.96	50%..... 1		Y	2 Y
$100.00		$101.91	100%..... 1		Y	2 Y
$100.00		$103.83	200%..... 1		Y	2 Y
$100.00		$105.74	300%..... 1		Y	2 Y

Impatience(3)

Now let's assume that you have the option to receive $100 in **one month** or receive a different amount in **thirteen months**. *Compare the **amounts** and **timing** in Option "A" with Option "B" and indicate which amount you would prefer to receive for all 8 choices.*

Option "A" Receiving In 1 Month	*or*	**Option "B"** Receiving In 13 Months	***Includes An Annual Interest Rate Of:***	→	**Which ONE do you prefer? (X ONE Box For EACH Row)** Option "A"	Option "B"
$100		$95	-5%..... 1		Y	2 Y
$100		$100	0%..... 1		Y	2 Y
$100		$102	2%..... 1		Y	2 Y
$100		$104	4%..... 1		Y	2 Y
$100		$106	6%..... 1		Y	2 Y
$100		$110	10%..... 1		Y	2 Y
$100		$120	20%..... 1		Y	2 Y
$100		$140	40%..... 1		Y	2 Y

Impatience(4)

Now let's assume that you have the option to receive $10,000 in **one month** or receive a different amount in **thirteen months**. *Compare the **amounts** and **timing** in Option "A" with Option "B" and indicate which amount you would prefer to receive for all 8 choices.*

Option "A" Receiving In 1 Month	*or*	**Option "B"** Receiving In 13 Months	***Includes An Annual Interest Rate Of:***	→	**Which ONE do you prefer? (X ONE Box For EACH Row)** Option "A"	Option "B"
$10,000		$9,500	-5%		1 Y	2 Y
$10,000		$10,000	0%		1 Y	2 Y
$10,000		$10,010	0.1%		1 Y	2 Y
$10,000		$10,050	0.5%		1 Y	2 Y
$10,000		$10,100	1%		1 Y	2 Y
$10,000		$10,200	2%		1 Y	2 Y
$10,000		$10,600	6%		1 Y	2 Y
$10,000		$11,000	10%		1 Y	2 Y

Impatience(5)

Now let's assume that you have the option to **pay** $10,000 in **one month** or **pay** a different amount in **thirteen months**. *Compare the **amounts** and **timing** in Option "A" with Option "B" and indicate which amount you would prefer to **pay** for all 8 choices.*

Option "A" Paying In 1 Month	*or*	**Option "B"** Paying In 13 Months	***Includes An Annual Interest Rate Of:***	→	**Which ONE do you prefer? (X ONE Box For EACH Row)** Option "A"	Option "B"
$10,000		$9,500	-5%		1 Y	2 Y
$10,000		$10,000	0%		1 Y	2 Y
$10,000		$10,010	0.1%		1 Y	2 Y
$10,000		$10,050	0.5%		1 Y	2 Y
$10,000		$10,100	1%		1 Y	2 Y
$10,000		$10,200	2%		1 Y	2 Y
$10,000		$10,600	6%		1 Y	2 Y
$10,000		$11,000	10%		1 Y	2 Y

Appendix 2. Calculation procedure of expected values from the range of designated in the questions

In the questionnaires, such as "*Impatience(1)*",…, "*Impatience(5)*", a respondent was supposed to choose appropriate range containing the corresponding amount of receiving cash, instead of writing down the exact values. To calculate point estimates of impatience variables, we employ the following procedure using the range of designated in the questions.

First, we assume that each of those impatience variables, θ, follow the log-normal distribution, or $\ln\theta \sim N(\mu, \sigma)$ where μ and σ denote the mean and standard deviation of the normal distribution respectively. When there are J classes $(c = 1, \ldots, J)$, the probability for θ of individual i in the jth class ($x_i = \ln\theta_j$) can be expressed as:

$$P(c = j) = P\left(\ln\underline{\theta}_j < x_i < \ln\bar{\theta}_j\right) = \Phi\left(\frac{\ln\bar{\theta}_j - \mu}{\sigma}\right) - \Phi\left(\frac{\ln\underline{\theta}_j - \mu}{\sigma}\right),$$

where $\bar{\theta}_j$ and $\underline{\theta}_j$ means the upper and lower bounds of θ_j respectively in the jth class, for example $\bar{\theta}$ = 0.2 (annual interest rate is 20%) and $\underline{\theta}$ = 0.1 (annual interest rate is 10%) printed in "*Impatience(1)*". The mark Φ, in addition, denotes the cumulative distribution function of the normal distribution. The mean (μ) and variance (σ) of $\ln\theta$ were estimated by the maxim likelihood method to maximize the likelihood a person being into the category he or she really chose. Note that we need set arbitrary value in top and bottom end of each questionnaire to maximize the likelihood. We set top end value as 1.0e+77 and bottom end value as -1.0e+77 in all questionnaires.

Second, employing the parameter μ and σ, each expected value of θ in the jth class can be calculated with the following equation (Kimball et al., 2005).

$$E\left(\theta_i \middle| \ln\underline{\theta}_j < x_i < ln\bar{\theta}_j\right) = \exp\left(\mu + \frac{\sigma^2}{2}\right) \frac{\int_{\ln\underline{\theta}_j}^{\ln\bar{\theta}_j} \frac{1}{\sqrt{2\pi}\sigma} \exp\left(\frac{-(y - \mu - \sigma^2)^2}{2\sigma^2}\right) dy}{\int_{\ln\underline{\theta}_j}^{\ln\bar{\theta}_j} \frac{1}{\sqrt{2\pi}\sigma} \exp\left(\frac{-(y - \mu)^2}{2\sigma^2}\right) dy}.$$

In this calculation, we also need to decide arbitrary value in top and bottom end of each

questionnaire. For example, using "*Impatience(1)*", we assume the maximum value as 5 (annual interest rate is 500%) and minimum value as -1 (annual interest rate is -100%)[1].

[1] Using "*Impatience(2)*", we assume the maximum value as 5 (annual interest rate is 500%) and minimum value as -1 (annual interest rate is -100%). Using "*Impatience(3)*", we assume the maximum value as 1 (annual interest rate is 100%) and minimum value as -0.1 (annual interest rate is -10%). Using "*Impatience(4)*", we assume the maximum value as 0.3 (annual interest rate is 30%) and minimum value as -0.1 (annual interest rate is -10%). Using "*Impatience(5)*", we assume the maximum value as 0.3 (annual interest rate is 30%) and minimum value as -0.1 (annual interest rate is -10%)