Confucianism and Preferences: Evidence from Lab Experiments in Taiwan and China*

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Abstract

This paper investigates how Confucianism affects individual decision making in Taiwan and in China and whether the Cultural Revolution in China, which denounced Confucian teaching, has had a long-lasting impact. We found that Chinese subjects in our experiments became less accepting of Confucian values, such that they became more risk loving, less loss averse, and more impatient after being primed with Confucianism, whereas Taiwanese subjects became more trustworthy and more patient after being primed by Confucianism. Combining the evidence from the incentivized laboratory experiments and subjective survey measures, we found evidence that Chinese subjects and Taiwanese subjects reacted differently to Confucianism.

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"The power behind the recent surge in Asia's economy may have developed from the tenets of one of that continent's earliest philosophers."

Hofstede and Bond (1988)

1. Introduction

Confucian values are widespread throughout East Asia--China, Taiwan, Hong Kong, Singapore, South Korea, and Japan. Scholars have long hypothesized that that Confucian values affect social norms, influence individual decision making, and possibly contribute to economic growth. In particular, the Confucian emphasis on the accumulation of human capital, perseverance, and a future orientation can be key components of economic growth. (see Chen, 1996; Lam, 2003; Hofheinz & Calder,1982; Dai, 1989; Rozman, 1992; Hofstede & Bond, 1988; Ornatowski, 1996; Liang, 2010).[1] Surprisingly, however, little has been done in the way of empirical research to test these claims, and most of that work has been ethnographic in nature.

Whether there is a causal relationship between Confucianism and economic outcomes is extremely difficult to determine. This study takes the first step in probing this relationship with lab experiments. We adopt the priming method to investigate how Confucianism affects individual behaviors.

The priming method has been widely used in psychology and marketing. (Turner 1985; Dijksterhuis & van Knippenberg 2001; Wheeler, Jarvis, & Petty 2001; Macrae & Johnston, 1998). In recent years, several economic studies, including Benjamin et al. (2010), Benjamin et al. (2012) and Chen and Li (2009), have used this technique to study the impact of religion, race, and group identities. In one interesting example where cultural prime is used, Westernized Hong Kong-Chinese subjects were primed

[1]Another line of studies suggests that Confucianism may be a barrier to capitalism because of the strict hierarchy of the social order and the avoidance of individual confrontation with the world. For example, Max Weber suggested that enthusiasm for action is rare in Confucianism and that active pursuit of wealth is unbecoming to proper Confucians (Bendix, 1977; Chung, Shepard & Dollinger 1989).

with either American or Chinese culturally-laden icons, then they were shown a picture with one fish swimming ahead of four others and were asked to describe what they see (Hong, Chiu, & Kung, 1997; picture first used in Morris et al., 1995). When they were primed with American icons such as an American flag, subjects were more likely to describe that the lone fish was leading the others. Whereas subjects being primed with Chinese primes were more likely to describe that the lone fish was being chased by the other fish.

In this study, subjects in the experiments were randomly assigned to receive Confucius-prime or neutral-prime. The primes were designed to introduce variation in the salience of Confucianism, so that the normally dormant aspects of the Confucian values may be temporarily activated by the Confucian prime. After randomly manipulating the salience of Confucianism to our subjects, we elicited subjects' risk preferences (risk aversion, loss aversion), time preferences (present bias and discount factor), and trust and trustworthiness using an incentive-compatible protocol. Others have shown that these individual preferences play a central role in economic outcomes (Shaw, 1996; Knack and Keefer 1997; Porta et al. 1997; Laibson, 1997). If there is any difference in their outcomes between these Confucius-prime and neutral-prime groups, we can attribute it to their reaction to the Confucius prime.

To our knowledge, this is the first paper that primes the salience of Confucianism. After we examine how Confucianism affects individual behaviors with the priming method, we examine the persistence of Confucian values. Although Confucian values have long influenced a number of Asian countries, Confucius was excoriated as a political swindler and Confucian values were denounced during China's Cultural Revolution (1967-1976). Sociologists now suggest that as a result, Confucian tradition is better preserved and practiced today in Asian countries other than China, for example, in Taiwan (Ip, 2009). Nevertheless, some researchers, for example Herman Kahn and Geert Hofstede, have suggested that cultural traits can be rather sticky, and therefore difficult to change (for more discussion see Hofstede & Hofstede, 2005). Our question, then, is whether the decade-long interruption in China eradicated the teaching of Confucian values that had been passed down for thousands of years? Or is this cultural trait as

sticky as Hofstede and Kahn suggested?[2] We pursued this question by examining whether subjects in Taiwan and in China would react in different ways to our Confucius primes.

Our findings suggest that subjects became more trustworthy and risk loving, exhibited less present bias, and, interestingly, became more impatient when they were exposed to the Confucius prime. Our evidence also showed that subjects in Taiwan and in China reacted differently to the Confucius prime. In contrast to the control group, subjects in China became more risk loving, less loss averse, and more impatient, behaviors not in alignment with Confucian values. The subjects in Taiwan became more trustworthy and more patient, in accord with Confucian values, than the control group. We performed validation checks of our priming instruments by asking subjects to rank on a scale of 1 to 10 how much they agreed with each of four different belief systems: Confucianism, rationalism, Eastern religion, and Western religion. We found that Chinese subjects, but not subjects in Taiwan, who were primed on Confucianism were more likely to rank Confucius lower and agreed less with Confucian values than the control group did.

Most Taiwanese trace their ancestry to China, share the same language, and have similar culture today as in China. In addition, Confucian values have been passed down in Taiwan from parents to children and from teachers to students. Based on our observation of Taiwanese subjects, we can conclude that the Confucianism cultural traits have persisted. However, our study also suggests that young generations of Chinese and of Taiwanese have diverging reactions to Confucianism. Whether this interruption and discourse of Confucian belief is caused by Cultural Revolution is beyond the scope of this paper, and it is a topic for future research. [3]

[2] Some economic papers suggest that certain traits can be quite sticky. For example, Nunn and Wantchekon (2011) suggest that although the slave trade took place in Africa more than 400 years ago, it has a long-lasting impact on mistrust even today. Similarly, Alesina, Guiliano, and Nunn (2013) find that beliefs about women's roles in different societies today can be traced to different agricultural practices hundreds of years ago.

[3] The subjects in our sample were too young to have had direct exposure to Cultural Revolution, but their parents would have experienced the Cultural Revolution. If their views of Confucius have changed as a result of the Cultural Revolution, it suggests that the Cultural Revolution has had a long-lasting impact that extends beyond the generation that experienced it directly.

The rest of the paper is organized as followed, Section 2 presents some background on Confucianism and our hypothesized links between preferences and Confucianism, section 3 sets out the experiment, section 4 discusses the results, and section 5 concludes.

2. Background on Confucianism and Hypothesized Links between Confucian Values and Economic behavior

There are competing theories regarding the effect of Confucianism on risk aversion and loss aversion. To our knowledge, Confucius himself did not say whether taking a risk should be encouraged or not, but there are some famous quotes from Mencius, the second most important person in, Confucianism and one of its principal interpreters, that can be viewed as encouraging risk aversion--for example, "One who understands destiny will not stand beneath a tottering wall."[4] Confucian values also emphasize the role of individuals within a society and their relationship to others. For example, a male can view himself as a son, a brother, a husband, and a father but rarely as an autonomous individual(Gao, 1998; Hwang, 1987). Based on this theme of an individual's role in a group, scholars such as Yeh and Xu (2010) and Tse (1996) suggest that individual risk-taking behavior can be regarded as challenging a group's interest and even existence, and thus is discouraged.

Alternatively, economic studies such as Barr and Genicot (2008) find that the availability of a risk-sharing arrangement can increase individual risk-taking behavior in a lab experiment. It is also possible that when the salience of Confucianism reminds individuals of their role in a group and their risk-sharing network, the subjects in the Confucian prime group may take more risks in a lottery. Thus, the evidence of how Confucianism affects individual attitudes toward risk is conflicting.

As for loss aversion, extending what Yeh and Xu (2010) suggest, incurring loss can also threaten a group's harmony. Yet stories recorded in the *Four Books,* Chinese classic texts illustrating the core values and belief systems in Confucianism, have indicated that Confucius thinks a gentle man would not mind being poor; in addition, losing may not always be bad, and winning may not always be good. Thus,

[4] The quote is from the book *The Mencius.*

there is an ambiguous prediction for how Confucianism can affect individual attitudes toward risk and losses.

Unlike risk and loss aversion, where Confucius teaching may be ambivalent and subject to individual interpretation, being more future oriented is a central theme in Confucius teaching and captured in many well-known Confucius sayings—for example, "Impatience over trivial things may ruin important pursuits," and, "If a man takes no thought at what is distant, he will find sorrow near at hand."[5] Thus, we would predict that subjects should become more patient after being primed. [6]

In the case of trust and trustworthiness, according to Koehn (2001), one distinct feature of Confucian thinking is that the virtue of trustworthiness is more important than actual trust. For example, in The Analects of Confucius there are sayings like, "I do not know how a man without truthfulness is to get on." and, "I daily examine myself on three points:-- whether, in transacting business for others, I may have been not faithful;-- whether, in interaction with friends, I may have been not been trustworthy;-- whether I may have not mastered and practiced the instructions of my teacher." We predicted that subjects would become more trustworthy after being primed. However, it is not clear if this emphasis on trustworthiness translates into encouragement for trusting others. In particular, Confucian values put the emphasis on a small circle of family members, which could discourage trust among strangers.

3. Experimental Design

This study drew subjects from the student pools of National Taiwan University (NTU) and Peking University (PKU) by soliciting students on campus through flyers and e-mails.[7] Our final study had 380 subjects: 195 NTU students and 185 students from PKU. A total of nineteen experimental

[5] Both quotes are from the book *The Analects of Confucius*. The translations of *The Analects of Confucius* texts used in this paper is from Legge (1871).
[6] In a recent work, Liang (2010) develops a general equilibrium model with specified Confucian parameters. Under the assumption that countries exposed to Confucian values have lower discount rates, he calibrates the model to assess the quantitative importance of these cultural effects and to examine their implications for the future evolution of these economies.
[7] NTU subjects recruited through the Taiwan Social Science Experimental Laboratory (TASSEL)

sessions were carried out with paper and pencil from September 2012 to April 2013. When subjects arrived at an experimental session, their seats were assigned randomly. They were instructed not to communicate with one another during the experiment and given oral instructions for the general rules and written instruction for each part of the experiment (the full experimental protocol is in the appendix). Subjects were told the total number of games they would participate in but not the specific content of the games before the experiment started.

Subjects were first given instructions for the priming experiment (see details in section 3.1). There were no time constraints. Immediately after the prime, they participated in games that were designed to elicit their individual attitude toward risk, their individual attitude toward loss, their time preferences (i.e., regarding being patient and therefore future oriented or impatient and more interested in short-term gains), and their individual attitude toward trust and trustworthiness, followed by a short questionnaire with survey questions. The instructions for each game were given after the decisions they had made in the previous game were collected.

One of the risk, loss, and time preference games was randomly chosen and played for a monetary prize. The investment game, to elicit trust and trustworthiness, always involved a monetary prize.[8] This determination of the payments was explained to subjects before the experiment began. At the start of each experiment, each subject was told that they receive 100 tokens as their show-up fee. On average, subjects received an additional 400 tokens for the experiment that took approximately one hour. At the end of the experiment, every token they earned was converted to 1 national Taiwan dollar or 0.1 Chinese yuan.[9] The exchange rates between tokens and local currencies were scaled for parity, using the hourly wage of a student research assistant as the common metric. To avoid present biases triggered by transaction costs of

[8] Investment game is a 2-person game. Each subject is paired with an anonymous subject. The fact that the investment game may ultimately not be selected for a payout (by their partner) could subtly affect subjects' decisions during the game. For this reason, we decided to always pay out on the investment game.
[9] The exchange rate of 1 national Taiwan dollar to 1 Chinese yuan was 4.8 to 1 at the time of the experiments.

future payments when eliciting time preferences, all payments (including the participation fee) were transferred by wire to subjects' bank accounts.[10]

3.1 Priming Experiment

We employed a between-subjects design where each subject participated in the experiment once only. Half of the subjects in each school were randomly assigned to the Confucius prime (treatment group) and half assigned to the neutral prime (control group). For those in the treatment group, we selected six pieces of classic texts from the Analects of Confucius and inserted one incorrect character in each of the quotes; we refer to these as word problems hereafter. The incorrect characters were either phonetically similar or had a similar meaning. Subjects were asked to identify the wrong characters and to rewrite the entire sentence with the corrected characters on the answer sheet. If they could not identify the mistake, they were told to simply copy the entire sentence anyway. For the control group, we selected six sentences from contemporary Chinese writing that were unrelated to Confucianism and asked subjects to perform the same task. In fact, we were not interested in whether the subjects could identify the incorrect character; rather, what was important was that our priming worked by having them read and then rewrite the text, therefore manipulating the salience of Confucianism.[11]

For example, this is one of the statements for the treatment group (translation: "Confucius said: Learning without thought is labor lost; thought without learning is perilous."):

(wrong) 子曰：学而不思则罔，思而不学则**迷**

(correct) 子曰：学而不思则罔，思而不学则**殆**

This is one of the statements for the control group (translation: "I want to write about those family stories told from the generations to generations"):

(wrong) 我要寫的是那些傳**誦**不已的親情故事

(correct) 我要寫的是那些傳**頌**不已的親情故事

[10] Based on our observation, having a bank account was common in our sample pools.
[11] To our knowledge, this is the first paper that primes Confucianism. We created and tested this priming instrument.

We carefully selected texts that were unrelated to any of the preferences we elicited about risk, loss, time preference, and trust and trustworthiness. (The full list of the texts we chose is presented with translation in the appendix.) For example, we avoided using as a prime the Confucius saying: "If a man takes no thought about what is distant, he will find sorrow near at hand." This saying could have a direct impact on time preference even without evoking one's attitude about Confucianism. Had we used this saying as a prime, it would have been difficult to disentangle the effect of Confucianism with the direct effect of this particular reminder. We also conducted pilot tests to ensure that the tasks of identifying wrong characters were of similar difficulty for the treatment and control groups.

For comparison reasons, we asked both the treatment and control groups to complete each other's word problem at the end of the entire experiment. In addition, subjects' performance on these word problems provided an objective assessment of their knowledge of Confucianism.[12]

3.2 Incentivized Lottery Choice Task I: Risk Aversion

In this experiment, modeled after Holt and Laury (2002), each subject was asked to make decisions on a series of nine binary-choice questions between a safe option and a risky option. The choices and the difference in expected payoff between risky and safe options are presented in Table 1. Subjects who are more risk averse should choose safer options than those who are less risk averse. Subjects who are risk neutral should choose the safe options (choice A) for questions 1 to 4 (Q1-Q4) and risky options (choice B) for questions 5 to 9 (Q5-Q9). Subjects' degree of risk aversion was based on the number of safe options they chose. Following Holt and Laury's methodology, we assume the following utility functional form:

$$U(x) = \frac{x^{1-\sigma}}{1-\sigma}. \quad ---Equation\ (1)$$

[12] In the exit survey, we asked subjects questions about their upbringing background. We found that subjects who had a more traditional/ or conservative upbringing performed better on these word problem when controlling for basic demographic characteristics, such as gender, undergraduate major, and parental education.

Subjects' choices allowed us to estimate their coefficient of relative risk aversion, σ.

3.3 Incentivized Lottery Choice Task II: Loss Aversion

In order to measure subjects' attitude toward loss, we asked them to decide between binary choices that involve the possibility of losing money in this game. The choices and the differences in expected payoff are presented in Table 2.[13] For each question, both choice A and choice B have a 50/50 chance of winning or losing money. The amount of possible loss is always lower in choice A (lose 35 yuan) than choice B (ranges from losing 40 to 65 yuan). In Q1, the expected payoff of choice A is better than the expected payoff of B. As one move down the series, choice B (with a higher expected payoff) becomes increasingly more appealing than Choice A. A subject who is risk neutral and not loss averse would choose choice A from Q1 to Q3, would be indifferent between choices A and B in Q4, and would choose choice B from Q5 to Q7. Someone who is loss averse and risk neutral would not be indifferent between choices A and B in Q4 since choice B incurs larger losses than choice A. Ceteris paribus, the more loss-averse person would choose choice A (a low-loss option) more often than a less loss-averse individual before switching to choice B (a high-loss option). This experimental protocol, presented in Table 3, is modeled after Tanaka, Camerer and Nguyen (2010) and Liu (2013). We follow their estimation methodology assuming that the utility functional form is

$$U(x) = \frac{x^{1-\sigma}}{1-\sigma} \text{if } x \geq 0 \text{ and } U(x) = -\lambda * \frac{(-x)^{1-\sigma}}{1-\sigma} \text{ if } x < 0 \quad --- \; Equation(2)$$

Subjects' choices from the risk aversion game and this one allow us to jointly estimate coefficients of relative risk aversion σ and loss aversion λ. The standard expected utility is nested in equation 2; if we fail to reject the null hypothesis that $\lambda = 1$, there is no evidence of loss aversion.

[13] To prevent the possibility of subjects paying out of pocket, the participation money for the participants was more than the maximum loss possible in the game.

3.4 Convex Time Budget Method: Time Preferences

We adapted Andreoni and Sprenger's (forthcoming) convex time budget (CTB) method to elicit time preferences. Subjects were given 300 experimental tokens to allocate between receiving some tokens at time t and $t+h$, with varying interest rates r over these h periods. Allocating x tokens to time t and (300 - x) to time $t+h$ would mean that the subject receives x tokens at time t and receives $(300-x)*(1+r)$ at time $t+h$.[14] Specifically in the experiment, we asked subjects to make 10 decisions (see Table 4). We set the values of t to be today or 6 weeks later, h equals 4 weeks, and the interest rates, r, range between 0.5% and 2.5%.[15] Thus, for a given interest rate, more impatient subjects would allocate more tokens to the earlier payment date (today in games 1 to 5 and 6 weeks in games 6 to 10) than more patient individuals. By varying the earlier payment between today and 6 weeks later, with some assumptions of the utility function form, these choices allow us to estimate the coefficients of exponential discounting and present bias.[16]

We needed to ensure that receiving payments today would be as costly as receiving payments a month later. Otherwise subjects might choose to receive payment today to reduce the possible transaction cost regardless of their discount factor. We announced at the beginning of all experimental sessions that there would be no cash payments to subjects at the end of the experiment; rather, all payments would be transferred to the subjects' bank account. Another concern with elicitation of time preference is that subjects needed to trust that they would actually receive the later payments due them from the

[14] We chose the CTB experimental method for several reasons. First, unlike most of the existing literature, such as Andersen et al. (2008) and Tanaka, Camerer and Nguyen (2010), which offer a set of binary choices between X at time t and Y at time $(t+h)$, CTB gives subjects more flexibility and offers a continuum of choices. Second, other than Andersen et al. (2008) and Andreoni and Sprenger (forthcoming), much of literature assumes a linear utility function when estimating time preference parameters. Not incorporating a risk preference measure would cause an upward bias in the estimation of discount rates.

[15] The original CTB experiment protocol also varies the duration of the postponement h, which gives authors a more precise estimate of the parameters. Our version of the experiment is shorter than the original CTB, and by eliminating the variation in h, we worried about the strength of the priming effect. The 0.5-2.5% is the interest rate that occurred after 4 weeks. The annualized interest rates would range between 6% and 30%. This range of interest rates is based on estimates from Andreoni and Sprenger (forthcoming).

[16] The CTB methodology has also been adapted by Gine, Goldberg, Silverman, and Yang (2012) and Carvalho, Prina, and Sydnor (2013) in Malawi and in Nepal, respectively.

experimenters. To gain subjects' trust, we followed the protocol similar to that of Andreoni and Sprenger (forthcoming): all subjects were given the business card of the professors who were in charge of the experiment.

3.5 Investment Game: Trust and Trustworthiness

To measure individuals' interpersonal trust and trustworthiness, we modeled our game after Berg, Dickhaut, and McCabe (1995). Each subject was randomly assigned the role of being an investor or a trustee. The investors were given 150 tokens and were paired with a subject who was a trustee, but they were not told who that person was. Investors had seven choices (between 0 and 150 in increments of 25 tokens) of how much to send to their trustee. We tripled the amount the investors decided to send to the trustee in each of six possible scenarios. The share of tokens that the investor gave out served as a proxy for interpersonal trust. Those who were more trusting would invest a higher share of the 150 tokens. The share of tokens returned by a trustee to the investor was a proxy for the trustworthiness of the trustee, where a higher share of tokens being returned indicated the trustee was more trustworthy.

3.6 Survey

The survey collected basic information on the participants, including age, gender, major, parental education, and graduate student status; a set of questions asking about their upbringing, which sought to determine how much emphasis their parents had placed on observing Chinese traditions; and a set of questions about their subjective views (e.g., whether they agreed that it is unfortunate to have a daughter and no son). Having these answers to the subjective questions allowed us to construct a proxy for their conservatism that we used in the later analysis.

3.7 Data and Sample Selection

Table 4 presents the summary statistics of subject characteristics by university. The last column in the table shows *p*-values on a test of equality of means between PKU and NTU. Among the recruited

students, PKU students were slightly older and more likely to be female and to be in graduate studies than the students at NTU. Their parents were also slightly less educated than the parents of NTU students. Table 5 performs a randomization check to show that there is no difference in these characteristics between treatment and control groups.

4. Empirical Analysis

4.1 Descriptive Findings

We first examined the differences between the treatment and control group across each of the games. Figure 1 presents the cumulative distribution over the number of safe choices by treatment status for the risk aversion game. It shows that the distribution of lottery choices for the treatment group is to the left relative to the distribution of the control group, that is, the treatment group chose fewer safe lotteries compared to the control group. Therefore, the treatment group was more risk loving than the control group.

Figure 2 presents the distribution over the number of choice A (low-loss options) by the treatment and control groups in the loss aversion games. Similar to Figure 1, the distribution of the treatment group is also to the left of the distribution of the control group: these groups tended to choose fewer low-loss option, indicating that it was less loss averse than the control group.

In the investment game, investors were asked to invest 0, 25, 50, 75, 100, 125, or 150 tokens with an anonymous trustee. Figure 3 presents the distribution over investment choices by treatment and control group. Here, an interesting pattern emerges: the treatment group was more likely to have extreme choices than the control group. A significant higher proportion of the control group invested half of the 150 tokens with the trustee than did those in the treatment group. The treatment group was more likely than the control group likely to invest either 0 or 150 tokens with the trustee. This suggests that after receiving the Confucius prime, subjects become more extreme in their interpersonal trust than subjects who were not treated.

In this same investment game, trustees would receive 0, 75, 150, 225, 300, 375, or 450 tokens. We asked trustees how many of the tokens they would return to the investors for each of the six scenarios (there is no token to be returned if they receive zero). Figure 4 presents the mean share of tokens that trustees returned for each of the scenarios by treatment status. The first noteworthy point is that the more tokens the trustees received, the more they would reciprocate and return a higher share of tokens. The treatment group returned a higher proportion of the tokens to the investors than the control group did regardless how much they received. In other words, the treatment group was more trustworthy than the control group.[17]

Figure 5 shows the choices in the CTB task by treatment status for each of the games. The left panel presents the decisions for the allocation of tokens between receiving it today versus in 4 weeks (games 1 to 5 in Table 3), and the right panel presents the choices made between receiving the tokens in 6 weeks versus 10 weeks (games 6 to 10 in Table 3). Each bar indicates the mean proportion of the tokens allocated to the earlier payment date. The lower the bar is, the more patient the subjects were. There are a few noteworthy points here. First, when interest rates increased, the share of tokens allocated to the earlier date decreased. Second, there seems to be some evidence of present bias to allocating more tokens to an earlier payment for any given interest rate in the left panel than the right panel. However, for the purpose of the comparison across treatment and control groups, the difference is negligible.

4.2 The Effect of Confucius Prime on Risk Preferences, Trust/Trustworthiness, and Time Preferences

In this section, we pursued regression analysis in examining the differences in priming effect across the two schools.

First, we compared the responses of the treatment and control groups for their choices in the incentivized lottery tasks. In these regressions, both the direct measure of risk or loss aversion from the experiments (the number of safe options and number of low-loss options) and the imputed measures of

[17] Interestingly, the mean proportion of tokens returned (20%-30%) in both the treatment and control groups were lower than other trust experiments done with Chinese subjects (Buchan, Johnson, & Croson, 2006, reported 34%).

risk or loss aversion coefficients (σ, λ from equation 2) were the dependent variables. These regressions controlled for a subject's gender, age, whether he or she was a graduate student, his or her father's education level, and a dummy indicating that he or she was a PKU student.[18] Standard errors are clustered at the session level. The regression results and the mean and standard deviation of each of the dependent variables are presented in Table 6. The coefficients of relative risk aversion have a mean of 0.45 and are similar to other experiments using different experimental protocols in China (Liu, 2013; Frijters, Kong, & Liu, 2013). We found that the treatment group was less risk averse than the control group at a 5% level in both the direct and imputed measures of risk aversion. The size of the treatment effect is considerable: one-fifth of a standard deviation.[19] The treatment group behaved in a less loss-averse way than the control group, although the coefficients are not statistically different from 0. Based on the discussion in section 2, there are two possible interpretations for the findings so far. One is that their salience of Confucianism caused subjects to react negatively to Confucian values. The other is that it is possible that subjects who received a Confucian prime were reminded of their role in a group and their risk-sharing network and as a result took more risks in the lottery. We later found that this result was driven by the reaction of PKU students who were behaving in opposition to Confucian values.

Next, we examined interpersonal trust and trustworthiness. Given our finding that the treatment group had more extreme choices than the control group (from Figure 3), it is not surprising that the average treatment effect of the Confucius prime on trust was not statistically different from 0. In terms of trustworthiness, subjects returned almost 4.57 percentage points more tokens to the investor, a nearly 20% increase from the baseline. This suggests that the treatment group behaved in a more trustworthy way compared to the control group, in accordance with our prediction.

To examine the impact of treatment on time preference, we had two sets of measures: the share of tokens allocated to the earlier payment (the direct measure) and structurally estimated parameters of discount factors. For the direct measure, each subject was asked to make decisions between receiving

[18] Results are robust when these individual characteristics are excluded. This table is available in the Web Appendix on the authors' website.
[19] To compare the magnitude to other covariates, the treatment effect is larger than coefficients on being female.

payment today or 4 weeks later with varying interest rates (games 1 to 5 in Table 3) and another set of decisions between receiving payments in 6 weeks or 10 weeks later (games 6 to 10 in Table 3). The following equation is estimated for games 1 to 5 and games 6 to 10 separately:

$$Share\ Tokens\ Sooner\ Payment_{ig} = treat_i + r_g + X_i$$

where i is indexed for subject, g is an index for game, and r is the corresponding interest rate for game g. The dependent variable is the share of tokens allocated to an earlier payment. $X_i$include subject i's gender, age, whether he or she was in graduate school, and whether his or her father has a college degree. Standard errors are clustered at the individual level. The regression results for the allocation choices for today versus 4 weeks is presented in column 7, and allocation choices for 6 weeks versus 10 weeks are presented in column 8 of Table 6. The intertemporal choices between 6 versus 10 weeks capture the discount factor, while the intertemporal choice between today versus 4 weeks encapsulate the present bias and discount factor. As shown here, the direct measures of the effect of the Confucius prime on time preference in a reduced form are not statistically different from 0. However, such a simple comparison would ignore the role of concavity in the utility function. For example, two individuals with the same allocation of tokens for an earlier payment in games 1 to 10 could still have different estimated time preference parameters if their risk aversion parameters differed. In particular, following Laibson (1997) and Andreoni and Sprenger (forthcoming), suppose the utility function forms from different periods are time separable and can be expressed as

$$U(x_t, x_{t+k}) = x_t^{(1-\sigma)} + \beta\delta^k x_{t+k}^{(1-\sigma)}\ if\ t = 0 \qquad ---\ Equation\ (3)$$

$$U(x_t, x_{t+k}) = x_t^{(1-\sigma)} + \delta^k x_{t+k}^{(1-\sigma)}\ if\ t > 0$$

In this proposed utility function, δ is the exponential discount factor and β is the present bias.[20] If $\beta = 1$, there is no evidence of present bias; if $\beta < 1$, present bias exists. A higher δ would indicate that a subject is more patient and better able to delay gratification.

[20] Anderson et al. (2008) suggest that ignoring the concavity would result in upward bias estimates of discount rates.

As we have shown in Table 6, columns 1 and 2, the concavity of utility function, σ, differs between treatment and control groups, so it is important to incorporate risk aversion coefficient in our estimation of the time preference parameters by treatment status. Using the estimated risk preference parameters based on subjects' response from the Holt and Laury game and following Andreoni et al.'s (2013) interval censored regression estimation method, we impute the present bias (β) and exponential discounting factors (δ). These parameters are stratified by treatment status and shown in Table 7.[21] β is statistically different from 1 for both treatment and control groups, so we cannot reject the existence of present bias. Interestingly, the treatment group had less present bias but a lower discount factor (the subjects were less patient), which is surprising. In the next section, we find that the reduction in present bias was being driven by the NTU subjects, and the surprising finding of subjects becoming more impatient was being driven by the PKU students, who were reacting negatively to Confucius teaching.

4.3 Experimental Results by School

In this section, we examine whether the Confucius priming effect was different between the groups from the two institutions in this study, and we investigate whether the puzzling finding from the previous section is being driven by the negative reaction of PKU students. Our regression specification is

$$Y_i = \gamma_0\, treat_i + \gamma_1\,(treat_i * NTU_i) + \gamma_2 NTU_i + X_i,$$

where *i* indexed for subject *i*; NTU is a dummy indicating whether the subject was an NTU student; X_i includes a subject's gender, age, graduate student status, and father's education level; *treat* equals 1 if a subject was in the Confucius-prime group; γ_0 captures the treatment effect on PKU students; and γ_1 is the difference between the treatment effect on NTU students and on PKU students. The treatment effect on

[21] Andreoni et al. (2013) propose several different methods of estimating parameters in CTB, including nonlinear least squares and two-limit tobit (censored) maximum likelihood regressions. As they suggest, tobit is a better method when there are corner solutions. In our experiments, we have a considerable number of choices, and for the purpose of our analysis, we do not need individual estimates since we only need to compare the mean across the treatment and control groups. Thus we opted for the censored regression method. In our estimation, we also used the weekly expenditure of 1539 TWD (for PKU students) and 1746 TWD (for NTU students). These expenditures are based on the exit survey.

NTU students would be equal to ($\gamma_0 + \gamma_1$). The dependent varible Y_i is the same as those in Table 6. Table 8 shows the coefficients ($\gamma_0, \gamma_1, \gamma_2$) and the p-values from the F-test ($\gamma_0 + \gamma_1 = 0$).

In section 4.2, we saw that being primed on Confucianism caused subjects to behave in a more risk-loving and less loss-averse manner. From columns 1 to 3 of Table 8, it is evident that the negative treatment effect on risk preference and loss aversion was mostly driven by the reactions of the PKU students. The F-test results reported in columns 1 to 3 suggest that the priming effects on NTU students were not statistically different from 0 at a 10% level. Moreover, there was no priming effect on trust for srudents from either school. However, the positive effect of Confucius primes on trustworthiness reported in Table 6 stemmed mainly from the positive reactions of NTU students. Columns 7 and 8, which show the share of tokens invested to the earlier payment, reveal little change in these direct measures of time preferences.

Table 9 presents the structural estimates of present bias and the discount factor from equation 3 stratified by school and treatment status. The treatment groups at NTU (column 4) exhibited less present bias. However, the surprising results from Table 7 that those receiving the Confucius prime became less patient (lower discounting factor) is driven solely by the changes in PKU students (see column 1). In a regression not reported here, we investigated whether the treatment effects can differ based on students' subjective view of traditionalism (based on their answers in the exit survey) but found no statistically significant evidence.

In this section, we have presented some evidence that PKU students reacted against the commonly understood Confucian values when they were primed with Confucian teachings. That the same primes evoked different feelings in students from the two schools is an interesting finding.[22] An explanation for these differences may be that the priming instrument we developed was not priming Confucianism but instead evoked other feelings of of the PKU students, the reason for this opposite reaction. We investigate this possibility in the next section.

[22] Psychologists Wheeler and Berger (2007) suggest that the same priming instrument can have different effects on the subsequent choices of different groups of people.

4.4 Validation Check

We conducted a few extra surveys at both universities to validate the efficacy of our priming instrument. The surveys, distributed in several economic undergraduate classes to 389 students (none of whom participated in the experiment) in both schools, took about 5 to 10 minutes and the students were not paid. As with our full experiments, subjects were randomly assigned to receive either the Confucius prime or a neutral prime. Immediately after the prime, they were asked to complete a short questionnaire asking about their evaluation of Confucianism and some of their individual characteristics. Two of the questions allowed us to conduct a validation check: "Among the following belief systems (Rationalism, Confucianism, Eastern Religion (Buddhism, Taoism), Western Religion (Catholicism, Christianity, etc), please rank them based on their values from most agree (1) to least agree (4)," and, "On a scale of 1 to10, how much do you agree with each of the following belief systems (1 being least agree and 10 being most agree)?" Because these questions were answered immediately after the priming questions, the priming effect, if any, should be clear.

The regression results using these answers are reported in Table 10. In column 1, the dependent variable is the ranking of Confucianism (1 being the best, 4 being the worst), and ordered probit estimation method is used. Column 2, the dependent variable, shows how much the students agreed with Confucianism.[23] In column 3, we created a dummy indicating whether Confucianism was ranked as the most important. The results suggest that the PKU students ranked Confucianism lower and disagreed more with Confucian values after they received Confucian prime. For NTU students, the Confucius prime improved the ranking of Confucianism and increased how much NTU students agreed with Confucian values than the control group did. Combining the results here with those in the previous section reinforces the idea that PKU students reacted to the Confucius prime differently from the NTU students.

[23] Each person reported the values for all four belief systems. Some people tended to agree and put down a higher value for all, while others tended to disagree with everything and had lower values for all systems. Thus, the dependent variable is their rating on Confucian value minus their individual mean of evaluation of all four systems.

5. Conclusion

We investigated how Chinese and Taiwanese subjects reacted to Confucius primes and whether there were differences of reaction between the two groups. Our findings suggest that subjects became more risk loving, more impatient, and more trustworthy when they were exposed to a Confucius prime. However, this simple characterization of the impact of Confucianism is misleading since we found differences in priming effects depending on whether they are from China or from Taiwan.

Chinese subjects who were primed for Confucianism became more risk loving, more impatient, and less loss averse than the control group, behaviors not in accord with Confucian values. Taiwanese subjects who were primed for Confucianism behaved in a more trustworthy manner and were more patient than the control group, in accordance with Confucian values. We performed validation checks of our priming instruments by asking subjects to rank four different belief systems (Confucianism, rationalism, Eastern religion, and Western religion) and reported on a scale of 1 to 10 on how much they agreed with each of these systems. Chinese subjects who were primed for Confucianism were more likely to rank Confucianism lower and also tended to agree less with Confucian values than the control group did. We did not find this effect on the Taiwan subjects. Our study therefore suggests that Chinese and Taiwanese subjects have different reactions to Confucianism.

There has been a revival of interest in Confucianism in China. Unlike the anti-Confucius rhetoric from the 1960s and 1970s, government officials have once again acknowledged Confucius as a great contributor to the glorious Chinese tradition. Professor Yu Dan at Beijing Normal University has a popular TV show on the *Analects of Confucius* and her book, *Reflection on the Analects,* became a top seller in 2009. Our study suggests that social norms and social identities may be sticky, but they can also be altered. It is possible that we will see the currently diverging paths between China and Taiwan converging again.

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Figure 1: Cumulative Distribution of Safe Choices in Lottery Game I
By Treatment Status

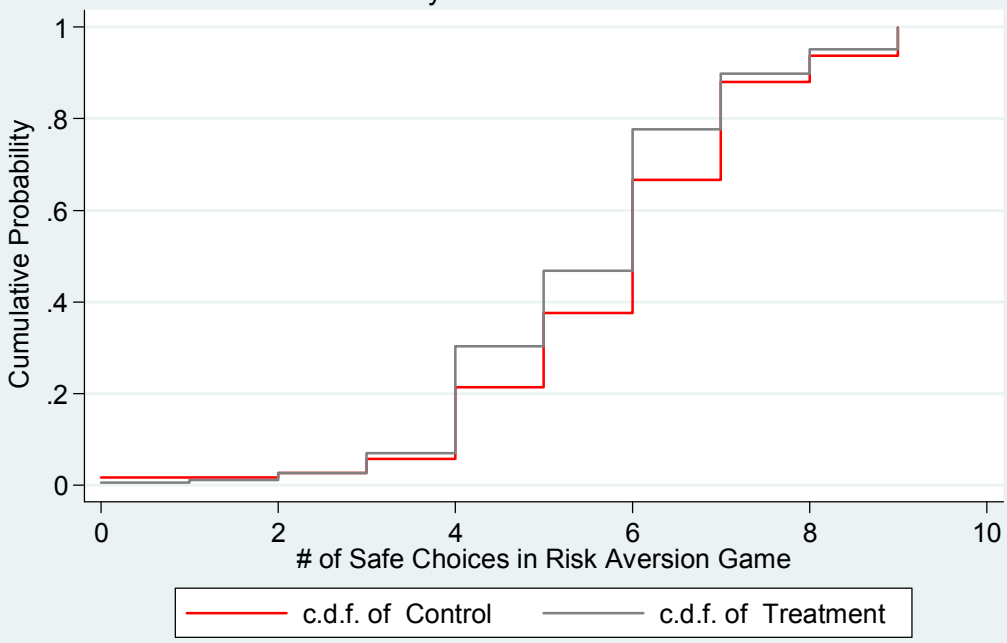
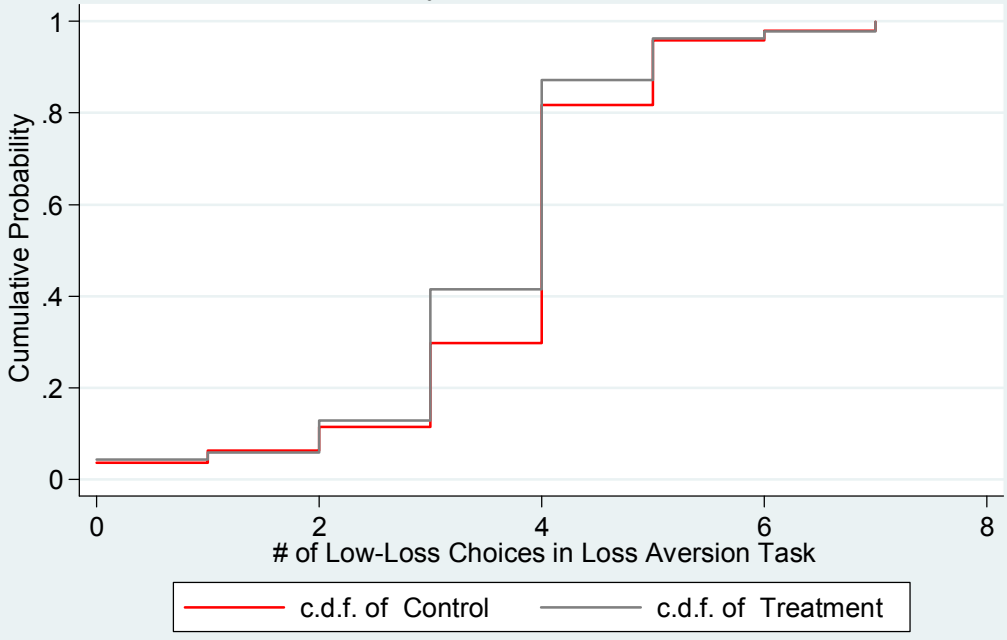


Figure 2: Cumulative Distribution of Low-Loss Choices in Lottery Game II
By Treatment Status



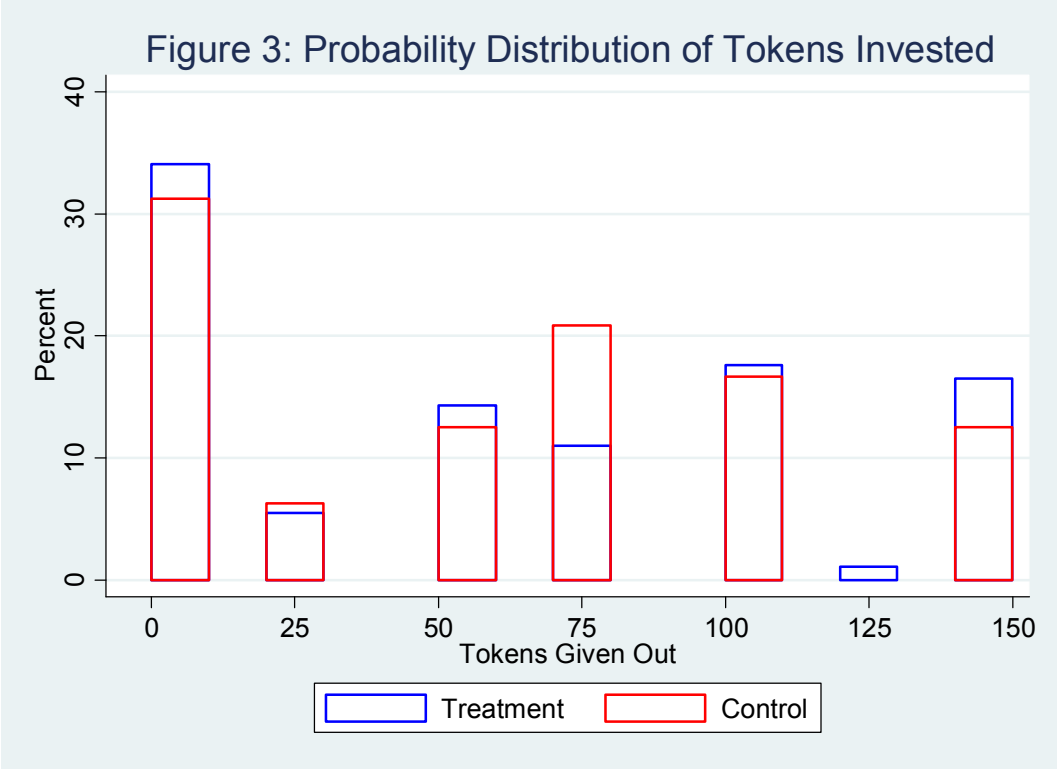


Figure 3: Probability Distribution of Tokens Invested
Percent
0
10
20
30
40
0
25
50
75
100
125
150
Tokens Given Out
Treatment
Control

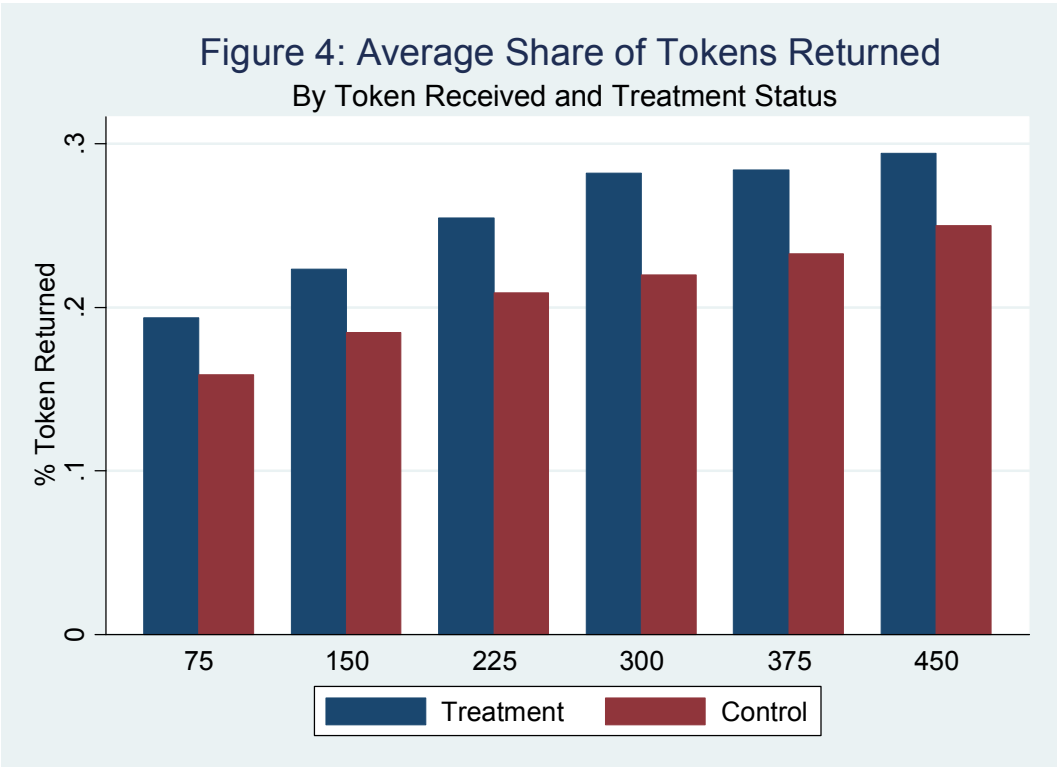


Figure 4: Average Share of Tokens Returned
By Token Received and Treatment Status
% Token Returned
0
.1
.2
.3
75
150
225
300
375
450
Treatment
Control

Figure 5: Proportion of Tokens Allocated to Earlier Payment

Stratified by Treatment Status and by Interest Rates

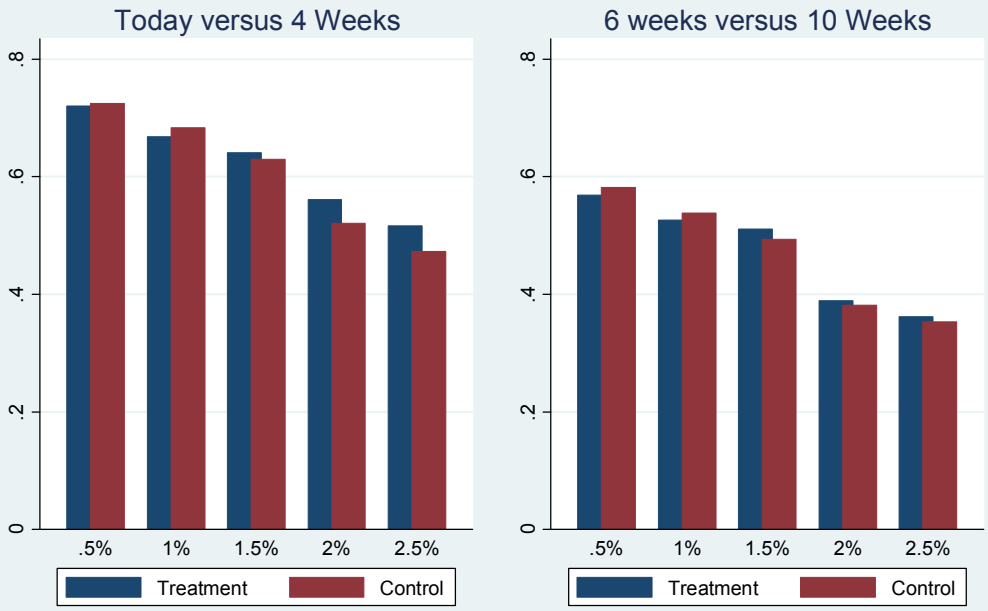


Table 1: Risk Aversion Experiment

	Choice A (Safe Option)	Choice B (Risky Option)	Differences in Expected Payoff (A-B)
1	10% Probability Winning 200 tokens 90% Probability Winning 160 tokens	10% Probability Winning 385 tokens 90% Probability Winning 10 tokens	116.5
2	20% Probability Winning 200 tokens 80% Probability Winning 160 tokens	20% Probability Winning 385 tokens 80% Probability Winning 10 tokens	83
3	30% Probability Winning 200 tokens 70% Probability Winning 160 tokens	30% Probability Winning 385 tokens 70% Probability Winning 10 tokens	49.5
4	40% Probability Winning 200 tokens 60% Probability Winning 160 tokens	40% Probability Winning 385 tokens 60% Probability Winning 10 tokens	16
5	50% Probability Winning 200 tokens 50% Probability Winning 160 tokens	50% Probability Winning 385 tokens 50% Probability Winning 10 tokens	-17.5
6	60% Probability Winning 200 tokens 40% Probability Winning 160 tokens	60% Probability Winning 385 tokens 40% Probability Winning 10 tokens	-51
7	70% Probability Winning 200 tokens 30% Probability Winning 160 tokens	70% Probability Winning 385 tokens 30% Probability Winning 10 tokens	-84.5
8	80% Probability Winning 200 tokens 20% Probability Winning 160 tokens	80% Probability Winning 385 tokens 20% Probability Winning 10 tokens	-118
9	90% Probability Winning 200 tokens 10% Probability Winning 160 tokens	90% Probability Winning 385 tokens 10% Probability Winning 10 tokens	-151.5

Table 2: Elicitation of Loss Aversion

	Choice A (Low Loss Option)	Choice B (High Loss Option)	Differences in Expected Payoff (A-B)
1	50% Probability Winning 60 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 65 tokens	7.5
2	50% Probability Winning 55 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 65 tokens	5
3	50% Probability Winning 50 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 65 tokens	2.5
4	50% Probability Winning 45 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 65 tokens	0
5	50% Probability Winning 40 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 50 tokens	-10
6	50% Probability Winning 40 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 45 tokens	-12.5
7	50% Probability Winning 35 tokens 50% Probability Losing 35 tokens	50% Probability Winning 75 tokens 50% Probability Losing 40 tokens	-17.5

Table 3: Choices for Convex Time Budget Task

Game	Interest Rate (r)	Sooner Date (t)	Later Date (t+h)
1	0.50%	today	4 weeks
2	1%	today	4 weeks
3	1.50%	today	4 weeks
4	2%	today	4 weeks
5	2.50%	today	4 weeks
6	0.50%	6 weeks	10 weeks
7	1%	6 weeks	10 weeks
8	1.50%	6 weeks	10 weeks
9	2%	6 weeks	10 weeks
10	2.50%	6 weeks	10 weeks

Note: Subjects decide how much (of the 300 tokens) to receive earlier rather than later for each of the 10 games. The amount allocated at the later date would earn interest at the corresponding interesting rate.

Table 4: Subject Characteristics Stratified by Schools

	Peking University	National Taiwan University	P-value of Hypothesis Testing
Female	0.503	0.425	0.13
	(0.501)	(0.496)	
Age	22.48	21.25	0.00
	(2.485)	(2.259)	
Graduate Students	0.503	0.290	0.00
	(0.501)	(0.455)	
Father has a college-equivalent degree	0.395	0.451	0.27
	(0.490)	(0.499)	
Mother has a college-equivalent degree	0.249	0.347	0.04
	(0.433)	(0.477)	
Observations	185	195	

Note: The means are reported for each question. Standard deviations are reported in parentheses. The last column reports the p-values of the two-way tests of the equality of the means between schools.

Table 5: Randomization Check

VARIABLES	Female	Father has a College Degree	Age	Graduate Student
treat	-0.0324	0.0301	0.307	0.0767
	(0.0384)	(0.0547)	(0.526)	(0.0958)
Constant	0.479***	0.408***	21.69***	0.354***
	(0.0255)	(0.0350)	(0.366)	(0.0637)
Observations	380	378	380	380
R-squared	0.001	0.001	0.004	0.006

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Dependent variables are subjects' characteristics.

Table 6: The Priming Effects on Risk Preferences, Trust/Trustworthy and Time Preferences

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Number of Safe Choices in Lottery Task I	Coefficient of Relative Risk Aversion	Number of Low loss Choices in Task II	Coefficient of Loss Aversion	Share of Tokens Invested in Investment Game	Average Share of Tokens Returned in Investment Game	Share of Token Invest in Today	Share of Token Invest in 6 wks
Mean(Dep Variable)	5.65	0.45	3.64	1.54	0.40	0.23	0.61	0.47
Standard Dev (Dep Variable)	[1.64]	[0.47]	[1.25]	[1.38]	[0.35]	[0.19]	[0.39]	[0.40]
Confucius Prime	-0.327**	-0.092**	-0.169	-0.105	0.008	0.046*	0.016	-0.001
	(0.120)	(0.035)	(0.108)	(0.149)	(0.036)	(0.026)	(0.039)	(0.038)
Individual Characteristics Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	378	378	378	378	187	191	1,890	1,880
R-squared	0.016	0.015	0.032	0.019	0.018	0.019	0.094	0.057

Note: Standard errors are clustered at the session level. *Confucius Prime* is a dummy for subjects receiving Confucian-salient primes. A dummy variable indicating whether the subject's father has a college degree, a dummy variable indicating PKU student, subject's age, a dummy variable indicating graduate student, and a dummy variable for female are included.

Table 7: Time Preference Parameters By Treatment Status

	(1) Delta (Discount Factor)	(2) Beta (Present Bias)
Confucius Prime	0.9914	0.9359
	(0.0002)	(0.0017)
Neutral Prime	0.9932	0.927
	(0.0001)	(0.0016)
P-Value for F-Test [Confucius-Prime=Neutral Prime]	0.0000	0.0001

Note: Standard errors are in parentheses. These parameters are estimated using individual risk aversion (imputed using subjects' choice made in incentivized lottery choice described in Section 3.2) and assume the mean weekly expenditure level to be 1657 NTD, as calculated based on the exit survey. *Confucius Prime* indicates subjects receiving Confucian-salient primes and *neutral prime* indicate subjects receiving neutral primes. Column 1 reports the estimation of discount factor and column 2 reports the estimation for present bias. The p-value of the two-way tests of the equality between treatment and control groups is reported.

Table 8: Confucius Priming Effects by Schools

VARIABLES	(1) Number of Safe Choices in Lottery Task I	(2) Coefficient of Relative Risk Aversion	(3) Number of Low loss Choices in Task II	(4) Coefficient of Loss Aversion	(5) Share of Tokens Invested in Investment Game	(6) Average Share of Tokens Returned in Investment Game	(7) Share of Token Invest in Today	(8) Share of Token Invest in 6 wks
Mean(Dep Variable)	5.65	0.45	3.64	1.54	0.40	0.23	0.61	0.47
Standard Dev(Dep Variable)	[1.64]	[0.47]	[1.25]	[1.38]	[0.35]	[0.19]	[0.39]	[0.40]
Confucius Prime (γ0)	-0.412**	-0.115**	-0.274**	-0.305	0.034	0.026	0.0220	-0.0113
	(0.184)	(0.054)	(0.100)	(0.234)	(0.041)	(0.030)	(0.0532)	(0.0605)
*Confucius Prime**NTU (γ1)	0.168	0.045	0.206	0.394	-0.051	0.040	-0.0110	0.0194
	(0.229)	(0.067)	(0.203)	(0.301)	(0.073)	(0.052)	(0.0771)	(0.0815)
NTU	-0.242	-0.061	0.141	-0.045	0.063	-0.030	-0.194***	-0.149***
	(0.177)	(0.049)	(0.150)	(0.256)	(0.053)	(0.042)	(0.0544)	(0.0569)
P-value from F-test (γ0+γ1=0)	0.107	0.105	0.704	0.613	0.779	0.123	0.88	0.84
Observations	378	378	378	378	187	191	1,890	1,880
R-squared	0.017	0.016	0.033	0.024	0.019	0.022	0.094	0.057

Note: standard errors are clustered at the session level for Columns 1-6 and clustered at the individual level for Columns 7 and 8. Confucius Prime is a dummy for subjects receiving Confucian-salient primes. NTU is a dummy for subjects from National Taiwan University. A dummy variable indicating whether the subject's father has a college degree, a dummy variable indicating pku student, subject's age, a dummy variable indicating graduate student, and a dummy variable for female are included. The p-value from F-test (γ0+γ1=0) for each regression is also reported.

Table 9: Time Preference Parameters By Treatment Status By Schools

VARIABLES	PKU Delta (Discount Factor) (1)	NTU Delta (Discount Factor) (2)	PKU Beta (Present Bias) (3)	NTU Beta (Present Bias) (4)
Confucius Prime	0.9913	0.9914	0.9450	0.9290
	(0.0003)	(0.0002)	(0.0023)	(0.0019)
Neutral Prime	0.9945	0.9919	0.9420	0.9180
	(0.0001)	(0.0003)	(0.0023)	(0.0025)
P-value of F-Test for Differences in Parameter	0.0000	0.1078	0.3575	0.0005

Note: These parameters are estimated using individual risk aversion (imputed using subjects' choice made in incentivized lottery choice described in Section 3.2) and assuming mean expenditure level at 1746 for NTU students and 1539 for PKU students as calculated based on the exit survey. *Confucius Prime* indicates subjects receiving Confucian-salient primes and *neutral prime* indicates subjects receiving neutral primes. Columns 1 and 2 report the estimation of discount factor and columns 3 and 4 reports the estimation for present bias. *Confucius Prime* is a dummy for subjects receiving Confucian-salient primes. *Neutral Prime* is a dummy for subjects receiving Confucian-salient primes. NTU is a dummy for subjects from National Taiwan University. The p-value of the two-way tests of the equality of between treatments and controls group for each column is reported.

Table 10: Validation Test of Priming Method

	(1)	(2)	(3)
	ranking of Confucianism (1=best, 4= worst)	How much do you agree with Confucianism(10 = most agree)	Rank Confucianism as Most important
VARIABLES			
Confucius Prime	0.384*	-0.603*	-0.620**
	(0.223)	(0.331)	(0.278)
*Confucius Prime**NTU	-0.463*	0.753**	0.576*
	(0.257)	(0.381)	(0.323)
NTU	0.460**	-0.832***	-0.502**
	(0.188)	(0.274)	(0.223)
Observations	389	386	389
R-squared		0.044	

Note: Standard errors are in parentheses. Age and gender are included in all regressions. The dependent variable in column 1 is the answer to, "Out of the 4 value systems (rationalism, Confucianism, Eastern Religion and Western Religion), please rank from 1 (being most agree with) to 4 (least agree with)." Column 1 employs an ordered probit model. We also ask "How much do you agree with Confucianism/Rationalism/Eastern Religion/Western Religion on the scale of 1 to 10?" The dependent variable in column 2 is their rating on Confucian value minus their individual mean of evaluation of all four systems. Column 2 uses an ordinary least squares model. Column 3 uses a probit model where the dependent variable equals 1 if Confucianism is ranked as number 1.*** p<0.01, ** p<0.05, * p<0.1