



# Religious affiliations of Chinese people and prosocial behavior: evidence from field experiments

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## Abstract

In this study, the four Chinese religious groups of Chinese Buddhists, Christians, Muslims, and nonbelievers were the participants, and an online field experiment was used to measure their prosocial behaviors in dictator game, ultimate game, trust game, and public goods game. In addition, through the degree of devoutness questionnaire, we analyzed the mechanism underlying the relationship between religions and individual prosocial behaviors. The experimental results show that the prosocial behaviors of Buddhists are higher than that of nonbelievers. Buddhists show significantly higher altruistic behaviors and trusting behaviors compared with the nonbelievers; however, their appeals to fairness are lower than that of other groups. The association of the religious affiliations of Christianity and Islam with altruistic behaviors and trusting behaviors are often related to the degree of devoutness, whereas for Buddhists, higher degrees of extrinsically oriented devoutness were associated with higher rejection amounts in ultimatum game.

**Keywords** Religious affiliation · Degree of religious devoutness · Prosocial behavior · Field experiment

**JEL Classification** C93 · Z12

## 1 Introduction

Religious belief is an important component of human society. It can deeply shape an individual's values, beliefs, and attitudes. The Pew Forum (2012) reported that 80% of the people in the world have religious beliefs, while 2010 Gallup poll indicated that more than half of Americans thought religion was very important in their lives, and this number had been the same for the past 40 years. At the same time, the

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religious beliefs have become increasingly influential for Chinese people in recent decades. According to the World Value Survey (WVS), in 1990, the proportion of atheists in China was nine times the proportion of people who professed belief in a religion; in 2001, this ratio had decreased to two times, and by 2007, the proportion of people those who professed belief in a religion (21.79%) exceeded that of atheists (17.93%). Therefore, it is important to understand the association of various religious beliefs with people's interactions and society in China, whether there are differences in behaviors and preferences between followers of religions and nonbelievers in China, and whether there are differences between people with different religious beliefs in terms of fairness, cooperation, altruism, trust, etc.

Traditional religious studies have been carried out from the perspectives of philosophy, theology, religious history, and sociology, and many research results have been accumulated. In recent decades, religion has attracted the increasing attention of economists. Barro and McCleary (2003) and McCleary and Barro (2006) thought that belief in heaven and hell could increase the growth rate of the gross domestic product (GDP) because such belief is conducive to the cultivation of virtues such as professional ethics, honesty, trust. Hilary and Hui (2009) as well as Kumar et al. (2011) proposed that religious norms affect enterprise's investment decisions and individual's stock portfolio. Ruffle and Sosis (2007) proposed that collective religious ceremonies can promote cooperation and enhance cohesion. Campante and Yanagizawa-Drott (2015) indicated that religious practices can affect individual behavior and beliefs in ways that have negative implications for economic performance.

Through behavioral games, experimental economists have widely observed various prosocial behaviors among humans, including altruism, fairness, trust, and cooperation (Güth et al. 1982; Forsythe et al. 1994; Berg et al. 1995; Isaac and Walker 1988). These prosocial behaviors play an important role in economic and social development and are the foundation of social coordination (Blau 1964), which can give impetus to economic growth (Knack and Keefer 1997; Zak and Knack 2001), improve the legal system and government regulation (La Porta et al. 1997), prevent corruption (Uslaner 2002), and promote social welfare (Helliwell 2003).

Existing studies show that prosocial behavior is not only affected by demographic factors such as age and gender, but it is also closely related to the social environment and the social system (Delhey and Newton 2003). Religious belief is a key influencing factor in various social and cultural backgrounds (Zak and Knack 2001). For example, Dunbar (2009) thought that strong and inspiring religious ceremonies could stimulate the release of endorphins in people's brains, thereby strengthening connections among people. Irons (1996) used the signal theory in biology to prove that strict taboos or expensive ceremonies acted as a screening mechanism that precipitated believers' sending of credible signals of loyalty to the organization, thereby indirectly promoting cooperation and trust. Johnson and Krüger (2004) thought that religious belief and worship of a supernatural agent (i.e., a god in a religion) might increase the occurrence of prosocial behavior by providing a threat of punishment for uncooperative behavior. Therefore, Fehr et al. (2003) found that the degree of trust in Catholics was higher than the degree of trust in other people, and an experiment by Tan and Vogel (2008) showed that more devout believers were more trusted. Ahmed and Salas (2011) found that people with religious beliefs showed a higher level of cooperation.

Compared to institutionalized Western religions, traditional Chinese religions are mainly diffused religions (Yang 2007). That is, the boundary between traditional Chinese religions and secular society is blurred, and such religions are inextricably bound up with the secular system and social order. Additionally, most religions in the Western world are monotheistic (e.g., Judaism, Christianity, and Islam) and are explicitly mutually exclusive. However, after spreading to China, due to the country's local politics, culture, and history, these monotheistic religions are practiced significantly different in China than in the West, where they originated. In particular, Chinese people are also influenced by traditional religions and philosophies (such as Confucianism and Taoism). Therefore, the characteristics of mainstream Western religions may have shifted in China, becoming polytheistic or relatively secular religions. The believers in Western mainstream religions in China may have a weaker sense of belonging and religious piety than Western religious believers, which may further weaken the characteristics of religious believers' prosocial behaviors found in previous literature. For example, it was found that the prosocial behaviors of Christians in Chinese society, where Christians are the minority, are different from the prosocial behaviors of Christians in Western societies where Judeo-Christian religions are dominant (Hu 2013).

We recruited three foremost religions in China at present, Buddhists, Christians, and Muslims and nonbelievers in religion as the subjects to conduct an online field experiment combined with the degree of devoutness questionnaire (degrees of comprehensive devoutness, intrinsically oriented devoutness and extrinsically oriented devoutness) in this study. Through dictator game, ultimate game, trust game, and public goods game, the relationships between having or not having religious beliefs, the different religious beliefs, the degree of devoutness and the prosocial behavior of Chinese participants were examined.

The experimental results revealed that the Buddhists presented higher degree of prosocial behavior than the other religion groups and nonbelievers. There was not much difference among the Christians, Muslims, and nonbelievers in religion. The associations of Christianity and Islam with altruistic and trusting behaviors were often related to the degree of devoutness. The higher the degree of extrinsically oriented devoutness was, the higher the Buddhists' rejection amount. We also find that the intrinsically oriented devoutness decreased the allocation amounts (in the dictator game, ultimatum game and trust game) for Muslims. On the other hand, extrinsically oriented devoutness increased the allocation amounts for Muslims.

## 2 Related literature

Early studies used religious attributes through subjects' self-reported to determine their religious identity, and subjects' self-reported participation in religious activities to determine their religiosity, and based on these to study the associations of religious identity and religiosity with individuals' behaviors. Later, researchers used a variety of multidimensional scales to replace self-reported participation in religious activities as a method for measuring the subjects' religiosity to have a more comprehensive and accurate measurement in the region experiments.

### (1) Self-reported religious attributes and participation in daily religious activities

Orbell et al. (1992) were the first study to use experimental methods to compare the prosocial behaviors of followers and non followers of religions. It was found that the followers of religions were more cooperative than the non followers of religion, and the frequency of the Mormons' participation in church activities increased their cooperation. Sosis and Ruffle (2003) found that there was no difference between religious and secular kibbutz members in terms of cooperation. When the results were stratified according to gender, the men from the religious kibbutzes asked for significantly less money than the women from the religious kibbutzes and for less money than the men from the secular kibbutzes. It suggested that the reason for this difference was that the Jewish men from the religious kibbutzes went to synagogue every day and played important roles in their religious institutions.

Fehr et al. (2003) found that there was no difference between Protestants and others in their behavior as principals and agents in the trust game. In the experiment, the number of visits to church per month was used to measure the degree of religious devoutness. Bellemare and Kröger (2007) carried out a similar experiment, and the experimental results indicated that religious affiliation (Catholic, Protestant, and non-religious) was not related to the participants' behavior, regardless of whether they were principals or agents. Anderson et al. (2010) used the self-reporting method to identify the subjects' religious affiliation and the number of religious services attended per month to represent the degree of devoutness.

Karlan (2005) conducted a trust game and a public goods game with rural women receiving microcredit loans in Peru. Whether or not they attended church was used to determine religious affiliation, and the time since the most recent church visit was used to measure the degree of devoutness. The trust experiment results showed that church attendance and the time since the most recent church visit did not affect the subjects' behavior in any role they played.

Ahmed and Salas (2009) divided subjects into a believer group and a nonbeliever group according to their self-reported religious affiliation and then had them participate in a standard public good game. The results indicated that there was no correlation between the degree of self-reported devoutness and the provision of public goods. In another study, Ahmed and Salas (2011) used a similar method to carry out a public goods game from theological seminaries and secular colleges in India.

Anderson and Mellor (2009) performed repeated public goods game with subjects over 50 years old and found that the amounts of the subjects' donations were not affected by religious affiliation or the degree of participation in religion. Using students as subjects, Anderson et al. (2010) found that religious background had nothing to do with an individual's behavior but that participation in religious services had a mild effect in the public goods game. Brañas-Garza et al. (2014) tested the relationship between several religion-related variables, such as intensity of religiosity, measured by participation in church services and social behavior, using dictator, ultimatum, and trust games. Xu et al. (2018) reported data from a lab-in-the-field experiment in China to provide an evidence on the impact of religion (Christianity) and religiosity (church attendance and contributions) on deception and trust.

The abovementioned literature shows that when self-reported religious affiliation and participation in daily religious activities are used to measure the degree of religious devoutness, although a certain religion may have a relationship with a single behavior, as a whole, the connection of religion with behavior is relatively limited.

## (2) Multi-dimensional measurement method about religiosity

In some studies, the multidimensional indicators are used to measure the degree of devoutness, and study the relationship between religiosity and behavior. Tan (2006) recruited university students for a dictator game and an ultimate game and used the multidimensional scale of De Jong et al. (1976) to measure the subjects' degree of religious devoutness. The research indicated that the degree of devoutness determined by the multidimensional scale, as a whole, had no association with the subjects' behavior in these two experiments. In the dictator game, strong religious belief increased the amount of money paid by the proposer; however, participation in religious activities had the opposite effect. In the ultimate game, the responders' minimum acceptable amount decreased with the factor of religious ceremony, increased with spiritual pursuits, it decreased with forgiveness of God.

In addition to religion, Chuah et al. (2013) added racial factors and used a multidimensional scale to replace the single measure of daily religious activity participation for determining the degree of devoutness. In the experiment, Buddhists, Christians, Muslims, and Hindus were recruited for participation in a prisoner's dilemma experiment. The study also showed that degree of religious belief, measured with multidimensional indicators, was negatively correlated with prosocial behavior. Chuah et al. (2009) carried out an ultimate game with subjects from the United Kingdom and Malaysia and administered the WVS (Inglehart 1997) to the subjects. They found that the amount of money paid by subjects with a high degree of devoutness according to the WVS was lower when they were proposers. Everett et al. (2016) measured multiple components of religiosity (including frequency of private prayer, frequency of public worship, and certainty of belief in God), and found a positive relationship between religiosity and prosociality when playing with Christian partners versus atheist partners in economic games. Chuah et al. (2016) elicited individual religiosity using the 8-item instrument by Rohrbaugh and Jessor (1975) and found that interpersonal similarity in religiosity and affiliation promoted trust.

The previous studies have two main limitations: first, the existing research has taken an overly simplistic approach to measuring the degree of religious devoutness and cannot truly reflect the strength of the subjects' religious beliefs; second, these studies have all focused on subjects outside of China and are dominated by Christians and Muslims, and their conclusions have very limited significance as a reference for China. Therefore, the experimental subjects in this paper are followers of the three major mainstream religions in China—Buddhism, Christianity, and Islam—and both a comprehensive measurement of religious devoutness and the measurement of intrinsically/extrinsically oriented devoutness are used to study the relationship between religion and individual prosocial behavior from various dimensions.

### 3 Experimental design

#### (1) Experimental participants and settings.

The experiment was carried out in May 2017, and the participants included four groups—Chinese Buddhists, Christians, Muslims, and nonbelievers in religion. With the consent and confirmation of religious leaders, we distributed leaflets for recruiting subjects from all four group in communities where the believers live, churches, temples, and mosques, and left telephone numbers on the leaflets to make potential subjects can contact us to participate via phone. To avoid interference with experimental results caused by offline group features, such as the dress and language of different religious groups, we implemented online field experiments. Based on the religious identities of the recruited subjects, we established four online groups without using group names via WeChat (an internet platform for social interaction). The experimenter sent a link to the identity confirmation form and asked the subjects to fill it out. In addition to options about religious beliefs, this form also included topics related history, philosophy, economics, society, and other issues. The purpose was to avoid having the subjects guess the intention of the experiment and thereby confuse with the experimental results. Asking subjects to fill out this form served to confirm their religious identities. Confirmed subjects were kept in the study.

The experimenter sent an instruction of the experiment to the WeChat group to ensure that each subject understood the contents and process of the experiment. Additionally, the experimenter provided the control test for the experimental subjects mainly to help them better understand the payment calculation in the experiment. Even if the participants do not answer the question correctly at the first time, we will give the participants chances to answer the question again. In the end, all the subjects passed the control test, and participated in the formal experiment. The experimenter also informed the participants for the anonymous in the entire experimental process, and the experimenter would not record the subjects' names, and subjects' personal information.

Buddhists, Christians, and Muslims who passed the test were randomly selected until each group reached 60 people. The 60 people in each group were again divided into six subgroups, with 10 people in each group; there were a total of 18 groups of followers of the three religions, for a total of 180 people. The 100 people who were nonbelievers in religion were retained, and they were also divided into 10 groups of 10 people per group; thus, 280 people of the entire subject group comprised a total of 28 groups of 10 people per group, and 28 new WeChat groups were established for these 28 groups. The 28 WeChat groups were combined pairwise to create 14 matched experimental groups of 20 people each to perform the behavioral game experiments. Matched players were not informed of one another's religious identity.

We used this grouping method and sent Sojump links to different WeChat groups to ensure that we could distinguish the religious identity and the role played in the game of each participant did not through recording the WeChat ID of the participants. The participants in the groups clicked on the links shared by the experimenter in the WeChat groups to enter the Sojump platform, and they independently made strategic game decisions. Their game partners were participants in another WeChat group, and

they did not know who would be paired with them. Therefore, although subjects may add other people in the WeChat group as private friends, this does not affect the anonymity in the behavioral games. The whole experiment (including several games and questionnaire) took participants approximately 90 min, and the average earnings of the subjects were approximately CNY 65.

## (2) Experimental procedure

Before the experiment began, the experimenter informed the WeChat groups that the subjects could not communicate with one another via WeChat groups for the entire duration of the experiment, and the experimenter asked subjects who had questions to communicate with the experimenter by way of private messaging. After confirming that no one had questions, the experimenter first sent the link to the experimental decision pages to the WeChat groups and invited each subject to click the link and enter the website to fill it out. To prevent subjects from modifying previous answers when they saw subsequent questions, the decision pages were designed so that subjects could not return to previous pages but could only turn to the next page. After all subjects had completed the decision pages on the behavioral games and had submitted it, the experimenter sent the survey questionnaire that included degree of religious devoutness and demographic information for all subjects to fill out.

After questionnaire were completed and submitted, the experimenter announced the end of the experiment in the WeChat groups. Then, another experimenter would enter the questionnaire website, collect the data, and randomly match the data of the two groups to generate the final experimental earnings of each person. These earnings were paid to each subject via WeChat account transfer to ensure that the payment occurred within two hours after the experiment.

## (3) Behavioral game.

The experimental decisions were divided into four parts and included a total of 11 questions. The first part comprised questions 2 and 3, which referred to the dictator game. The specific contents were as follows:

- (a) The computer will randomly select one of the two of you to receive CNY 20. If you are selected to receive the CNY 20, how much money are you willing to share with the other party? The amount you choose to share will be given to the other party, and you will lose that amount.
- (b) If you are not selected to receive the CNY 20, how much money do you think the other party will share with you? If your guess and the other party's answer differ by no more than CNY 1, you will receive an extra CNY 2.

The second part comprised questions 4 to 6, which referred to the ultimatum game. The specific contents were as follows:

- (c) The computer will randomly select one of the two of you to receive CNY 20. If you are selected to receive the CNY 20, how much money are you willing to share with the other party? If the other party accepts your distribution, he or she will be given the amount you chose to share, and you will lose that amount. If the other party rejects your distribution, your CNY 20 will be taken back, and neither of you will get the money.

- (d) If you are not selected to receive the CNY 20, then what is the minimum amount of money the other party must opt to share with you for you to accept the offer?
- (e) If you are not selected to receive the CNY 20, how much money do you think the other party will share with you? If your guess and the other party's answer differ by no more than CNY 1, you will receive an extra CNY 2.

The third part comprised questions 7 to 10, which referred to the trust game. The specific contents were as follows:

- (f) The computer will randomly select one of the two of you to receive CNY 20. If you are selected to receive the CNY 20, how much money are you willing to share with the other party? The computer will give the other party double the amount you choose to share with him or her, and he or she will decide how much money to return to you.
- (g) If you are not selected to receive the CNY 20, then based on the amount of money the other party shares with you (assuming CNY 1–20), how much money are you willing to return to him or her?
- (h) If you are selected to receive the CNY 20, then based on double the amount of money you share with the other party, how much money do you think the other party will return to you? If your guess and the other party's answer differ by no more than CNY 1, you will receive an extra CNY 2.
- (i) If you are not selected to receive the CNY 20, then how much money do you think the other party will share with you? If your guess and the other party's answer differ by no more than CNY 1, you will receive an extra CNY 2.

The fourth part comprised questions 11 and 12, which were related to the public goods game. The specific contents were as follows:

- (j) The computer will give each of you CNY 20. Now there is a public project that needs you to invest money. The computer will multiply the total amount of money the two of you put in by 1.5 and then divide it equally between the two of you. How much money are you willing to put in?
- (k) How much money do you think the other party will put in? If your guess and the other party's answer differ by no more than CNY 1, you will receive an extra CNY 2.

We set absolutely stranger matching in the behavioral games, and told participants the game partners are different across the four experiments to make sure the independence of decisions between the four tasks.

#### (4) Degree of devoutness questionnaire.

The degree of devoutness questionnaire mainly measured the subjects' degree of religious devoutness. Rohrbaugh and Jessor's (1975) Religiosity Measure and Gorsuch and Mcpherson's (1989) Intrinsic/Extrinsic-Revised (I/E-R) Scale were selected for this purpose.

Rohrbaugh and Jessor's (1975) Religiosity Measure provides a comprehensive measurement of the subjects' degree of religious devoutness according to the five aspects of religious knowledge, religious belief, religious practice, religious experience, and religious effect. Gorsuch and Mcpherson's (1989) I/E-R Scale is a nine-level scale that measures subjects' degree of devoutness along two dimensions: intrinsic orientation and extrinsic orientation.



## (5) Hypotheses.

Therefore, we have below a set of hypotheses.

**Hypothesis 1** There was no significant difference in prosocial behaviors between religious believers and nonbelievers.

**Hypothesis 2** There were no significant differences in prosocial behaviors among these different religious groups.

**Hypothesis 3** The effect of religion on prosocial behavior was not affected by devoutness.

**Hypothesis 4** The underlying mechanism of devoutness in the effect of religions on prosocial behavior does not vary across religious affiliations.

## 4 Experimental results

### 4.1 Religious affiliation and prosocial behavior

Table 1 shows the descriptive statistics for the demographic features of all subjects. When we were recruiting people from different religions and those who did not follow a religion, we controlled as much as possible the differences of the different groups in terms primary individual characteristics such as gender, age, educational level, annual family income, and marital status. Specifically, there were no significant differences between the groups with different religious beliefs and those who did not follow a religion in terms of gender, age, and marital status (Kruskal Wallis test, gender:  $\chi^2 =$

**Table 1** Demographic information for the experimental subjects

Variables	Buddhists		Christians		Muslims		Non followers		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender	0.45	0.50	0.42	0.42	0.47	0.50	0.43	0.50	0.44	0.49
Age	40.00	8.18	38.00	10.28	36.83	10.47	36.32	9.99	37.58	9.85
Education	3.30	0.96	3.62	1.06	3.07	0.91	3.43	0.78	3.26	0.98
Income	2.78	1.43	2.98	1.31	2.53	1.10	2.73	0.88	2.52	1.25
Marriage	0.73	0.45	0.72	0.48	0.78	0.34	0.75	0.44	0.75	0.43
No	60		60		60		100		280	

Gender = 1 means “female”, and gender = 0 means “male”; education = 1 means “primary school or below”, education = 2 means “junior high school”, education = 3 means “high school”, education = 4 means “undergraduate”, and education = 5 means “graduate or above”; income = 1 means “annual income of 10–60 thousand CNY”, income = 2 means “annual income of 60–120 thousand CNY”, income = 3 means “annual income of 120–200 thousand CNY”, income = 4 means “annual income of 200–300 thousand CNY”, and income = 5 means “annual income of 300 thousand CNY or more”; and marriage = 1 means “married”, and marriage = 0 means “unmarried”

3.026,  $p = 0.453$ ; age:  $\chi^2 = 4.271$ ,  $p = 0.234$ ; marital status:  $\chi^2 = 5.617$ ,  $p = 0.189$ ). In terms of educational level and annual family income, there were no significant differences between the Buddhists, Christians, and those who did not follow a religion (educational level:  $\chi^2 = 4.162$ ,  $p = 0.295$ ; annual family income:  $\chi^2 = 5.126$ ,  $p = 0.217$ ). The results allow us to test the relationship clearly between religion affiliation and prosocial behavior, and the hypothesis 1 and 2 will be examined.

### (1) Relationship between religious affiliation and altruistic behavior.

In our experiment, the subjects needed to choose the amount of money to be allocated to the other party and guess the amount of money that would be allocated to them when the other party was the dictator. Two pieces of data were thus generated: the giving amount and the expected giving amount. The giving amount reflected the subjects' degree of altruism; the expected giving amount could be used to observe the subjects' requirement of others' altruistic behavior, which is to say that it reflected the subjects' judgment of others' altruistic behavior.

First, the overall experimental results regarding the giving amount and the expected giving amount for the four types of subjects are presented in detail in Table 2. There were significant differences in the overall giving amounts among these four types of subjects ( $p = 0.082$ ), while there were no significant differences in the expected giving amounts for the four groups overall ( $p = 0.163$ ).

Next, we used the Mann–Whitney test to perform a pairwise difference analysis of the giving amounts and the expected giving amounts for these four groups of subjects (see Table 3). First, we considered the difference between the followers of religions and the nonbelievers, wherein the group of followers of religions was obtained by merging the Buddhist, Christian, and Muslim groups. The test results showed that there was no significant difference in the giving amounts between the followers of religions and the nonbelievers ( $p = 0.447$ ), but significant differences in the expected giving amounts were found ( $p = 0.092$ ). Second, we performed pairwise comparisons of different religious affiliations in terms of the giving amounts and the expected giving amounts. The results showed that the Buddhists' giving amounts were significantly higher than the Muslims' giving amounts ( $p = 0.030$ ), and the Buddhists' expected giving amounts were significantly higher than the nonbelievers' expected giving amounts ( $p = 0.027$ ), while there were no significant differences in the other pairwise comparisons.

### (2) Relationship between religious affiliation and appeal to fairness.

In our experiment, the subjects distributed the initial CNY 20 as the proposers. Then, they determined in their own rejection amount as the responders and predicted the amount the other party might propose. Three pieces of data were thus generated: the proposed amount and the expected proposed amount, and the rejection amount.

Table 2 presents the experimental results for the proposed amount and the expected proposed amounts. There were no significant differences in the proposed amounts ( $p = 0.116$ ) and the expected proposed amounts ( $p = 0.331$ ) among the four groups. Table 3 shows the further test results for the proposed amounts and the expected proposed amounts of the four types of subjects. The results showed that there were no significant differences in the proposed amount ( $p = 0.214$ ) or the expected proposed

**Table 2** The comparison of prosocial behaviors among different religious groups

Games	Prosocial behaviors	Buddhists		Christians		Muslims		Non-followers		<i>p</i> value
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
DG	Giving	9.50	1.38	9.13	2.04	8.6	2.39	8.67	2.73	0.082*
	Expected giving	10.13	4.26	9.07	4.39	8.83	4.43	8.36	4.42	0.163
UG	Offer	11.40	3.77	10.57	3.79	10.72	4.89	9.79	4.06	0.116
	Expected offer	9.32	3.20	8.45	3.70	8.73	4.31	8.26	4.42	0.331
TG	MAO	5.63	4.37	5.88	4.64	7.00	5.01	6.67	3.58	0.022**
	Expected MAO	9.32	3.20	8.45	3.70	8.73	4.31	8.26	3.28	0.060*
PGG	Investment	12.92	4.68	11.75	5.03	10.92	4.47	10.57	4.16	0.012**
	Expected investment	10.03	4.48	9.25	4.81	9.90	4.75	9.20	4.30	0.598
PGG	Return	0.688	0.232	0.567	0.218	0.619	0.227	0.537	0.235	0.001***
	Expected return	0.863	0.248	0.905	0.181	0.924	0.186	0.910	0.205	0.404
PGG	Contribution	15.95	5.00	15.30	6.03	13.82	5.48	14.84	5.32	0.182
	Expected contribution	14.73	5.43	14.28	6.02	12.50	5.84	13.93	5.38	0.157

The *p* value was calculated by one-way ANOVA test  
 \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively

**Table 3** Difference test for the prosocial behaviors of different religious groups

Games	Prosocial behaviors	Mann–Whitney test ( <i>p</i> value)						
		Re-No	Bu-No	Ch-No	Mu-No	Bu-Ch	Bu-Mu	Ch-Mu
DG	Giving	0.447	0.111	0.350	0.488	0.532	0.030**	0.131
	Expected giving	0.092*	0.027**	0.272	0.588	0.340	0.159	0.671
UG	Offer	0.214	0.039**	0.530	0.852	0.173	0.100	0.641
	Expected offer	0.326	0.106	0.584	0.927	0.372	0.187	0.711
	MAO	0.174	0.122	0.147	0.910	0.998	0.171	0.227
TG	Expected MAO	0.326	0.106	0.584	0.927	0.372	0.187	0.711
	Investment	0.109	0.003***	0.411	0.894	0.096*	0.010***	0.395
	Expected investment	0.284	0.146	0.946	0.355	0.238	0.716	0.466
	Return	0.008***	0.000***	0.740	0.059*	0.001***	0.065*	0.136
PGG	Expected return	0.732	0.290	0.824	0.589	0.434	0.160	0.482
	Contribution	0.657	0.211	0.410	0.299	0.784	0.046**	0.158
	Expected contribution	0.902	0.439	0.673	0.143	0.779	0.053*	0.119

Re means the followers of religions, No means nonbelievers, Bu means Buddhists, Ch means Christians, and Mu means Muslims  
 \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively

amount ( $p = 0.326$ ) between the followers of religions and the nonbelievers. Next, we considered the results of the pairwise comparisons between the subjects with different religious affiliations. With the exception of the Buddhists' proposed amount, which was significantly higher than the proposed amount of the nonbelievers ( $p = 0.039$ ), all other differences were not significant.

The rejection amount is the minimum acceptable offer (MAO) to the responder, which is usually thought to reflect the subject's attitude toward fairness. The rankings of mean rejection amount among different religious groups are basically the opposite of the rankings for the previously determined distribution amounts and proposed amounts, which can be interpreted as showing that Muslims having higher requirements for fairness than the subjects with other religious affiliations and that Buddhists have the lowest appeal to fairness. There were significant differences in the rejection amounts ( $p = 0.022$ ) and expected rejection amounts ( $p = 0.060$ ) among the four groups of subjects, while the pairwise differences between these groups did not have significance.

### (3) Relationship between religious affiliation and trusting behavior.

In the trust game, the subjects as the principal were given CNY 20 of endowment and were asked to choose the investment amount to the agents; at the same time, the principals had to predict the amount of money that the agents would return to them. Then, as the agent, the subjects were asked to fill in the amount of money that they were willing to return when the principal invest amount ranging from CNY 1 to 20 and to predict the investment amount that the principal might choose. Therefore, four pieces of data were generated in the trust experiment: the investment amount, the expected investment amount, the return amount, and the expected return amount. The investment amount reflects the subjects' level of trust; the expected investment amount reflects the subjects' judgment of others' level of trust; the return amount reflects the subjects' level of trustworthiness; and the expected return amount reflects the subjects' judgment of others' level of trustworthiness.

First, the two pieces of data—investment amount and expected investment amount—were analyzed. As the shown in Table 2, there were significant differences in the investment amounts of the four groups of subjects overall ( $p = 0.012$ ). Table 3 shows the results of further analysis indicating that the Buddhists' investment amount was significantly higher than the Christians' ( $p = 0.096$ ), the Muslims' ( $p = 0.010$ ), and the nonbelievers' ( $p = 0.003$ ). In contrast, there were no significant differences in the investment amounts among the Christians, Muslims, and nonbelievers.

The results show that for all four groups of subjects (see Table 2), expected investment amounts have no significant differences overall ( $p = 0.597$ ), and there were no significant differences for expected investment amounts between any two different religious groups.

We also analyzed the return amount and the expected return amount. Since the return amount was a one-to-one return of the investment amount, which ranged from CNY 1 to 20, the average return rate intuitively reflects the subjects' level of trustworthiness; similarly, we can use the expected return rate to represent the subjects' judgment regarding the trustworthiness of their partners. First, we examined at the results for the average return rate and the expected return rate (see Table 2). Generally speaking,

the average return rates of these four groups were significantly different ( $p = 0.001$ ). Further testing (see Table 3) showed that the average return rate of the followers of religions was significantly higher than the average return rate of the nonbelievers ( $p = 0.008$ ). Moreover, the Buddhists' average return rate was significantly higher than that of the Christians ( $p = 0.001$ ), the Muslims ( $p = 0.065$ ), and the nonbelievers ( $p < 0.001$ ). In addition, the Muslims' average return rate was also significantly higher than that of the nonbelievers ( $p = 0.059$ ).

In terms of the expected return rate, the mean values for the subjects with different religious affiliations were not very different ( $p = 0.404$ ), and the overall difference and the comparisons between groups were not significant (see Table 3).

In addition, we can intuitively show the return behavior of the subjects with different religious affiliations by graphic. Figure 1 shows the returns rates of the subjects from the four different religious affiliation groups for investment amounts from CNY 1 to 20. It can be seen from the figure that the Buddhists' return rate was the highest and that the return rates of the Muslims and the Christians were slightly higher than that of the nonbelievers. In addition, it also shows a downward trend as the investment amounts increase, and this trend involves in the close relationship between trust and trustworthiness (Ashraf et al. 2006; Sutter and Kocher 2007; Chaudhuri and Gangadharan 2007).

#### (4) Relationship between religious affiliation and cooperative behavior.

In the public goods game, the subjects were asked to contribute any amount of the endowment of CNY 20 to a public project. At the same time, they had to predict the amount their partner might contribute to the public project. Therefore, two pieces of data were generated by this experiment: the contribution amount and the expected contribution amount.

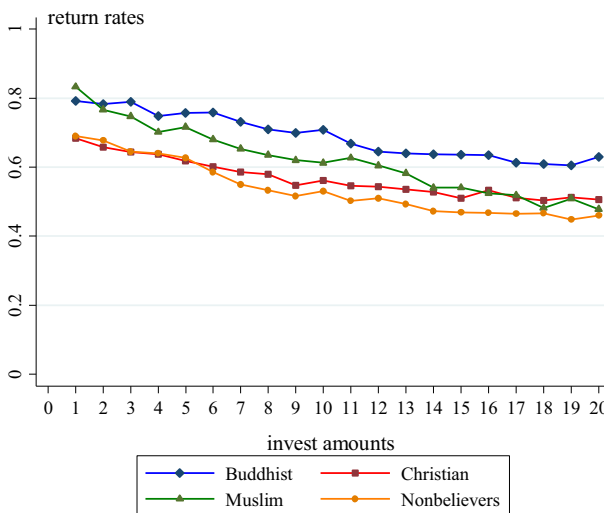


Fig. 1 Average return rates of the subjects from the four religion groups

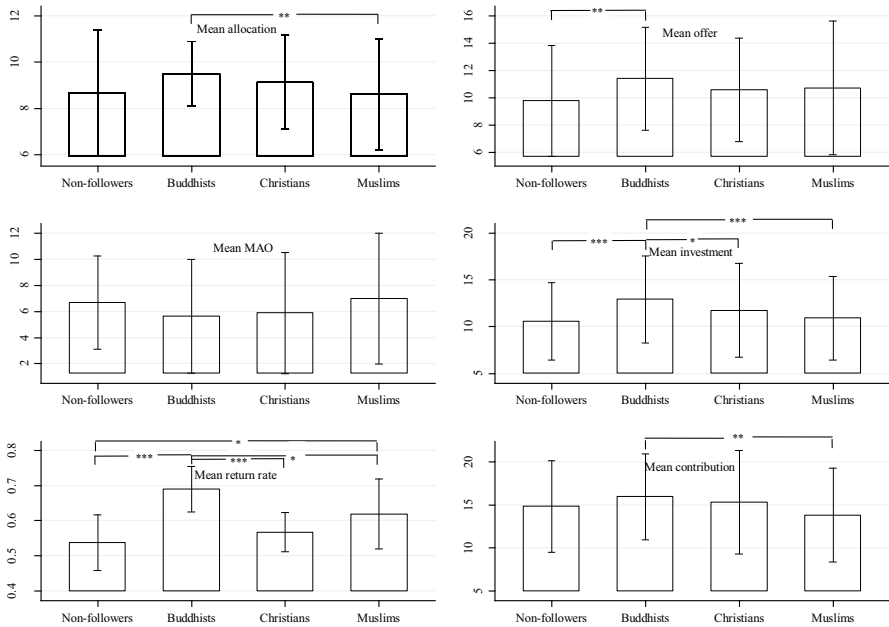


Fig. 2 Prosocial behaviors of the subjects of the four religion groups

We present the descriptive statistics and nonparametric tests for the contribution amounts and the expected contribution amounts. First, regarding the contribution amounts, Table 2 shows that there was no significant the overall differences across different religious affiliations ( $p = 0.182$ ). Moreover, the pairwise tests of the contribution amounts showed that the Buddhists' contribution amount was significantly higher than that of the Muslims ( $p = 0.046$ ), but there were no significant differences between the other groups (see Table 3).

Next, the expected contribution amount was analyzed. It can be seen in Table 2 there were no significant differences among the four religion groups ( $p = 0.157$ ). Based on the results of the pairwise comparison test (see Table 3), the Buddhists' expected contribution amount was significantly higher than that of the Muslims ( $p = 0.052$ ), but there were no significant differences in the expected contribution amounts between other groups. Figure 2 shows the level of various prosocial behaviors of the subjects of the four groups.

### 4.2 Degree of religious devoutness and prosocial behavior

Since an analysis of religious affiliation alone could not completely reveal the mechanism underlying the association of religion with prosocial behavior, we further studied the relationship between the degree of religious devoutness and prosocial behavior, and the hypothesis 3 and 4 will be examined. We used the degree of comprehensive

devoutness, the degree of intrinsically oriented devoutness, and the degree of extrinsically oriented devoutness to study the relationship between different dimensions of religious devoutness and prosocial behavior.

According to Tan (2006), it was necessary to perform standard score conversions for the degree of comprehensive devoutness and intrinsically/extrinsically oriented devoutness measure that the subjects completed. The standard score is also called the Z-score, which is determined by dividing the difference between the score and the mean by the standard deviation, that is,  $z = (x - \mu)/\sigma$ , where  $\mu$  is the mean value, and  $\sigma$  is the standard deviation. The advantage of performing standard score conversion is it allows the values of the multidimensional religiosity measure to be converted into a standard numerical result. Moreover, since the comprehensive religiosity scale used a five-level Likert scale, and the intrinsically/extrinsically oriented scale used a nine-level Likert scale, standard score conversion allowed the measured values of different scales to be converted into a unified result.

(1) Association of the degree of religious devoutness with altruistic behavior.

Table 4 shows the OLS regression results for the giving amounts. In Model (1), Buddhist, Christian, and Muslim represented the religious affiliation of Buddhist, Christian, or Muslim, respectively. They were treated as dummy variables: when the values of all three were 0, it indicated that the subject was a non follower of religion. The results indicated that affiliation with Buddhism had a positive effect on the giving amounts. Although the Christian affiliation also correlated positively with the giving amounts, the result was not significant. The coefficient between Muslim affiliation and the giving was negative but not significant. This regression result is also consistent with the results of previous nonparametric tests.

**Table 4** Relationship of the degree of comprehensive devoutness with giving amounts

	(1)	(2)	(3)	(4)
Buddhist	0.830** (0.372)	0.830** (0.373)	0.830**(0.372)	0.823** (0.381)
Christian	0.463 (0.372)	0.463 (0.373)	0.463 (0.372)	0.499 (0.390)
Muslim	- 0.070 (0.372)	- 0.070 (0.373)	- 0.070 (0.372)	- 0.349 (0.392)
RELI		- 0.466 (0.269)		
RELI × Buddhist			0.202 (0.472)	0.159 (0.473)
RELI × Christian			0.568 (0.501)	0.485 (0.502)
RELI × Muslim			- 0.700 (0.428)	- 0.742* (0.430)
Education				0.0592* (0.0322)
Income				0.0001 (0.001)
Age				0.099 (0.014)
Male				- 0.369 (0.287)
Constant	8.670*** (0.228)	8.670*** (0.228)	8.670*** (0.227)	8.902*** (0.532)
N	280	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error



In this study, the subjects' degree of comprehensive devoutness was measured by Rohrbaugh and Jessor's (1975) eight-item scale of religiosity, with responses given on a five-level Likert scale. In Model (2), the degree of comprehensive devoutness, RELI, was added on the Model (1) to test the effect of the subjects' degree of religious devoutness on the giving amounts. According to the regression results, RELI did not have an independent effect. Model (3) tested the interaction effect of the degree of devoutness (RELI) and religious affiliation (Buddhist, Christian, and Muslim), and the results showed that the interaction effects were not significant. Educational level (Education), annual family income (Income), age (Age), and gender (Male) were added to Model (4) as demographic variables to perform robustness tests.

After controlling for personal characteristics, the regression results showed that the significance of Buddhist affiliation was still very robust. Although the interaction terms between the degree of comprehensive devoutness and Buddhist and Christian affiliation were not significant, the signs were always positive, which implied that the degree of religious devoutness had a positive effect for Buddhists and Christians. The interaction term between RELI and Muslim presented negative significance, which might indicate that the degree of comprehensive devoutness strengthened the negative effect on the Muslims' giving amount, which is to say that the higher the degree of comprehensive devoutness with Muslims, the lower their giving amount was.

We also replaced the degree of comprehensive devoutness in the model with the degree of the intrinsically oriented devoutness (IR) and the extrinsically oriented devoutness (ER) and performed a regression analysis. We use the I/E-R Scale 9-level scale of Gorsuch and McPherson (1989) to measure the degree of IR and the degree of ER. The results showed that these two variables did not generate an independent effect ("Appendix" Table 10). Similarly, the interaction effects of religious affiliation and the degrees of intrinsic and extrinsic devoutness were added, and the results showed that the degree of intrinsically oriented devoutness increased the giving amount for Christians, whereas the degree of extrinsically oriented devoutness increased the giving amount for Muslims. The results show that compared to Buddhists and Christians, Muslims differed greatly in their giving behavior. Whether it was the independent effect of Muslim affiliation or the interaction effects of the degree of comprehensive religious devoutness or the degrees of intrinsically and extrinsically oriented devoutness, the direction of the effect on the giving amount was completely opposite that for Buddhists and Christians. This finding seemed to indicate that the mechanism underlying the relationship of Muslim affiliation with individual behavior differed greatly from the mechanism of Buddhism and Christianity.

## (2) Association of the degree of religious devoutness with appeal to fairness.

We performed an OLS regression analysis on the results for the proposed amounts (see Table 5). Model (1) shows that the Buddhists' proposed amount was significantly higher than other groups. In Model (2), the degree of comprehensive religious devoutness was added on the basis of Model (1), and the results showed that this variable was correlated negatively and significantly with the proposed amount, that is, the higher the subjects' degree of comprehensive religious devoutness, the smaller their proposed amount. The interaction effect of religious affiliation and the degree of comprehensive religious devoutness was tested in Model (3), and the results showed that Muslims

**Table 5** Relationship of the degree of comprehensive devoutness with proposed amounts

	(1)	(2)	(3)	(4)
Buddhist	1.610** (0.676)	1.610** (0.673)	1.610** (0.673)	1.493** (0.689)
Christian	0.776 (0.676)	0.776 (0.673)	0.776 (0.673)	0.925 (0.704)
Muslim	0.927 (0.676)	0.927 (0.673)	0.927 (0.673)	0.359 (0.710)
RELI		- 0.825* (0.486)		
RELI × Buddhist			- 0.260 (0.856)	- 0.158 (0.855)
RELI × Christian			- 0.292 (0.908)	- 0.272 (0.909)
RELI × Muslim			- 1.680** (0.776)	- 1.750** (0.778)
Education				- 0.136** (0.560)
Income				0.0005 (0.0012)
Age				- 0.016 (0.026)
Male				0.415 (0.519)
Constant	9.790*** (0.414)	9.790*** (0.412)	9.790*** (0.412)	11.103*** (0.782)
N	280	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

with a higher degree of comprehensive religious devoutness offered smaller proposed amounts. In Model (4), after personal characteristics were controlled on the basis of Model (3), the results of the aforementioned main variables were all robust. We also further subdivided the comprehensive religiosity in the model into the intrinsically oriented religiosity and the extrinsically oriented religiosity. The results indicated that these two degree of devoutness indicators did not have an independent relationship with the proposed amount but that for Muslims, the degree of intrinsically oriented devoutness had a negative effect on the proposed amount (See “Appendix” Table 11).

We also performed regression analysis for the rejection amount (see Table 6). Models (1)–(4) show that although the effect of Buddhist and Christian affiliation on the rejection amount was not significant, it was always consistent. Other main variables, such as the degree of comprehensive devoutness and the interaction term between the degree of comprehensive devoutness and religious affiliation, were not significant. The degree of comprehensive religious devoutness was further subdivided into the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness, and the regression results showed that the interaction term between the

**Table 6** Relationship of the degree of comprehensive devoutness with rejection amounts

	(1)	(2)	(3)	(4)
Buddhist	– 1.037 (0.705)	– 1.037 (0.706)	– 1.037 (0.704)	– 0.986 (0.711)
Christian	– 0.787 (0.705)	– 0.787 (0.706)	– 0.787 (0.704)	– 0.345 (0.726)
Muslim	0.330 (0.705)	0.330 (0.706)	0.330 (0.704)	– 0.230 (0.732)
RELI		– 0.149 (0.510)		
RELI × Buddhist			– 0.661 (0.895)	– 0.491 (0.883)
RELI × Christian			– 1.231 (0.949)	– 1.121 (0.938)
RELI × Muslim			1.062 (0.811)	1.058 (0.803)
Education				– 0.126* (0.058)
Income				0.0001 (0.0003)
Age				– 0.048* (0.027)
Male				1.245** (0.535)
Constant	6.670*** (0.432)	6.670*** (0.432)	6.670*** (0.431)	7.865*** (0.916)
N	280	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

degree of extrinsically oriented devoutness and Buddhist affiliation was significant and positive (“Appendix” Table 12). This indicated that for Buddhists, a high degree of extrinsically oriented devoutness was clearly associated with an increase the rejection amount, which is to say that this group had higher requirements regarding the sense of fairness.

### (3) Association of the degree of religious devoutness with trusting behavior.

It presents the results of the regression analysis for the investment amount in the trust game (see Table 7). Models (1)–(4) show that the Buddhists’ investment amount was significantly higher than other groups and that an increase in the degree of comprehensive devoutness significantly reduced the investment amounts offered by the followers of religions. The interaction term between Muslim and RELI was significant and negative, which could be interpreted to indicate that the trusting behavior of Muslims associated with their degree of comprehensive devoutness such that the higher their degree of comprehensive devoutness was, the lower their degree of trust in others was. We used the degrees of intrinsically and extrinsically oriented devoutness in place of the degree of comprehensive devoutness for further analysis (“Appendix” Table 13). The results indicated that these two degrees of devoutness had a significantly negative association with the investment amount. In addition, the interaction term between Christian and extrinsically oriented devoutness was significantly negative, and the interaction term between Muslim and intrinsically oriented devoutness appeared to significantly negative. Therefore, for Buddhists, in general, regardless of their degree of devoutness, their level of trust was significantly higher than that of the subjects with other religious affiliations. The relationship of Christian and Muslim identification with the investment amount depended on the level of devoutness; and the degree of

**Table 7** Relationship of the degree of comprehensive devoutness with investment amounts

	(1)	(2)	(3)	(4)
Buddhist	2.347** (0.741)	2.347** (0.738)	2.347** (0.731)	2.042** (0.749)
Christian	1.180 (0.741)	1.180 (0.738)	1.180 (0.731)	1.207 (0.765)
Muslim	0.347 (0.741)	0.347 (0.738)	0.347 (0.731)	0.004 (0.772)
RELI		− 0.984* (0.532)		
RELI × Buddhist			− 0.159 (0.929)	− 0.093 (0.930)
RELI × Christian			0.413 (0.986)	0.381 (0.988)
RELI × Muslim			− 2.685*** (0.843)	− 2.874*** (0.846)
Education				− 0.0471 (0.305)
Income				0.056 (0.048)
Age				0.0001 (0.0002)
Male				0.878 (0.564)
Constant	10.570*** (0.454)	10.570*** (0.452)	10.570*** (0.448)	10.632*** (0.785)
N	280	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

comprehensive devoutness and the degree of intrinsically oriented devoutness reduced the Muslims' level of trust, but the degree of extrinsically oriented devoutness reduced the Christians' level of trust.

Table 8 shows the regression results for the average return rate. The results indicated that the average return rates of Buddhists and Muslims were significantly higher than other groups. The coefficients of the degree of comprehensive devoutness and the interaction between the degree of comprehensive devoutness and the three religious affiliation variables were not significant, illustrating that the degree of comprehensive devoutness had no clear relationship with the average return rates for the followers of different religions. Taking into account the regression results for the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness ("Appendix" Table 14), only the interaction term between the degree of intrinsically oriented devoutness and Buddhist affiliation was significantly negative, showing that

**Table 8** Relationship of the degree of comprehensive devoutness with return rates

	(1)	(2)	(3)	(4)
Buddhist	0.152*** (0.037)	0.152*** (0.037)	0.152*** (0.037)	0.143*** (0.384)
Christian	0.030 (0.037)	0.030 (0.037)	0.030 (0.037)	0.027 (0.393)
Muslim	0.082** (0.037)	0.082** (0.037)	0.082** (0.037)	0.076* (0.396)
RELI		- 0.031 (0.270)		
RELI × Buddhist			- 0.028 (0.048)	- 0.016 (0.048)
RELI × Christian			- 0.021 (0.051)	- 0.010 (0.051)
RELI × Muslim			- 0.042 (0.043)	- 0.402 (0.434)
Education				- 0.003 (0.003)
Income				0.000*(0.0001)
Age				- 0.002 (0.001)
Male				0.037 (0.029)
Constant	0.537*** (0.023)	0.537*** (0.023)	0.537*** (0.023)	0.568*** (0.035)
N	280	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

for Buddhists, the higher their degree of intrinsically oriented devoutness, the lower the proportion they were willing to return.

(4) Association of the degree of religious devoutness with cooperation behavior.

Finally, we performed a regression analysis for the relationship between the degree of religious devoutness and the contribution amount in the public good game (see Table 9). The results show that the three religious affiliation variables of Buddhist, Christian, and Muslim were not significant, indicating that religious affiliation did not have a direct effect on the contribution amount. The interaction terms between the degree of comprehensive devoutness and the three religious affiliation variables were also not significant, indicating that there was no significant relationship between the size of the subjects' contribution amount and the degree of comprehensive devoutness. Further regression analysis was performed using the degrees of intrinsically and extrinsically oriented devoutness as explanatory variables ("Appendix" Table 15), and the results indicated that connection of the degree of extrinsically oriented devoutness was significantly negative, showing that the higher the subjects' degree of extrinsically oriented devoutness was, the lower their contribution amounts would be.

**Table 9** Relationship of the degree of comprehensive devoutness with contribution amounts

	(1)	(2)	(3)	(4)
Buddhist	1.110 (0.890)	1.110 (0.891)	1.110 (0.891)	0.714 (0.918)
Christian	0.460 (0.890)	0.460 (0.891)	0.460 (0.891)	0.098 (0.937)
Muslim	- 1.023 (0.890)	- 1.023 (0.891)	- 1.023 (0.891)	- 0.800 (0.945)
RELI		- 0.512 (0.643)		
RELI × Buddhist			- 0.734 (1.133)	- 0.630 (1.139)
RELI × Christian			0.769 (1.201)	0.856 (1.210)
RELI × Muslim			- 1.266 (1.027)	- 1.372 (1.035)
Education				0.011 (0.021)
Income				0.0001 (0.002)
Age				0.015 (0.035)
Male				0.529 (0.691)
Constant	14.840** (0.545)	14.840** (0.545)	14.840** (0.546)	13.542** (0.643)
N	280	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

Through a regression analysis of the results of four behavioral game experiments, we found that Buddhists showed a significantly higher social preference in terms of altruistic behavior and trusting behavior compared with nonbelievers in religion. The effect of Christian and Muslim religious affiliation on altruistic and trusting behavior was often related to the degree of devoutness. The higher Buddhists' degree of extrinsically oriented devoutness, the higher their rejection amount would be. Regarding cooperative behavior, none of the religious affiliations had a significant effect, and cooperative behavior was only weakly associated with the degree of extrinsically oriented devoutness.

In addition, we investigate whether social aspects of religion influence prosocial behavior. We use the social external factors of externally-oriented questions, including question 21 (I go to church\temple\mosque mainly because I enjoy seeing people I know there), question 10 (I go to church\temple\mosque because it helps me to make friends), and question 19 (I go to church\temple\mosque mostly to spend time with my friends) to capture the social aspect of religions. We find the total scores on these questions are significantly correlated with subjects' prosocial behaviors, such as offer (spearman's rank correlation test,  $p = 0.036$ ), investment ( $p = 0.025$ ), return ( $p = 0.078$ ), and contribution behaviors ( $p < 0.01$ ).

## 5 Conclusion

An increasing number of empirical studies have shown that religion is an important factor affecting individual behavior and economic output. Comparatively speaking, China's research in the field of religious economics is still very limited, and there are very large differences between China's religious beliefs and the belief structures of Western world, which are dominated by Christianity or Islam. In this paper, a foothold was kept in Chinese society. Through experimental economics methods, the relationships of different religious beliefs with the subjects in terms of prosocial behaviors such as altruism, fairness, trust, and cooperation were studied.

We randomly recruited Buddhists, Christians, Muslims, and nonbelievers in religion in China and conducted dictator game, ultimate game, trust game, and public good game between the subjects through an online network platform. We first studied the relationship between each Chinese religious affiliation and prosocial behavior. The statistical results indicated that, except for the rejection amount and the expected rejection amount, the Buddhists' mean values were the highest for the other groups in the behavioral games, indicating that the Buddhists presented higher degree of prosocial behavior than the other groups. The finding that Buddhists had the lowest rejection amount indicates that their appeal to fairness was lower than that of the others groups, which may be related to the emphasis on "renouncing the world" in Buddhism. There was not much difference among the Christians, Muslims, and nonbelievers in religion.

The second level of research was a discussion of the association of the degree of religious devoutness with prosocial behavior. We used the degree of comprehensive devoutness to measure the subjects' overall degree of devoutness, used the degree of intrinsically oriented devoutness to measure the subjects' spiritual pursuit of religion, and used the degree of extrinsically oriented devoutness to measure the subjects' use of religion as a guide in an attempt to test the associations of different aspects of religious devoutness with prosocial behavior. Through analysis of the experimental results, we further verified that Buddhists manifested stronger prosocial behavior. The associations of the religious identities of Christianity and Islam with altruistic and trusting behaviors were often related to the degree of devoutness. The higher the degree of extrinsically oriented devoutness was, the higher the Buddhists' rejection amount. In comparison, the Christians' and Muslims' attitudes regarding fairness did not have a significant connection to either religious affiliation or degree of devoutness. We also find that the intrinsically oriented devoutness decreased the allocation amounts (in the dictator game, ultimatum game and trust game) for Muslims. On the other hand, extrinsically oriented devoutness increased the allocation amounts for Muslims. That is, Muslims who believe because they have a more inner belief for this religion will allocate less to others, while Muslims who believe because they seek more social support and social identity will be allocated more to others.

The degree of devoutness questionnaire used in this paper originated in the Western world, with Christianity as the dominant tradition. Therefore, it seems especially important to further develop research methods suitable for studying Chinese religions due to their particularities. It is noted that the results regarding the association of religious beliefs with people's behavioral preference in the Chinese context might not easy to be generalized to other societies, in particular where the religious environments are different. For example, the behaviors of Christians in China, where Christians are the minority, might be different from the behaviors of Christians in Western societies where Judeo-Christian religions are dominant (Hu 2013). In addition, because of the self-selection issue, these results do not tell us religion makes people more/less prosocial, but maybe because that the more/less prosocial people are more/less likely to believe in some particular religion. In future research, we could also consider subjects' religious identities through priming in the experiments to more directly study the causal relationship between religion and prosocial behavior.

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## Appendix A

Appendix A reports the questionnaires, including measurement of degree of religious devoutness and individual characteristics.

The Religiosity Scale of Rohrbaugh and Jessor (1975) comprehensively measures participants' religiosity via religious knowledge, religious beliefs, religious practices, religious experiences, and religious effects. Religious knowledge concerns familiarity with religious knowledge; religious beliefs involve the individual's commitment to a certain religious principle and doctrine; religious practices include organized worship, prayer, religious scriptural study, and observation of the moral and ethical precepts related to the religion believed in; religious experiences refer to various miracles and mysterious personal experiences; and religious effects include peace of mind, a calm character, moral compliance and other behavioral influences that are a result of faith. For example, in the Appendix, questions 1–2 address religious beliefs; questions 3–4 examine religious practices; questions 5–6 concern religious experiences; and questions 7–8 address religious effects.



## One choice questions

1. Which of the following statements comes closest to your belief about life after death (immortality)?
  - a) I believe in a personal life after death, a soul existing as a specific individual.
  - b) I believe in a soul existing after death as a part of a universal spirit.
  - c) I believe in a life after death of some kind, but I really don't know what it would be like.
  - d) I don't know whether there is any kind of life after death, and I don't know if I will ever know.
  - e) I don't believe in any kind of life after death.
2. Which of the following statements comes closest to your belief about God\Buddha\Allah?
  - a) I am sure that God\Buddha\Allah really exists and that He is active in my life.
  - b) Although I sometimes question His existence, I do believe in God\Buddha\Allah and believe He knows of me as a person.
  - c) I don't know if there is a personal God\Buddha\Allah, but I do believe in a higher power of some kind.
  - d) I don't know if there is a personal God\Buddha\Allah or a higher power of some kind, and I don't know if I will ever know.
  - e) I don't believe in a personal God\Buddha\Allah or in a higher power.
3. How often have you attended religious services during the past year?
  - a) every week.
  - b) twice a month.
  - c) once a month.
  - d) sometimes a year.
  - e) never
4. Which of the following best describes your practice of prayer or religious meditation?
  - a) Prayer is a regular part of my daily life.
  - b) I usually pray in times of stress or need but rarely at any other time.
  - c) I pray only during formal ceremonies.
  - d) Prayer has little importance in my life.
  - e) I never pray.
5. During the past year, how often have you experienced a feeling of religious reverence or devotion?
  - a) Almost daily.
  - b) Frequently.
  - c) Sometimes.
  - d) Rarely.
  - e) Never.
6. Do you agree with the following statement? "Religion gives me a great amount of comfort and security in life."
  - a) Strongly disagree.
  - b) Disagree.
  - c) Uncertain.
  - d) Agree.
  - e) Strongly agree.
7. When you have a serious personal problem how often do you take religious advice or teaching into consideration?
  - a) Almost always.
  - b) Usually.
  - c) Sometimes.
  - d) Rarely.
  - e) Never.
8. How much of an influence would you say that religion has on the way that you choose to act and the way that you choose to spend your time each day?
  - a) No influence.
  - b) A small influence.
  - c) Some influence.
  - d) A fair amount of influence.
  - e) A large influence.

We use the I/E-R Scale 9-level scale of Gorsuch and McPherson (1989) to measure the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness. These 14 questions include 8 internally-oriented questions (I), 6 externally-oriented questions, 3 of which are personal external factors, such as desire for peace and comfort (Ep), and the other 3 are social external factors, such as desire for friendship and team support (Es), each question is scored on a 9-level scale. In order to prevent the inertia of the participants' scoring, questions 11, 18, and 22 are deliberately designed to be reversed.

Please give 1–9 score depending on how much you agree with it.

9. I enjoy reading about my religion. (I)
10. I go to church\temple\mosque because it helps me to make friends. (Es)
11. It doesn't much matter what I believe so long as I am good. (I) (reversed)
12. It is important to me to spend time in private thought and prayer. (I)
13. I have often had a strong sense of God\Buddha\Allah's presence. (I)
14. I pray mainly to gain relief and protection. (Ep)
15. I try hard to live all my life according to my religious beliefs. (I)
16. What religion offers me most is comfort in times of trouble and sorrow. (Ep)
17. Prayer is for peace and happiness. (Ep)
18. Although I am religious, I don't let it affect my daily life. (I) (reversed)
19. I go to church\temple\mosque mostly to spend time with my friends. (Es)
20. My whole approach to life is based on my religion. (I)
21. I go to church\temple\mosque mainly because I enjoy seeing people I know there. (Es)
22. Although I believe my religion, many other things are more important in life. (I) (reversed)

## Demographic information

23. What is your gender?

- a) male      b) female

24. How old are you \_\_\_\_\_

25. What is your education level?

- a) primary school education      b) middle school education  
c) associate degree      d) bachelor degree      e) graduate degree or above

26. What is your family's annual income?

- a) ¥10000-60000      b) ¥60000-120000      c) ¥120000-200000  
d) ¥200000-300000      e) above ¥300000

27. What is your current marital status?

- a) single      b) married

## Appendix B

Appendix B reports further regression tables.

See Tables 10, 11, 12, 13, 14 and 15.

**Table 10** Relationship of the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness with giving amounts

	(1)	(2)	(3)
Buddhist	0.830** (0.373)	0.830** (0.370)	0.839** (0.354)
Christian	0.463 (0.373)	0.463 (0.370)	0.512 (0.372)
Muslim	- 0.070 (0.373)	- 0.070 (0.370)	- 0.365 (0.388)
IR	0.207 (0.275)		
ER	- 0.029 (0.266)		
IR × Buddhist		0.417 (0.502)	0.440 (0.512)
IR × Christian		0.928* (0.537)	0.830 (0.542)
IR × Muslim		- 0.719 (0.437)	- 0.788* (0.426)
ER × Buddhist		- 0.270 (0.451)	- 0.450 (0.458)
ER × Christian		- 0.150 (0.491)	- 0.268 (0.482)
ER × Muslim		0.850* (0.475)	0.808* (0.455)
Personal characteristics	No control	No control	Control
Constant	8.670*** (0.229)	8.670*** (0.226)	9.896*** (0.820)
N	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

**Table 11** Relationship of the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness with proposed amounts

	(1)	(2)	(3)
Buddhist	1.610** (0.677)	1.610** (0.697)	1.438** (0.658)
Christian	0.776 (0.677)	0.776 (0.679)	0.922 (0.730)
Muslim	0.927 (0.677)	0.927 (0.679)	0.328 (0.712)
IR	- 0.533 (0.498)		
ER	- 0.160 (0.483)		
IR × Buddhist		0.304 (0.921)	0.342 (0.915)
IR × Christian		- 0.098 (0.985)	- 0.138 (0.985)
IR × Muslim		- 1.456* (0.802)	- 1.656** (0.759)
ER × Buddhist		- 0.127 (0.828)	- 0.190 (0.832)
ER × Christian		0.062 (0.902)	0.008 (0.925)
ER × Muslim		0.103 (0.871)	0.308 (0.865)
Personal characteristics	No control	No control	Control
Constant	9.790*** (0.414)	9.790*** (0.416)	12.018*** (1.525)
N	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

**Table 12** Relationship of the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness with rejection amounts

	(1)	(2)	(3)
Buddhist	- 1.037 (0.699)	- 1.037 (0.699)	- 1.045 (0.711)
Christian	- 0.787 (0.699)	- 0.787 (0.699)	- 0.438 (0.712)
Muslim	0.330 (0.699)	0.330 (0.699)	- 0.168 (0.735)
IR	- 0.294 (0.515)		
ER	1.241 (0.499)		
IR × Buddhist		0.223 (0.949)	0.242 (0.936)
IR × Christian		- 1.349 (1.015)	- 1.154 (1.012)
IR × Muslim		0.418 (0.828)	0.240 (0.825)
ER × Buddhist		1.897** (0.853)	2.052** (0.840)
ER × Christian		1.246 (0.929)	1.360 (0.932)
ER × Muslim		0.107 (0.898)	0.185 (0.890)
Personal characteristics	No control	No control	Control
Constant	6.670*** (0.428)	6.670*** (0.428)	9.538*** (1.540)
N	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

**Table 13** Relationship of the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness with investment amounts

	(1)	(2)	(3)
Buddhist	2.347*** (0.734)	2.347*** (0.728)	2.035*** (0.726)
Christian	1.180 (0.734)	1.180 (0.728)	1.302* (0.735)
Muslim	0.347 (0.734)	0.347 (0.728)	- 0.289 (0.734)
IR	- 0.971* (0.540)		
ER	- 1.119** (0.523)		
IR × Buddhist		0.367 (0.988)	0.187 (0.988)
IR × Christian		- 1.351 (1.057)	- 1.459 (1.052)
IR × Muslim		- 2.354*** (0.861)	- 2.320*** (0.860)
ER × Buddhist		- 0.785 (0.888)	- 0.765 (0.887)
ER × Christian		- 2.553*** (0.967)	- 2.558*** (0.968)
ER × Muslim		0.425 (0.935)	0.432 (0.933)
Personal characteristics	No control	No control	Control
Constant	10.570*** (0.449)	10.570*** (0.446)	11.032*** (1.502)
N	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

**Table 14** Relationship of the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness with return rates

	(1)	(2)	(3)
Buddhist	0.152*** (0.037)	0.152*** (0.037)	0.138*** (0.038)
Christian	0.030 (0.037)	0.030 (0.037)	0.029 (0.037)
Muslim	0.082** (0.037)	0.082** (0.037)	0.078* (0.041)
IR	- 0.041 (0.027)		
ER	- 0.034 (0.026)		
IR × Buddhist		- 0.092* (0.051)	- 0.090* (0.051)
IR × Christian		- 0.020 (0.054)	- 0.019 (0.054)
IR × Muslim		- 0.014 (0.044)	- 0.016 (0.044)
ER × Buddhist		- 0.033 (0.046)	- 0.032 (0.045)
ER × Christian		- 0.031 (0.050)	- 0.030 (0.048)
ER × Muslim		- 0.046 (0.048)	- 0.045 (0.047)
Personal characteristics	No control	No control	Control
Constant	0.537*** (0.023)	0.537*** (0.023)	0.542*** (0.028)
N	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

**Table 15** Relationship of the degree of intrinsically oriented devoutness and the degree of extrinsically oriented devoutness with contribution amounts

	(1)	(2)	(3)
Buddhist	1.110 (0.888)	1.110 (0.885)	0.789 (0.910)
Christian	0.460 (0.888)	0.460 (0.885)	0.168 (0.886)
Muslim	- 1.023 (0.888)	- 1.023 (0.885)	- 0.904 (0.952)
IR	0.004 (0.654)		
ER	- 1.161* (0.633)		
IR × Buddhist		- 0.890 (1.202)	- 0.906 (1.212)
IR × Christian		1.884 (1.285)	1.842 (1.301)
IR × Muslim		- 1.041 (1.047)	- 1.049 (1.050)
ER × Buddhist		- 0.944 (1.080)	- 0.840 (1.087)
ER × Christian		- 1.806 (1.176)	- 1.782 (1.182)
ER × Muslim		- 0.062 (1.137)	- 0.185 (1.136)
Personal characteristics	No control	No control	Control
Constant	14.840*** (0.546)	14.840*** (0.542)	13.578*** (1.005)
N	280	280	280

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and that in parentheses is the standard error

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