

Trust in Chinese agric-food cooperatives: A games approach

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Abstract: Base on a games approach, we empirically test the trust among farmers and between farmers and cooperatives. We design three games, called trust game, dictator games and voluntary contribution mechanism. We conduct all three games with 136 farmers from four Chinese agri-food cooperatives in Jiangsu Province. Results revealed that there are significant differences of trust level between genders of cooperative members and performance of the cooperatives. The results obtained from this study will help to improve the understanding of the current situation of trust in Chinese agric-food cooperatives and provide several policy implications.

Keywords: trust, games, farmer professional cooperatives, China

Introduction

There is a growing interest in studying Farmer Professional Cooperatives (FPCs) in China and worldwide. The fundamental role of cooperatives in promoting socio-economic development is widely acknowledged, especially in times of economic downturn. The United Nations Secretary-General Ban Ki-Moon said: "Cooperatives are a reminder to the international community that it is possible to pursue both economic viability and social responsibility." On 18 December 2009, The United Nations General Assembly has declared 2012 as "**the International Year of Cooperatives**" (<http://social.un.org/coopsyear>).

In recent years, especially after the implementation of the "Chinese Farmers' Professional Cooperatives Law", as the new organizations forms in China, the Farmers' Professional Cooperatives (FPCs) are growing rapidly in China (Deng *et al.*, 2010). According to the law, FPCs are farmer-owned, self-management and benefit share organizations which offer service for their members, and provide members the necessary agricultural inputs, and offer service about marketing, processing, transportation, and storage of agricultural products, and also provide the relevant technology and information about production and operation.

It is a necessity for cooperatives existing in China, because China agricultural production has obvious characteristics: diversity of production and regional and in heterogeneous in scale (Huang, 2000). FPCs provide information and technology to dispersed small-scale farmers, and help to access the market (Huang and Liang, 2007). FPCs also reduce transaction costs for marketing due to the scale effect (Zhang, 2009). So, domestic scholars think that cooperatives is a kind of institution arrangement between market and hierarchy, and it is good for the realization of Chinese agriculture industrialization (Guo, 2003; Huang, 2000).

Although there is a strong incentive to develop FPCs to improve farmers marketing capability and to increase farmers' income, the operation and the impact and contribution of FPCs to Chinese rural economy, however, remain understudied. Preliminary field investigation showed that the impacts of FPCs in rural China are diversified, and there are some important questions need to be solved. The cooperatives in China are facing lack of farmers' active participation, low operation efficiency. One of the most important reasons is lack of trust between farmers and cooperative and among farmers (Guo *et al.*, 2008; He, 2009; Zhang, 2010). The problem of trust already becomes a social phenomenon in China and may prohibit the long-term development of cooperatives (Zhang, 2009).

Researchers already notice the importance of trust in the development of cooperatives in China, and perform theoretical discussion and conduct preliminary investigation in various areas of China. However, there still lacks of empirical evaluation on the level of trust in Chinese cooperatives. Thus, the actual situations of trust between farmers and cooperatives and among farmers are still unclear. And the factors influencing the level of trust in cooperative are also underestimated.

The aim of this study is thus to evaluate the trust level between farmers and cooperatives and among farmers based on a games approach in China. The results of this study will provide solid evidence to improve the understanding of the current situation of the trust in Chinese agric-food cooperatives and give some policy implementations for the further development of FPCs in China.

The rest of the paper is structured as following. The next section provides a theoretical discussion, followed by the development of Chinese agri-food FPCs. The research design is then described and research results are discussed. The paper ends with several conclusions and policy implementations.

Trust in Cooperatives

The definition of trust

Trust is a key feature of relational governance. The need for trust between partners has been identified as an essential element of buyer-seller relationships (Anderson and Narus, 1990; Geyskens *et al.*, 1998; Morgan and Hunt, 1994; Rousseau *et al.*, 1998). Trust is frequently considered to be the positive expectations one party has about another party's

intentions. That is, trust is one party's confidence in another's good will (Zaheer and Venkatraman, 1995) or the shared belief that in the long run, rewards will be distributed fairly among the partners (Barney and Hansen, 1994). Broadly defined, trust reflects the extent to which negotiations are fair, commitments are sustained (Anderson and Narus, 1990) and the extent to which one party believes that its requirements will be fulfilled through future actions undertaken by the counterpart (Anderson and Weitz, 1989; Barney and Hansen, 1994).

The development of trust

Researchers studied trust from different aspects. Doney and Cannon (1997) proposed five distinct processes by which trust can be developed in business relationships, namely calculative process, prediction progress, capability process, intentionality process, and transference process, on the basis of the synthesis of social psychology, sociology, economics and marketing theories. Mayer et al. (1995) contend that factors of ability, benevolence, and integrity can contribute to trust in a group or organization. Gilson (2003) put forward that trust is when one party believe the other party was competence, openness, concern and reliability. They categorized trust into four dimensions, namely competence trust, publicity trust, interests trust and reliability trust. McAllister (1995) differentiate the cognition-based and affect-based trust.

The role of trust

Generally, trust is an important factor to sustain the performance, and to maintain the production of organization. It can effectively reduce transaction costs, exchange information, and reduce cost of safeguarding transactions. Trust can also promote the mutual cooperation between members, and cohesion inside groups and organizations, and strengthen the competitiveness and promote economic development (Fukuyama, 1995; Michael, 2002; Porter, 2002). Based on a survey in China, Zhang et al. (2002) revealed that trust has a positive impact on regional economic performance. There findings confirm the basic hypothesis of repeated game generate trust in the economics theory. Kong et al. (2010) also revealed that the higher trust level, the easier for the farmers to get loan from rural credit cooperatives. Based on a general social survey (GSS) questionnaire survey, it is found that the trust level is significantly related to economic development (Knack and Keefer, 1997) and citizen participation (Brehm and Rahn, 1997).

Trust in Chinese Cooperatives

Scholars have conducted extensive empirical studies on the social trust about town enterprise and private enterprise, but less attention had been paid on the trust in Chinese agric-food FPCs, an emerging form of organization in China. Zhao (2007) declare that special trust based on genetic and phylogenetic relationships is the action logic of cooperative. Guo et al. (2008) further pointed out farmers' trust on the leader of the cooperative is largely influenced by the competence of the leader, such as the ability, character, reputation, and the

relationship with farmers.

Yang (2010) further distinguished the cooperative leaders of the talent organizers and cadres organizers. They revealed that the trust building progress is different with different leaders. Based on a national survey of 758 villages in China, Xu et al. (2011) empirically investigated the impact of social trust on the development of FPCs in China. They conclude that social trust is necessary condition for the existence and development of FPCs.

The Measurement of Trust

The way of measuring trust

Scholars use a variety of ways to measure trust. One school of method to measure trust is relationship analysis based on questionnaire survey, such as General Social Survey (GSS) and World Values Survey (WVS). These two surveys include questions related to individual trust, fairness, and the attitude to help others etc. The survey questionnaires investigate the factors related to the level of trust (Chen and Ye, 2009; Hu and Lei, 2005)

The second school of method to measure trust is game theory based on the experiments (Ostrom and Walker, 2003). This is the most common used method in measuring trust. Through a series of behavior games, experimental method tries to discover the factors and the internal mechanism of influencing trust. Berg (1995) argued that experimental method provide a more effective method for economists to measure the individual and social trust. Camerer (2003) further confirmed that in the environment with controlled and incentive mechanism, one time double blind games can measure the pure trust because it eliminates the influence of personal and social relationships of the game participants.

Researchers also investigated the correlation of game experiments and questionnaires methods. Carpenter (2002b), Carpenter et al.(2004) and Glaeser et al. (1999) emphasize the value of combining games experiments and survey for measuring trust. Moreover, the questionnaire and games approach can complement each other. Chen et al. (2010) found that the two methods have internal consistency.

In this study, however, we will focus on games approach since it is still undergoing to collect more personal data based on a questionnaire survey.

Trust Measurement: A Games Approach

The measure of trust in cooperatives is critical to solve the trust crisis in China. There is a growing literature using games approach to measure trust between farmers and cooperatives and cooperative behavior among farmers.

In this study, we use games approach to quantify the trust level in Chinese agric-food FPCs based on a serial of games. We extended from the traditional games setting by taking into account the gender of the cooperative members in measuring their trust.

The design of the games

Three games, named trust game (TG) (Berg *et al.*, 1995), dictator game (DG) (1994) and voluntary contribution mechanism (VCM) (Isaac *et al.*, 1984), were conducted among male and female members of each selected cooperative (Kormelinck, 2010).

The TG was designed by Berg *et al.* (1995). In this game, two players are endowed with money. The first-mover is given the chance to send as much of the endowment to an anonymous female/male second-mover as he/she wishes respectively. The experimenter triples the amount of money sent and the second-mover then returns a certain amount to female/male first-mover respectively. There are various mechanisms behind this game. Second-mover behavior measures trustworthiness and reciprocity, while first-mover behavior measures trust. Interpreting first-mover behavior is important for measuring trust, but it is harder to interpret as this behavior might be influenced by altruism as well. Combining the TG with the Dictator Game (DG) designed by Forsythe (1994) may overcome this problem and may lead to a high level of consistency (Cox, 2004).

Therefore the second game, DG, in this study is applied in order to measure farmers' altruism. We assume that trust and altruism are additively separable. The pure trust is the difference between the transfer in the TG and the DG. In the DG, there is also a first-mover that makes a transfer based on the endowment, but the second-mover is not able to send an amount back. This mechanism is that there is no self-interested reason to transfer from the first-mover to the second-mover, which makes it interpretable as altruism (Cardenas and Carpenter, 2008; Cox, 2004).

The third game is VCM (Isaac *et al.*, 1984). This game is the most commonly used game to investigate cooperative behavior for a public good (Cardenas and Carpenter, 2008; Carpenter, 2002b). It allows players to contribute to a public good by giving them an endowment of tokens that they can keep or put in public account that benefits everyone in the group. The mechanism behind this game is that participants tend to free-ride. The amount contributed to the public account is therefore a measure of the cooperativeness of the participant.

The conducting process of the games

Before carrying out the real money games, widespread preparations had to be undertaken. Necessary utensils, like markers, envelopes and elastics, were bought. We also had training in which all games were explained and practiced. This was of main importance, since they were going to assist and translate in all games. A researcher from Wageningen University with rich experience on games trained the student assistants. Six master students were trained for two days to knowledge them about the games. Before playing the actual games with farmers, the six master students conducted pilot games with excel spreadsheet and with 16 master students for several rounds. So they are fully familiar with the whole procedure of the games. Then, all game material was prepared and collected as well, such as exchanging money and obtaining all extra utensils. Given the diversified education level of

farmers, large posters were constructed with drawings explaining every game. Finally, envelopes had to be filled with the start amount and they were marked with a sign in order to trace members throughout the games. At this manner the games were shaped as framed field experiments, which means that important elements – such as language, instructions, currency and the start amount (10 yuan¹ per game) – were adapted to the local Chinese context (Carpenter, 2002a; Harrison and List, 2004).

The games were performed per cooperative within one day. Two groups of the students conduct games with 8 farmers (4 males and 4 females) separately both in the morning and afternoon. In total, there are 32 farmers for each cooperative to play the games. In the general introduction, goals of the games and anonymity of the members were explained. It was emphasized that members could not discuss the games with each other, that game money came from the university and that members could keep whatever they won. Each game was explained preceding that particular game. The explanations for all games were given verbally (with multiple repetitions) and visually (using the posters), to ensure that members understood the games completely. All three games were ran single blind, which means that participants were anonymous to others but not to the researchers and enumerators.

For conducting the TG and DG, the two A-players (male and female) entered the room. Both received an envelope marked with their unique symbol containing the start amount of 10 yuan. Both individually decided how much to give to both B-players (male and female) by putting the amounts in successively a blue and pink envelope. After the A-players had left the room, the amounts for both B-players were counted, tripled (in case of the TG) and written down by the researcher. All four envelopes were marked with a blue or pink dot, dependent on the gender of the A-players, so that B-players could trace which amount they received from each member.

Then, both B-players entered the room, and they were asked for the two expected amounts to receive from male and female A-players respectively. After recording that, they both received their two envelopes with money and two empty envelopes (blue and pink) in order to (possibly) return something to both A-players. After they had left the room, the researcher again counted and noted the amounts, marked them with a blue or pink marker and asked both A-players back in. Both A-players were asked how much they expected to receive back, before opening the envelopes and ending the first round of the game. Both TG and DG where then played vice versa in round two.

The third game (VCM) was played individually, but was conducted in groups of eight for efficiency. All members received two envelopes, one containing the start amount of 10 yuan, the other empty. They could decide which amount to put into the empty envelope, which represented the cooperatives' account. The members could leave the room after delivering the cooperative envelope. Then, the researcher counted and noted the amounts of

¹ 1 USD = 6.28 Yuan (Access date: April 15, 2012)

all members. That amount was doubled and returned into all envelopes. Finally, all 8 members were asked into the room. The total amount was announced and everyone received their share. After finishing the third game there was a round off in which the members were thanked.

Results and Discussions

Results of trust games

During the period of July 2011-March 2012, we played all three games with four different cooperatives in Jiangsu Province, P.R. China. In total 136 farmers played games. Among them, 70 farmers are male members and 66 farmers are female members. According to the classification of the cooperatives' performance of Jiangsu Department of Agricultural and Forestry², we identify three cooperatives as good performed cooperatives and one as weakly performed cooperative. In this section, we will briefly discuss the results of three games carried out in 2011-2012.

Gender and trust in members

The results of the trust games and dictator games are shown in Table 1 and Table 2 respectively. Both male and female Player A send more money to males than females, and they also receive more from male members than female members (Column b and c in Table 1). This reveals that males are more trusted by both male and female members. However in DG games, there is no significant gender difference. Although male and female generally send more to male members than female members and they also get more from male members than female members. However, the difference is not significant (column b and c in Table 2).

We also asked about members' expectations in two games. Both male and female members expected to receive more from male members in both TG and DG. This may be explained by the strong financial position of male members in China. In both TG and DG, male and female members actually get more from male members than female members. We conclude that there is a high level of reciprocity for male members compared to female members.

Male members not only gave more in the DG and TG as Player A, they also returned in average more as Player B (see last two lines of Table 1). They are therefore more trustworthy or reciprocal, by returning a higher proportion of their wealth (Croson and Buchan, 1999).

² There is a promotion for the improvement of the cooperatives quality in Jiangsu Province. From 2008, Jiangsu provincial government started to select so called "Four Have" (have formal organization structure, have cooperative capacity, have a big scale, and have good financial benefits) cooperatives. From 2010, they launched another standards of "Five Good" (good service to the members, good operational benefits, good benefits distribution, good democratic management, and good demonstration effects) to promote the further development of cooperative in Jiangsu Province. We distinguish the cooperatives listed in "Four Have and Five Good" as good performed cooperatives.

Table 1. Descriptive statistics of trust in Trust Game

	Total	Male	Female	Strong			Weak		
				Total	Male	Female	Total	Male	Female
	a	b	c	d	e	f	g	h	i
Player A ¹²³									
Sent to male	4.24	4.51 ^{bc*}	3.96 ^{bc*}	4.18	4.58 ^{ef**}	3.79 ^{ef**}	4.41	4.31	4.50
Sent to female	3.74	3.78	3.69	3.90 ^{dg**}	4.00	3.81	3.19 ^{dg**}	3.06	3.31
Expected from male	6.10	6.48	5.74	6.37 ^{dg*}	7.20 ^{ef**}	5.56 ^{ef**}	5.25 ^{dg**}	4.19 ^{hi**}	6.31 ^{hi**}
Expected from female	5.06	5.04	5.07	5.29	5.35	5.23	4.31	4.06	4.56
Received from male	12.44	9.13 ^{bc**}	7.03 ^{bc**}	8.50 ^{dg**}	9.81 ^{ef**}	7.19 ^{ef**}	6.72 ^{dg**}	6.94	6.50
Received from female	11.45	7.69	7.50	7.70	7.56	7.85	7.25	8.13	6.38
Player B									
Expected from male	4.68	4.50	4.85	4.75	4.65	4.85	4.44	4.00	4.88
Expected from female	4.15	4.24	4.06	4.29	4.15	4.42 ^{fi***}	3.69	4.50 ^{hi**}	2.88 ^{hi** fi***}
Received from male	8.08	13.54 ^{bc**}	11.34 ^{bc**}	12.87	13.75	11.06 ^{fi*}	11.06	12.94 ^{hi*}	9.19 ^{hi* fi*}
Received from female	7.60	11.78	11.12	11.37	11.25 ^{fi*}	11.72	11.72	13.50 ^{hi*** fi*}	9.94 ^{hi***}
Return ratio to male ⁴	0.62	0.65	0.58	0.61	0.67 ^{ef**}	0.55 ^{ef**}	0.64	0.59	0.68
Return ratio to female	0.64	0.66	0.61	0.64	0.68	0.60	0.62	0.59	0.65

Source: Data are calculated base on Trust Game conducted by the authors in the field in 2011-2012.

Note: 1. Mean scores refer to amounts in Chinese currency unit: Yuan (initial endowment is 10 Yuan).

2. Superscripts refer to significant pairwise differences in t-tests (two-tailed);

3. ***: significant at 1% statistical level; **: significant at 5% statistical level; *: significant at 10% statistical level;

4. Return ratio is the amount send back to a person divided by the amount received from that same person.

Table 2. Descriptive statistics of trust in Dictator Game

	Total	Male	Female	Strong			Weak		
				Total	Male	Female	Total	Male	Female
	a	b	c	d	e	f	g	h	i
Player A ¹²³									
Sent to male	3.80	3.97	3.63	3.86	4.02	3.69	3.63	3.81	3.44
Sent to female	3.82	3.94	3.69	3.90	4.12	3.69	3.53	3.38	3.69
Player B									
Expected from male	4.14	4.10	4.18	4.37 ^{dh**}	4.42 ^{ei**}	4.31	3.41 ^{dh**}	3.06 ^{ei**}	3.75
Expected from female	3.49	3.41	3.56	3.56	3.40	3.71	3.25	3.44	3.06
Received from male	3.93	3.97	3.90	4.03	4.00	4.06	3.63	3.88	3.38
Received from female	3.68	3.63	3.74	3.75	3.75	3.75	3.47	3.25	3.69

Source: Data are calculated base on Dictator Game conducted by the authors in the field in 2011-2012.

Note: 1. Mean scores refer to amounts in Chinese currency unit: Yuan (initial endowment is 10 Yuan).

2. Superscripts refer to significant pairwise differences in t-tests (two-tailed);

3. **: significant at 5% statistical level.

The performance and trust in members

We further compare the trust in members for weak and strong cooperative and gender differences within and between these cooperatives. Table 1 and 2 shows that there are strongly significant differences in trust in members between strong and weak cooperatives. Members of good performed cooperatives send significantly more to female members than members of weakly performed cooperatives. They also expect to receive more and actually get more from members of good performed cooperatives than members of weak performed cooperatives (column d and g in Table 1). In the TG, members of good performed members indeed gave more to male members. In DG, however, we did not find such difference (See Table 2).

In addition, male members in good performed cooperatives return significantly more to male members than female members. Again male members are more trustworthy or reciprocal.

The cooperativeness of members

The cooperativeness of the members is measured by the VCM game. The results of VCM are listed in Table 3. The results show that the male members contribute significantly more to the cooperatives than female members in the research area (the average amounts send to cooperatives are 8.06 for males and 7.82 for females, see column b and c in Table 3). This means that the male members are more willing to cooperate and trust their cooperatives than female members. In other words, the female members in the research area show high level of free riding behavior compared to male members. This finding is further confirmed by the high standard errors for female member (2.61 vs. 2.56 in column C in Table 3). This may because the female members have less knowledge about the cooperatives and thus not willing to trust cooperatives.

Table 3. Descriptive statistics of cooperativeness in VCM game

	Total	Male members	Female members	Strong cooperatives			Weak cooperatives		
				Total	Male	Female	Total	Male	Female
	a	b	c	d	e	f	g	h	i
Amount sent to VCM	7.94 (2.58)	8.06 ^{bc***} (2.56)	7.82 ^{bc***} (2.61)	8.38 ^{dg**} (2.29)	8.50 ^{eh**} (2.27)	8.26 ^{fi**} (2.32)	6.50 ^{dg**} (2.96)	6.56 ^{eh**} (2.97)	6.44 ^{fi**} (3.05)
Total amount VCM	18.65 (3.57)	18.29 ^{bc*} (3.59)	19.05 ^{bc*} (3.54)	19.01 (3.51)	18.76 ^{eh**} (3.53)	19.28 (3.50)	17.50 (3.59)	16.69 ^{eh**} (3.44)	18.31 (3.67)

Source: Data are calculated base on VCM game conducted by authors in the field in 2011-2012.

Note: 1. Currency unit: Chinese yuan (initial endowment is 10 yuan).

2. The standard errors are in the brackets.

3. Superscripts refer to significant pairwise differences in t-tests (two-tailed).

4. ***: significant at 1% level; **: significant at 5% level; *: significant at 10% level.

We further investigate the differences of cooperativeness for different performed cooperatives. Table 3 shows that the strong performed cooperatives also have a significantly high level of cooperativeness (the amounts sent to VCM are 8.38 and 6.50 for strong cooperatives and weak cooperatives respectively, see column d and g in Table 3). The results further confirmed that male members show more cooperativeness compared to female in both performed cooperatives. This result is consistent to the findings of Brown-Kruse and Hummels (1993). However, it contradicts to the previous findings of Nowell and Tinkler (1994), Squion et al. (1996), and Cadsby and Mayness (1998). The possible explanation is that females are less involved in the activities of the cooperatives, so they know less about the operation of the cooperatives and thus less familiar with the cooperative leaders. As a result, they are not willing to invest in cooperatives.

Conclusions and Policy Implications

Based on an empirical test design, we conducted three games for four cooperatives in Jiangsu Province, China to evaluate the trust level among farmers and between farmers and cooperatives.

We found that cooperative members in Jiangsu Province of China show different trust levels. Male members are generally more trusted by both male and female members. Male members show a higher level of trust in male members than female members. Members in good performed cooperatives show a higher level of trust than members in weakly performed cooperatives. It is also confirmed by the games, male members show a high level of trustworthiness or reciprocity compared to female members.

The results of this study have several policy implications. First, most of the female members of cooperatives in Jiangsu Province are less involved in the activities of the cooperatives, so that they have a low level of trust in members and trust in cooperatives. This situation should be aware by the most of the cooperatives and policy-makers. As an economically developed area, the off-farm employment absorbs most of the rural males. As a result, the majority workers for agriculture are women. Farmers' professional cooperatives is highlighted by the central government and Jiangsu government in order to further strengthen the Chinese rural economy. It is therefore important to focus on the participation of females in the cooperatives and improve the cooperativeness of female members. Because women are considered to have less knowledge and experience in agricultural and cooperative matters, cooperatives should provide better services, such as training, technical assistance etc., to female members especially.

Second, members in good performed cooperatives have a higher level of trust and trustworthiness than weakly performed ones in the researched area. Government support to cooperatives is one of the most important factors to improve the performance of cooperatives (Bijman and Hu, 2011). Policies, such as taxation reduction, public certification of cooperatives and government-driven agro-industrialization strengthens farmers' access to

modern agri-food chain via cooperatives may play an important role.

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