



Identifying risks inherent in farmer cooperatives in China

Risks inherent
in farmer
cooperatives

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Abstract

Purpose – The purpose of this paper is to investigate risks faced by farmer cooperatives in China, using farmer cooperatives in Zhejiang province as a case. Specifically, the authors identify risks inherent in two primary types of farmer cooperatives in China (traditional and modern ones) when the external environment changes, the cooperative size expands and heterogeneity in membership widens.

Design/methodology/approach – The authors assume that the “uncertainty of the external environment” and the “deviation of organisational adaptation” constitute the two dynamic factors that generated risks for farmer cooperatives. A survey of 158 farmer cooperatives is obtained in Zhejiang province in 2010, and factor analysis is employed to identify the risks and their critical degrees of traditional and modern cooperatives.

Findings – The results indicate that two types of cooperatives in China face drastically different sets of risks. Traditional cooperatives face larger competitive and human resources risks, whereas modern cooperatives face larger decision-making and behavioural risks. Product market risk, macroeconomic policy risk and financial risk are common critical risks faced by both types of cooperatives.

Originality/value – In this paper, risks in China’s farmer cooperatives were empirically studied and systematically discussed. The paper offers a typology to identify risks inherent in two primary types of farmer cooperatives in China (traditional and modern ones) according to property rights arrangements and governance structure.

Keywords Farmer cooperative, Risk identification

Paper type Research paper

1. Introduction

As a user-owned and -controlled organisation, farmer cooperatives have emerged responding to the change in market economy. Up to September of 2012, there are nearly 600,000 farmer cooperatives involving 46,000,000 members and accounting for 18.6 per cent of the total farmers in China. However, compared with their counterparts in the Europe and the USA, farmer cooperatives in China start much late and are subject to some genetic deficiencies, such as small farm size, narrow regional coverage, limited service, irregular governance structure and inadequate capacity to cope with risks. Since the 1990s, particularly after China’s entry into the World Trade Organisation in 2001, the macroeconomic environment has changed profoundly, creating fiercer competition for massive number of smallholding farmers (Rural Economic Research Centre of Department of Agriculture, 2009). Under such an increasingly competitive environment, it makes sense for individual farmers to form a group and act collectively. The cooperatives have played an important role in reducing risks by unifying the

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procurement of input and marketing final products as well as standardizing the production process (Zhang and Yuan, 2009). Yet, many cooperatives still face enormous challenges in dealing with various risks because they fail to collect enough dues from members to set up a fund to manage risks due to low business level or small profit margins (Xu and Huang, 2009).

Literatures on farmer cooperatives have discussed risk management from different angles. The neoclassical economics emphasises the role of cooperatives in protecting farmers against risks by correcting market failures (Sexton, 1990; Nourse, 1995). The institutional economics reckons that cooperatives can lower transaction costs by reducing asset specificity, uncertainty, limited rationality and opportunism (Williamson, 1985; Fulton, 1995; Van, 1997). In recent years, the climate change literature highlights the looming natural-related risks faced by farmer cooperatives. For example, the report "Climate change and farmer cooperatives" by Inter-governmental Panel on Climatic Change (2008) shows that there is increasing risks associated with more frequent extreme weathers, such as flood and drought, calling for setting up an early warning system for natural disasters. As the size of a cooperative grows, property rights may increasingly matter more. Vaguely defined property rights of cooperatives may result in an eventual dissolution (Cook and Burress, 2009). Farmer cooperatives should have the same interests with their farmer owners. However, the operating team of the cooperatives may have different interests. Farm members often worry that cooperatives will not return their profits due to the management failure, equity reserves, the managers' personal benefit maximisation, etc. (Yim, 2004). These problems are serious in many cooperatives in which the ownership and management are divided, that is, a team of professional managers is hired for the cooperative, who have a little connection with the farmers. Conflicts between the cooperatives and their farm members emerged (Wang *et al.*, 2011).

Although the literatures have widely recognised the importance of risks in the operation of farmer cooperatives, there are few studies examining how to identify various risks on the ground. As the external environment changes, the cooperative size expands and heterogeneity in membership widens, risks inherent in farmer cooperatives become more intense. In this paper, we focus on the analysis of key risks in two primary types of farmer cooperatives in China (the traditional cooperatives and modern cooperatives).

2. The theoretical framework of risk identification for traditional and modern cooperatives

Risk management theory considers the sustainable development of enterprises and the uncertainty they face from the perspective of risk. The theory has been validated over many years of use, and its practical value continues to increase, enabling enterprises to identify and control operational risks and thus ensure their survival. Risk management theory has four principal aspects: risk identification, measurement methods, theoretical explanation and risk control. Among these aspects, the research on identifying the types and sources of risks faced by enterprises is the most comprehensive. Miller (1992) proposed a model of risk perception and systematically and comprehensively categorised the environmental risks that enterprises face. Brouthers (2002) validated and improved Miller's risk perception model from the perspective of experiences and categorised the environmental uncertainties into six risk types: government policy risk, macroeconomic risk, the risk of company resources, product market and demand risk, competitive risk and industry technological risk.

Adrian and Drzik (2005) categorised the risks faced by enterprises into seven types (industry, technology, brand, competitor, customer, new project and demand stagnation) and drew a corporate risk map. Researchers believe that risk is the main factor that affects the strategy implementation and operational performance of enterprises. In the complex and ever-changing competitive market, different enterprises encounter different risks with differing impacts. Risk identification refers to the identification of the real and potential risks within an enterprise's business environment using methods based on perception, judgement and categorisation. Risk identification is the first step in enterprise risk management.

A farmer cooperative is a special enterprise that combines external profit-oriented and internal non-profit work. Risk management theory can be used to study how such enterprises identify risk. The risks faced by cooperatives include losses caused by internal and external factors in production and operation. Risk identification for cooperatives refers to the identification of key risks that have significant effects on strategic performance, which may lead to risk consequences. A cooperative is an environment-adaptive organisation, and risk management at such an organisation involves an iterative matching process extending from environment analysis to internal adaptation.

"Uncertainty of the external environment" and "deviation of organisational adaptation" constitute the two dynamic factors that generate the risks faced by cooperatives (Acs, 1985). "Uncertainty of the external environment" refers to the unscientific decision-making and operational risk of cooperatives resulting from the changes and pressures of the external environment, including the policy, economic, technological and industry environments. The natural and cyclical properties and geographical dispersion of agricultural production indicate that agriculture is a classic risk industry. Additionally, agriculture is a vulnerable industry that is significantly affected by product characteristics influenced by unpredictable natural disasters, the asset specificity caused by the seasonal nature and vulnerability (perishability) of agricultural products and the fraud encountered by small and vulnerable farmers during transactions. China is undergoing an economic and social transition, and the uncertainties of policy and laws exacerbate the risk level in agriculture. Farmer cooperatives focus on agriculture, and the various risks in agriculture are passed on to the cooperatives. Therefore, the cooperatives face significant uncertainties. "Organisational adaptation" refers to the adaptation and reaction to the environment of cooperatives through the selection of a cooperative organisational model and the arrangement of an internal governance mechanism, which are factors that reduce or transfer risk. Defects in the internal governance mechanism cause the adjustment and adaptation of cooperatives to lag behind the changes in the external environment. Furthermore, cooperatives are not strong enough to withstand the pressure of the external environment. Such "deviation of adjustment and adaptation" determines the risk level of cooperatives. In cooperatives, the owners and the users are identical. The special structure of property rights causes the deviation or failure of a cooperative's internal governance mechanism to varying degrees. There are governance difficulties, such as the principal-agent problem, moral hazards and conflicts of interest, that affect the sustainable development of cooperatives and can lead to their disintegration.

With the growth of the market economy, the industrial management of agriculture is undergoing in-depth development. Consumer demands are increasingly diverse. Advances in agricultural science and technology are rapid. Additionally, a market pattern characterised by the oversupply of agricultural products is taking form.

China's farmer cooperatives have been facing the challenge of the vertical integration of the agricultural industry since their infancy. Because of the significant differentiation of Chinese farmers, farmer cooperatives in China reflect the cooperation typical of heterogeneous groups. There are significant differences in resource endowment, risk responsibility and investment among the various participating members. Under such internal and external environmental conditions, farmer cooperatives in China have followed a different developmental path from that of the agricultural cooperatives in Europe and the USA (Huang and Xu, 2005). From the outset, the internal institutional arrangement of the cooperatives has differed from that of traditional cooperatives in principle and form. To reduce internal transaction costs and adapt to the external risk environment, institutional arrangements, such as a relatively concentrated ownership structure, the combination of one person-one vote and one person-multiple votes in the decision-making mechanism, members' delivery contracts and the permission to transfer equity, have been established, resulting in a diversity of organisational forms.

According to the differences between their internal institution arrangements, Chinese farmer cooperatives can be divided into two basic types: traditional and modern. Traditional cooperatives reflect decentralised, horizontal cooperation among farmers, which counterbalances the market and protects farmer interests. Such cooperatives have been established and operated in accordance with the classic principles of cooperatives, such as the freedom to join and exit, the equal capital contribution of members and the principles of one person-one vote in decision making, distributing benefits in proportion to patronage, public accumulation in benefit distribution and maximising the interests of the membership. Modern cooperatives are characterised by vertical integration and focus on market competition and high profit. They integrate cooperation in agricultural material supply and agricultural production as well as the marketing and advanced processing of agricultural products. The main characteristic of modern cooperatives is the introduction of equity and the influence of equity interests on decision making and distribution. These cooperatives are typically funded by leading enterprises, government authorities or entrepreneur-qualified rural elites. As shareholders, they invest to establish a cooperative, also using a small amount of capital contributed by ordinary farmer members. In another approach, all of the members invest as shareholders, whereby the proportion of an individual member's stake corresponds to his or her capacity or the investment level and sales potential. There are various voting systems: one person-one vote, voting in combination with additional voting rights and voting according to shareholdings. Additionally, benefit distribution is accomplished in various ways, such as by distributing in proportion to shareholdings in addition to patronage, mainly according to shareholdings and exclusively according to shareholdings. A comparison of the two basic types of farmer cooperatives is shown in Table I.

Property rights, governance mechanisms and business strategies differ between traditional and modern cooperatives. The two cooperative types have different resources, such as manpower, material and financial resources; different relationship networks; and different capacities for decision-making, marketing, production, distribution and research and development in the search for a competitive advantage. Therefore, according to type, the different cooperatives face different key risks, which has a significant effect on business decision making. The theoretical framework of risk identification for traditional and modern cooperatives is shown in Figure 1.

	Traditional cooperative	Modern cooperative
Collaboration	Production and marketing	Production, marketing and capital
Ownership right structure	Collective equity and internal personal shares	Collective equity, personal shares and a small quantity of external shares
Individual ownership	Equal	Restricted
Member Qualification	Free	Restricted
Transferability of personal shares	Unconditionally withdrawn but nontransferable	Conditionally withdrawn and transferable
Decision making	One person-one vote	Diversified
Benefit distribution	Proportional to patronage	Proportional to shareholdings in addition to patronage
Business strategy	Member oriented	Converting from the member-oriented to market oriented
Business scope	Production or sale of raw farm products	Production, sale or value-added manufacture of raw farm products

Table I.
Characteristics of traditional and modern cooperatives

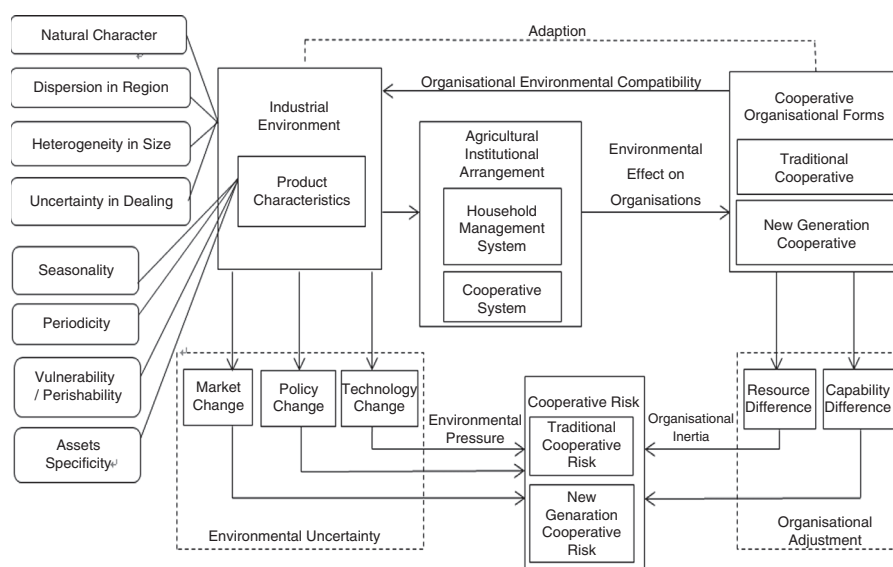


Figure 1.
The theoretical framework of risk identification for traditional and modern cooperatives

3. Empirical analysis

3.1 Data collection

Data here were from the questionnaire survey sponsored by the National Science Fund Project “Risk Management Paradigm Construction of Farmer Cooperatives in China” in 2010. A Likert five-point scale was used to design the questionnaire on risk identification for cooperatives. The score was positively correlated with a favourable evaluation. A higher score indicated a more favourable evaluation. The five scores signified “very small”, “small”, “general”, “serious” and “very serious” and were used to

evaluate the impact of each item on the risk level of cooperatives. A score of 1 indicated “very small”, with the remaining scores and evaluative terms correlating successively. In this study, the presidents of traditional and modern cooperatives in Wenzhou, Taizhou and Lishui in Zhejiang Province were used as research objects and randomly selected to receive the questionnaire. A total of 343 questionnaires were distributed, and 202 questionnaires were collected, of which 158 were valid. The sample cooperatives were concentrated in Zhejiang Province, where the development of cooperatives is considered exemplary in China. Wenzhou, Taizhou and Lishui were the areas with the best cooperatives in Zhejiang Province. Therefore, the number of superior cooperatives in the sample is high. Among the sample cooperatives, the number of cooperatives annually established showed an increasing trend. Twenty-six cooperatives were established prior to 2005, 28 were established in 2005, and an additional 104 were established since 2006. This trend reflects the 2005 promulgation and implementation of the Zhejiang farmer cooperative regulations and the ensuing 2007 China farmer cooperatives act.

3.2 Research methods

The risk identification methods included site investigation, the compilation of historical data, financial statement analysis, flow charts, a risk checklist and the preparation of a fault tree. Based on a review of the enterprise environment and an understanding of the business process, the checklist of risks enabled a relatively complex problem to be classified into many manageable sub-problems. Each sub-problem was studied to enumerate the risk factors and the gains and losses, which were listed on the checklist and used as an action guide for risk control and performance analysis. The risk checklist could be used for the overall design of an internal risk management system and the identification of specific risk points. Additionally, it served as an important tool for the decomposition analysis of a large, complex system and the thorough understanding of various risk factors. This study used 21 items to evaluate the risk of farmer cooperatives. The risk checklist is shown in Table II.

The risk evaluation items in Table II were selected primarily with reference to risk management theory and the research on risks in cooperatives, additionally taking into account the characteristics of Chinese farmer cooperatives. Items 1 through 11 were based on the risk perception models of Miller (1992) and Brouthers (2002) and required the directors of the cooperatives to evaluate the uncertainties in the external environment of their cooperatives. Items 12 through 21 were taken from the enterprise risk diagram of Adrian and Drzik (2005) and the theoretical framework of cooperative governance mechanisms and performance of Xu (2010). These items evaluate the risk resulting from the deviation or failure of the internal governance mechanisms of cooperatives. Each risk item was specifically defined as follows:

- (1) Changes in the external economic environment. Changes in the external economic environment, such as the slowdown of domestic and international economic growth, the slowing of economic activity and the rise in the inflation index, have resulted in a reduced demand for agricultural products, price volatility and sluggish sales and brought a large amount of risk and uncertainty to the operation of cooperatives.
- (2) Changes in government policies. The promulgation and implementation of government agricultural economic policy, the promulgation of new laws and regulations, and the modification of existing laws and regulations are the main risk-generating factors for cooperatives.

No.	Risk evaluation items of farmer cooperatives
1	Changes in the external economic environment
2	Changes in government policies
3	Inappropriate administrative intervention
4	Uncertainties in the introduction and development of agricultural technology
5	Weak intellectual property protection
6	The natural and seasonal aspects of agricultural production and the freshness of agricultural products
7	Price fluctuations and changes in market demand
8	Market forecast deviations or errors by cooperatives
9	Cooperative responsibility for the quality and safety of agricultural products
10	Pressure from peer competitors
11	The strength of the upstream material suppliers and the pressure of the downstream processing enterprises
12	The low educational level of Chinese farmers
13	The constraints on the quality and capacity of entrepreneurs in cooperatives
14	The talent shortage
15	The self-serving behaviour of managers
16	The self-serving behaviour of ordinary farmer members
17	The replacement of collective decision making by the decision making of core members
18	The poor decision-making ability of ordinary farmer members
19	The lack of funds
20	The imperfect financial system
21	Arbitrary benefit distribution

Table II.
Risk checklist of
farmer cooperatives

- (3) Inappropriate administrative intervention. Unlike western countries, where more relaxed policies are implemented to support the development of cooperatives, the government in China at various levels often relies on administrative intervention. The direct or indirect involvement of government in the establishment and operation of cooperatives has hidden risks, such as excessive administrative intervention during the support process and not respecting the wishes of farmers in management.
- (4) Uncertainties in the introduction and development of agricultural technology. Agricultural cycle is long, and the application of agricultural technology has the characteristics of regional adaptability. Because of the complexity of the technology and the uncertainty of the external environment, the actual earnings of cooperatives may deviate from expected earnings during the introduction of new technology and new plant varieties.
- (5) Weak intellectual property protection. Because the life cycle of agricultural research is long with strong regional characteristics, confidentiality is difficult to maintain. The legal environment for agricultural intellectual property protection is not fully developed in China. The new plant variety protection system should be improved. The registration system for region-of-origin markers for agricultural products is immature, and a management system for agricultural biological genetic resource ownership has not been established. Therefore, infringements have frequently occurred.
- (6) The natural and seasonal aspects of agricultural production and the freshness of agricultural products. Agricultural production is subject to a variety of natural influences. Drought, floods, hail, persistent high temperature, harmful

insects and blights are all likely to create unpredictable risks for cooperatives. Agricultural production is seasonal with significant off seasons and peak seasons that affect the variety and quantity of agricultural products in the market. Seasonal market saturation and shortages are likely to occur. Additionally, most agricultural products are perishable and difficult to store for long periods.

- (7) Price fluctuations and changes in market demand. The prices of agricultural products fluctuate seasonally throughout the year because of the disequilibrium between the supply concentration and year-around demand. When agricultural products are in short supply, prices rise and the production scale is increased. When there is an oversupply, farmers race to cut prices and reduce production, resulting in a new round of short supply. The volatility of the prices of agricultural products leads to the substantial deviation of actual return from expected return for cooperatives.
- (8) Market forecast deviations or errors by cooperatives. China's small-scale agricultural production and the business model of dispersion and fragmentation result in widely divergent information on agricultural production and market supply, and the costs of information collection are high. In addition, because of imperfections in the circulation system of agricultural products and the agricultural market, the problem of agricultural market information asymmetry is prominent. Therefore, it is difficult for cooperatives to understand agricultural market information in a timely and comprehensive manner, and their market judgements and forecasts are prone to error and deviation.
- (9) Cooperative responsibility for the quality and safety of agricultural products. The quality and safety of agricultural products are directly related to human health. Pollution of the production location; the frequent appearance of harmful insects, blights and livestock epidemics; pesticide residue; food spoilage during transport and storage; and the misuse of additives in processing pose risks to the quality and safety of agricultural products at various junctures on the path leading from the production location to the consumer. Cooperatives must control the quality and safety of agricultural products throughout the entire production chain.
- (10) Pressure from peer competitors. Market competition among cooperatives with similar business activities is fierce. Joint-stock companies implement a wide range of business strategies and possess a high degree of flexibility in business scope to obtain a high return on capital and acquire market share, which places competitive pressure on cooperatives. Since China joined the World Trade Organisation, large foreign agricultural enterprises and multinational agricultural corporations have been seizing market share in the Chinese agricultural market, and Chinese cooperatives face an increasingly challenging market environment.
- (11) The strength of the upstream material suppliers and the pressure of the downstream processing enterprises. If cooperatives rely on a small number of suppliers, the input costs of the cooperatives will increase when a dominant supplier raises prices or reduces supply. Additionally, pressure by downstream processing enterprises to reduce prices or improve quality, which can force cooperatives to invest in chemical fertilisers, pesticides,

agricultural machinery and facilities and farming knowledge, can lower the profitability of cooperatives.

- (12) The low educational level of Chinese farmers. Since China's economic reform in 1978, quantities of farmers have migrated to urban areas in search of well-paid work. Those who still live in rural areas and deal in their farming career are aged, low in educational level and poor in capacity of group building. It is hard to establish cooperatives only depending on farmers without assistance of the government such as training on matters of production or marketing.
- (13) The constraints on the quality and capacity of entrepreneurs in cooperatives. Entrepreneurs in Chinese cooperatives consist not only of large-scale farmers and salespersons but also of external social forces such as leading enterprises, local governments, the agricultural technology agencies and village collectives that lead the establishment of cooperatives. When faced with the rapid development of cooperatives and market competition, most entrepreneurs in cooperatives reveal insufficient knowledge and ability and have difficulty adapting to the complex and volatile market environment. For cooperatives established by external social forces, these forces intervene in the operation and management of cooperatives by virtue of equity ownership and have the actual control of such cooperatives, leading to the alienation of ordinary farmer members.
- (14) The talent shortage. The long-standing urban-rural economic structure in China has led to differences in the levels of urban and rural economic development. The level of economic development is low in rural areas, and the rural living, working and cultural environment lags behind that of the city, resulting in an unwillingness of many individuals to work in rural areas. The Chinese farmer cooperative is generally small and economically weak. Therefore, it cannot provide competitive benefits to technological, marketing and management personnel, which makes it difficult to attract high-quality talent.
- (15) The self-serving behaviour of managers. Ordinary farmers in China lack the ability to establish and manage cooperatives. Large-scale farmers, leading enterprises and government authorities have become important forces in the development of cooperatives as a result of advantages in capital, sales channels, management capability and social networking. The diversity of the participating parties has led to a high degree of heterogeneity among cooperative members. Because of self-serving and opportunistic tendencies, cooperative managers may use their informational advantage for personal gain or to embezzle public accumulation funds, harming the interests of the ordinary farmer members.
- (16) The self-serving behaviour of ordinary farmer members. The agrarian mind-set and the tradition of decentralised management have resulted in a weak sense of cooperation, pronounced self-interest, a focus on rational calculation and a preoccupation with short-term interests of the small farmers. They are unwilling to contribute capital or make only small contributions to avoid capital risk as much as possible. They lack sufficient interest in the operation and long-term development of cooperatives. In addition, they enjoy the cooperative's price protection when market prices are low. However,

when the market prices rise, these members sell products to buyers offering a higher price than the cooperative.

- (17) The replacement of collective decision making by the decision making of core members. There are significant differences in resource endowments, participation motives and risk preferences among the participating parties of Chinese farmer cooperatives. A small number of core members (large-scale farmers, farms with transport and marketing capacities, individuals working in agricultural authorities and village cadres) and the majority of ordinary farmer members co-exist. These core members invest the resources required to establish and develop cooperatives, contribute the majority of the capital and have voting advantages in the decision-making process. The board of directors, which is composed of core members, controls the decision making of a cooperative. It is difficult to put into practice the democratic management.
- (18) The poor decision-making ability of ordinary farmer members. As ordinary cooperative members, they are only familiar with the production operations they engage in, such as planting and cultivation, and do not understand or are not familiar with processes other than production, such as processing, marketing, storage, transport and predicting the market demand for agricultural products. Therefore, they cannot make accurate judgements and decisions when facing the unpredictable market.
- (19) The lack of funds. With the rapid development of cooperatives, there is an urgent need for substantial capital for infrastructure construction, technological innovation and purchase of production materials. Cooperatives are mainly funded by members, accumulated capital reserves of cooperatives, bank loans and government financial support. To avoid funding risks, farmer members are typically reluctant to contribute or only contribute little. The level of profitability of farmer professional cooperatives is generally too low and their accumulation rate too slow to meet the needs of cooperative development. Rural lands are collectively owned in China. Therefore, cooperatives lack collateral assets and have difficulty obtaining bank loans.
- (20) The imperfect financial system. Chinese farmer professional cooperatives have a short period of development and are small and financially weak. Most cooperatives have not established a sound financial system. Typically, only a simple financial management system has been established, which merely includes the basic information required by the Industrial and Commercial Administrative Departments for registration. To avoid taxes, some cooperatives do not register with the Industrial and Commercial Administrative Departments and do not establish a formal financial system. The accounting record is often incomplete and discontinuous, resulting in the distortion of accounting information.
- (21) Arbitrary benefit distribution. Within cooperatives, the regulation of capital stock dividends and dividends and the profit repatriation of benefit distribution is sometimes not defined and does not provide a reasonable basis for the formulation of the percentages and proportions. Some cooperative members do not understand the difference between profit return, capital stock dividends and dividends. Some cooperatives do not allocate public accumulation funds from the surplus, or the allocation ratio is

insufficient to compensate for losses and self-sufficiency costs and to sustain development.

3.3 Factor analysis

In this study, internal consistency reliability was used as the questionnaire's reliability index. SPSS16.0 statistical analysis software was used for the data analysis. The results showed that the reliability coefficient, Cronbach's α , was 0.804, suggesting that the reliability of the questionnaire was acceptable. The correlation analysis showed that the respondents had different perceptions of the risks with respect to traditional and modern cooperatives. A two-tailed test showed that Kendall's τ - b correlation coefficient was 0.218** and that Spearman's ρ was 0.235**, suggesting that the two types of cooperative face different risks and that the key risks faced by traditional and modern cooperatives should be discussed separately. Taking into account the correlations between risk factors and the overlap of information, a factor analysis was conducted to summarise the major risk factors that affected the cooperatives. A goodness-of-fit test of the data was conducted prior to the factor analysis. The results showed that the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.825. Moreover, Bartlett's sphere test results were statistically significant ($p = 0.000$), suggesting that the survey data of this study were suitable for the factor analysis. Next, a principal component analysis was conducted to extract f_j , that are common factors whose eigenvalue was >1 , which was then rotated using the maximum variance method to obtain a_{ij} , the factor loading values:

$$\begin{aligned} \frac{\text{cov}(x_i, f_j)}{\sqrt{D(x_i)}\sqrt{D(f_j)}} &= \text{cov}(x_i, f_j) \\ &= \text{cov}\left(\sum a_{ij}f_i + e_i, f_j\right) \\ &= a_{ij} \end{aligned}$$

as shown in Tables III and IV. The analysis of the survey data of traditional cooperatives showed that all 21 evaluation indicators had high or very high loading values under certain factors and that the structure was clear, suggesting that the questionnaire had good construct validity. Table II shows the items used to evaluate the risks, and all eight factors were identified.

Table III shows V_j/k , the variance contribution of factors 1 through 8 gradually decreased:

$$V_j/k = (a_{1j}^2 + a_{2j}^2 + \dots + a_{nj}^2)$$

The cumulative variance contribution of the eight factors reached 83.61 per cent, and the cumulative variance contribution of the first five factors reached 78.43 per cent. Evidently, these five factors could explain most of the information provided by the 21 evaluation indicators; i.e. there were five types of key risk faced by traditional cooperatives: product market risk, macroeconomic policy risk, competition risk, financial risk and human resources risk, according to the order of the critical degree. Similarly, a factor analysis of the survey data of modern cooperatives was performed. The results are shown in Table IV, which additionally presents the five types of key risk faced by modern cooperatives: product market risk, decision-making risk, macroeconomic policy risk, behavioural risk and financial risk, according to the order of the critical degree.

Table III.
Results of factor analysis
for traditional
cooperatives

No.	1	2	3	4	5	6	7	8
7	0.68	-0.27	-0.16	-0.10	-0.09	0.20	-0.25	-0.14
6	0.68	-0.26	0.15	-0.11	0.04	-0.34	0.09	-0.08
8	0.66	-0.26	-0.01	-0.02	0.08	-0.28	0.02	-0.07
9	0.65	-0.25	-0.01	-0.03	0.07	-0.20	0.01	-0.05
2	0.31	0.72	-0.10	-0.12	0.09	0.02	-0.22	0.08
1	0.42	0.65	-0.12	-0.25	-0.08	0.12	0.00	0.09
3	0.30	0.54	0.18	0.24	-0.16	0.36	0.14	0.09
10	0.15	0.42	0.33	0.24	-0.18	-0.07	0.07	-0.38
11	0.48	-0.10	0.32	-0.15	0.23	-0.15	0.40	0.28
19	0.45	-0.25	0.14	0.41	-0.18	0.14	-0.18	-0.38
20	0.50	0.03	0.05	0.40	0.44	0.02	0.00	-0.30
21	0.49	0.02	0.05	0.39	0.43	0.01	0.12	-0.30
13	0.28	0.38	0.32	-0.08	0.58	0.07	-0.21	0.02
12	0.46	-0.38	-0.04	0.17	0.52	-0.01	0.30	0.22
14	0.08	0.39	0.24	0.32	0.45	-0.23	0.20	-0.02
16	0.42	0.27	-0.28	0.24	-0.10	0.53	0.25	0.23
15	0.42	-0.37	0.23	0.20	-0.13	0.48	-0.11	-0.10
18	0.53	0.06	-0.12	0.18	0.18	-0.11	0.44	0.10
17	0.51	-0.06	0.19	-0.06	-0.07	0.07	0.42	-0.16
4	0.44	-0.26	0.29	-0.06	0.30	0.36	0.02	0.44
5	0.58	-0.02	0.18	0.20	0.14	0.01	-0.38	0.37
Eigenvalue	5.93	4.13	3.19	2.15	1.50	0.50	0.36	0.27
Variance contribution %	27.56	19.16	14.78	9.98	6.95	2.30	1.65	1.23
Cumulative variance contribution %	27.56	46.72	61.50	71.48	78.43	80.73	82.38	83.61
Risk type	Product market risk	Macroeconomic policy risk	Competition risk	Financial risk	Human resource risk	Behavioural risk	Decision-making risk	Technology risk

No.	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
7	0.77	-0.22	0.04	0.04	-0.10	0.33	-0.10	-0.24
6	0.76	0.01	-0.20	0.14	0.05	-0.22	0.20	0.08
9	0.75	0.13	-0.19	0.01	0.08	-0.20	0.20	0.02
8	0.75	0.12	-0.27	0.01	0.07	0.20	-0.24	0.02
17	-0.03	0.74	-0.23	0.08	0.09	-0.17	-0.16	-0.22
18	0.18	0.73	-0.48	0.02	-0.07	-0.11	0.12	0.00
2	-0.21	-0.14	0.72	-0.11	-0.18	0.05	0.17	0.14
3	-0.32	0.01	0.71	0.02	-0.12	0.33	-0.07	0.15
1	-0.20	-0.30	0.70	0.34	0.21	0.08	0.17	0.07
15	-0.12	0.18	0.21	0.64	-0.18	0.16	-0.36	-0.17
16	-0.35	0.32	-0.23	0.57	0.44	0.04	-0.10	0.00
20	-0.30	0.35	-0.32	0.30	0.56	-0.30	-0.10	-0.22
19	0.42	0.20	-0.23	-0.37	0.55	-0.26	0.03	0.30
21	0.41	0.19	0.25	-0.36	0.54	-0.24	0.02	0.22
12	0.27	0.37	0.31	-0.10	0.22	0.47	0.04	0.25
14	0.46	-0.37	-0.05	0.17	-0.10	0.45	0.04	0.25
13	0.06	0.38	0.52	0.33	-0.11	0.44	-0.04	0.24
10	0.37	0.48	0.11	-0.48	0.18	0.03	0.42	-0.12
11	0.46	0.28	-0.29	-0.51	-0.06	-0.16	0.40	-0.18
4	0.45	-0.06	0.24	0.08	0.31	-0.12	-0.18	0.34
5	0.12	0.55	0.08	-0.15	0.15	0.16	0.03	0.32
Eigenvalue	5.99	4.78	4.50	2.98	1.76	0.62	0.37	0.28
Variance contribution %	23.79	18.97	17.88	11.84	6.98	2.45	1.46	1.13
Cumulative variance contribution %	23.79	42.76	60.64	72.48	79.46	81.91	83.37	84.50
Risk type	Product market risk	Decision-making risk	Macroeconomic policy risk	Behavioural risk	Financial risk	Human resource risk	Competition risk	Technology risk

Table IV. Results of factor analysis for modern cooperatives

On the basis of the factor analysis, the key risks faced by traditional and modern cooperatives are shown in Table V.

3.4 Discussion

The study found that there were differences in the key risks identified in the two types of cooperative, which can be grouped in two general classes. First, the key risks identified differed. Among the first five key risks, compared with modern cooperatives, traditional cooperatives did not encounter decision-making and behavioural risks. However, they did encounter competitive and human resources risks. Second, the orders of the critical degree of the identified risks differed. For traditional cooperatives, macroeconomic policy risk was the second critical risk, and financial risk was the fourth critical risk. For modern cooperatives, macroeconomic policy risk was the third critical risk, and financial risk was the fifth critical risk:

- (1) Traditional cooperatives faced a greater competition risk. With the development of industrial management in agriculture and the diversification of consumer demand, cooperatives face a wide range of competition such as from similar cooperatives, domestic and foreign industrial and commercial capital entering the agricultural sector to seize market share, powerful agricultural material suppliers and cost-conscious downstream agricultural products processors. For instance, there were formerly dozens of all-season grapefruit cooperatives in Mazhan Borough, Cangnan County, Wenzhou. These cooperatives were small with similar business operations. Because an effective strategy for the integration of resources was lacking, there was fierce competition among the various cooperatives and substantial internal friction. Traditional cooperatives acted as the link between the farmers and the leading enterprises, encouraging the pursuit of maximum production and offering cost advantages in the production and marketing of primary agricultural products. Faced with vertically integrated agricultural industrialisation and diversifying market demands, the strategy of a single horizontal integration of the traditional cooperatives could not produce an effective competitive advantage. In addition, open membership eligibility and inclusion obligations aggravated the operational instability and the potential overloading of the traditional cooperatives. Modern cooperatives, particularly those led by leading enterprises, required members to understand unified production technology and quality standards, provide brand-name products to the market, determine the quantity of marketed products based on demand and develop the processing of agricultural products. The modern cooperatives had strong market competitiveness.

Risk type	Critical degree (successive decrease from 1 to 8)	
	Traditional cooperatives	Modern cooperatives
Product market risk	1	1
Macroeconomic policy risk	2	3
Competition risk	3	7
Financial risk	4	5
Human resources risk	5	6
Behavioural risk	6	4
Decision-making risk	7	2
Technology risk	8	8

Table V.
The identification of the key risks faced by traditional and modern cooperatives

- (2) The human resources risk was the key risk for traditional cooperatives. Several thousand years of feudalism have made Chinese farmers closed minded. They have lacked a sense of innovation and risk awareness and have been poorly educated. Chinese farmer cooperatives started late, and there has been a shortage of entrepreneurs with a spirit of cooperation. Farmers who specialise in the marketing of agricultural products, farmers with large-scale operations and individuals with management and technological talent have been scarce, making it difficult for cooperatives to adapt to the challenges of specialisation, informatisation and knowledge-based agriculture operations. The traditional cooperatives protected the equal rights of members. However, the long-established “one person-one vote” method of decision making and “distributing benefits in proportion to patronage” method of benefit allocation weakened the incentive to improve material and human capital and could easily dampen the enthusiasm of members who possess capital and human and social resources. These circumstances have not been conducive to attracting individuals possessing the key production factors to join the cooperatives. In contrast, at the modern cooperatives, the management personnel from leading enterprises and government authorities possessed substantial knowledge of agricultural product marketing and business management, understood advanced production technology and had strong information processing and social skills. Therefore, to a certain extent, these individuals supplied scarce resources to their cooperatives.
- (3) For the modern cooperatives, the decision-making risk was a key risk. In becoming established, the modern cooperatives depended on large-scale farmers, the leading enterprises and government authorities. As the pioneers, the leaders and the owners of the key production factors for cooperatives, they had a significant impact on the initial establishment, the institution design and the daily operation and management of cooperatives. They were the core members who had effective control over the cooperatives. The decision-making authority of the cooperatives tended to concentrate on one or two “geniuses”, such as the cooperative’s director. These “geniuses” contributed significant funds upon joining the cooperatives and had a significant social influence. Their authority was apparent in decision making, implementation, management and supervision at the cooperatives. Ordinary farmer members lacked management expertise and had a low capacity to collect and process information. The equity owned by ordinary farmer members was fragmented and small. Therefore, they were in a subordinate position with respect to influence at the cooperatives. The general assembly of the membership was a mere formality and ineffective in the role of the highest cooperative authority. The independence of the board of supervisors was limited and was administratively subject to the board of directors. The board of supervisors had no right to participate in or veto the decisions made by the board of directors. It dared not and was incapable of monitoring the actions of the board of directors, which made it difficult for it to exercise oversight.
- (4) Behaviour risk was another key risk of the new cooperatives. In the modern cooperatives, a small number of core members were in control, which reduced coordination costs and was conducive to the realisation of collective action. However, because of a tendency towards self-serving and opportunistic

behaviour, the possibility that a small number of core members could use the control over the cooperatives to infringe on the interests of ordinary farmer members could not be excluded. The director and the other members of the board of directors were concurrently business managers. Some had their own enterprises or business entities, and some had become managers to implement the wishes of governmental departments. These individuals had different interests and goals than the ordinary farmer members. Moreover, compared with the ordinary farmer members, they had stronger business skills and bore more responsibility in management and social services. Therefore, they were entitled to a larger share of the surplus distribution. However, the cooperatives lacked an effective incentive mechanism. The unequal rights to claim or control surplus made it difficult for the managers to sustain a lasting commitment to nurturing the long-term development of the cooperatives. On the contrary, under the conditions of asymmetric information distribution and uncontrolled supervision, they used their authority to pursue personal gain. In addition, the public nature of the internal return of cooperatives enabled free-rider behaviour among the ordinary farmer members, who wanted to benefit from the cooperatives while avoiding public responsibilities and obligations. The lack of concern for the collective and the long-term interests of the cooperatives offered opportunities for a small number of core members to control the cooperatives.

Despite the differences among the key risks identified, the traditional and modern cooperatives shared other key risks, such as product market risk, macroeconomic policy risk and financial risk:

- (1) Product market risk was the leading key risk faced by both types of cooperative. Although the two types had different forms, both encountered this risk mainly because they were both farmer cooperatives and exposed to inevitable natural adversities in agricultural production. Agricultural production is seasonal, resulting in the seasonal fluctuation of the price of agricultural products. Additionally, agricultural production is dispersed. Therefore, when agricultural production and operations personnel encountered the variations of the agricultural products market, they always exited or entered the market for a given agricultural product market simultaneously, exacerbating the increase and decrease of agricultural prices. Meanwhile, because agricultural products are necessities of daily life, the elasticity of demand is low. However, the agricultural products market is nearly 100 per cent freely competitive, and the competition among agricultural producers is fierce. Therefore, the elasticity of the agricultural products supply is high and can easily cause the cobweb-like fluctuation of the price of agricultural products. Therefore, the cooperatives continuously faced the risk of fluctuations in market price at any time. The possibility of the deviation of actual earnings from expected returns was high. In addition, during planting and cultivation, agricultural products are subject to the pollution of the air, water and soil of their geographical places of origin from agricultural sources, such as fertilisers and pesticides, or other sources. Moreover, the non-specialised processing, transport and storage of agricultural products can subject the products to pollution by rodents, insects and microorganisms. To improve the appearance and extend the shelf life of agricultural products, certain producers misuse additives, which endangers human health. Therefore, the quality and safety risk of agricultural

products faced by cooperatives cannot be ignored. For instance, Ruian fruit and vegetable cooperatives in Wenzhou had to destroy 4,000 kg of bamboo shoots purchased from Jian'ou, Fujian Province, because of the excessive quantity of sulphur dioxide in the shoots, which resulted in serious financial losses.

- (2) Macroeconomic policy risk was another key risk faced by both cooperative types. The agricultural industry is vulnerable. Macroeconomic changes, such as the slowing of economic activity and the increase in the inflation index, have a significant impact on the agricultural economy and produce substantial risks and uncertainties for cooperatives. The new or reformulated governmental agricultural economic policies affected the operational stability of the cooperatives. The cooperatives had to take careful note of government economic policies to reduce the losses caused by policy change. Administrative intervention had a certain degree of rationality in the early stages of cooperative development, particularly when capital, management talent and social resources were scarce in rural China. However, as the cooperatives developed, the negative impact of governmental administrative intervention gradually became apparent. Government authorities and village cadres were more concerned about fulfilling the wishes of governmental departments and obtaining a good performance evaluation for their cooperatives than minimising cooperative transaction costs and maximising farmer interests. The prestigious cadres managed the cooperatives, and governmental power was used to intervene excessively or control the cooperatives. Ordinary farmer members did not dare to directly express their views, which violated the principle of the democratic management of cooperatives.
- (3) Both types of cooperative faced substantial financial risk. There was a lack of qualified accounting personnel in the cooperatives, and cooperative accounting personnel were frequently replaced. In addition, most staff members engaged in accounting were cooperative members or part-time accountants. Some cooperatives simply hired relatives to perform the work. The accounting at cooperatives was not standardised, and there were many homemade receipts and IOUs. The accounting information of some cooperatives was incomplete, the income was not recorded in a timely manner, the original certification evidence was incomplete, and there was even forgery of original certificates. The educational level of ordinary farmer members was generally low, and their understanding of financial management was deficient. They lacked financial knowledge and could not play an effective supervisory role. Some cooperatives did not attach importance to financial disclosure. The disclosure was merely a formality, and only the ledger was made public and not the breakdown. The distribution of the surplus in cooperatives was arbitrary. The percentage of the capital stock dividend and the dividends and profit repatriation in the benefit distribution were not reasonable and were determined by the individual in charge of the cooperatives. Many cooperatives treated the dividends paid to members as capital stock dividends, and some cooperatives used the preferential price enjoyed by members in transactions with cooperatives as profit repatriation. The lack of funding was the bottleneck in the development of the cooperatives. It rendered the cooperatives unable to introduce technology, modify equipment, perform quality testing, standardise agricultural products, improve business management, develop markets, collect information and

increase business outlets. The cooperatives were a consortium of vulnerable groups with a limited ability to attract capital. For non-profit organisations, the external transaction volume of the cooperatives was low, as was the level of profitability, and the capacity for self-accumulation was insufficient. Unlike the agricultural system in western countries, in which land is owned privately, China adopted the household contract responsibility system under collective ownership. Since rural land is collectively owned by villagers, and the right to use collective rural land cannot be used as loan collateral. It was difficult for the cooperatives to obtain bank loans. The Chinese farmer cooperatives were still in the early stages of development. They were financially weak with few assets available for use in financing. Some cooperatives relied on private lending, and the financing cost was high with large risks.

- (4) The critical degree of technology risk was the lowest of all of the risks faced by the two types of cooperative. This risk occurred because the Chinese farmer cooperatives were in the early stage of development and subject to the constraints of funds and talent. Most cooperatives opted to imitate the innovation model to reduce production costs and introduce new or mature technology to increase production. They did not dare to assume the risk of independent innovation or the high costs of innovation. Therefore, the technical risk and the cost of technology development were low. However, while introducing new technology and new varieties, the risk of failure associated with introducing technology because of the lack of scientific inspection, testing and validation could not be ignored. While introducing a new variety, some cooperatives did not include the relevant technical knowledge. Therefore, they were unable to provide members with training in planting and cultivation. The cooperative members still followed the previous planting and cultivation methods with the new variety. In addition, new technology introduced by certain cooperatives was not suited to the local natural environment and climate, resulting in great financial loss.

4. Conclusions and implications

In this paper, the key risks in farmer cooperatives were empirically studied and systematically discussed. The conclusions were as follows. First, the “uncertainty of the external environment” and the “deviation of organisational adaptation” constituted the two dynamic factors that generated risks for cooperatives. Second, the key risks and their critical degrees differed according to cooperative type. Traditional cooperatives faced larger competitive and human resources risks, whereas modern cooperatives faced larger decision-making and behavioural risks. Third, product market risk, macroeconomic policy risk and financial risk were common key risks faced by both types of cooperatives.

The conclusions of this study result in the following recommendations. First, traditional cooperatives should establish incentive mechanisms with clearly defined equity rights and improve their benefit allocation to attract members possessing key production qualities. Additionally, traditional cooperatives should organise their production and operation in accordance with market demand and efficiently manage the relationship between upstream and downstream enterprises in the production chain to enhance market competitiveness and environmental adaptability. Second, modern cooperatives should insist that the highest decision-making authority is the general assembly of members, coordinate the management of the “geniuses” and the democratic

management and establish incentive mechanisms with contribution-correlated salaries to avoid infringing on the interests of the farmers. Finally, both types of cooperative should pay attention to the transition from a simple business strategy of serving the membership to the implementation of a business strategy oriented towards market demand. Additionally, they should improve sales channel selection to resist the influence of market risk. Moreover, they should establish a standardised financial system and strengthen their independent financing capacity to avoid losses resulting from financial risk.

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Further reading

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