YAMEI HU

# Essays on the Governance of Agricultural Products

## Cooperatives and Contract Farming

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# Essays on the Governance of Agricultural Products
## Cooperatives and contract farming

Verhandelingen over beheersstructuren in de landbouw sector: cooperaties en contractuele relaties

Thesis

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**Yamei Hu**
born in Dezhou, P.R. China

**Doctoral Committee**

| | |
|---|---|
| Promoters: | Prof.dr. G.W.J. Hendrikse<br>Prof.dr. B. Krug |
| Other members: | Dr. Ph. Engeldorp Gastelaars<br>Prof.dr. R. Ruben<br>Dr. A. van Tilburg |

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*To Mingsheng and Eric*

# Abstract

Upstream primary producers and downstream processors in agricultural sectors are vertically coordinated via various governance structures, such as spot market, investor-owned firms, cooperatives, contract farming, and other hybrid forms. It is very interesting to observe that these governance structures co-exist in many markets, and that they interact with the institutional setting. How does each governance structure function? What accounts for co-existence and efficiency of various governance structures? What is the effect of the institutional setting? These questions deserve in-depth exploring to add new knowledge to the theory of firm on the one hand, and to provide suggestions to managers on the other hand.

Governance structures can be approached by delineating income rights and decision rights. The allocation of decision rights tells who has the right to guide or direct activities, i.e., how authority is allocated among various stakeholders. The allocation of income rights specifies how benefits and costs are allocated among different stakeholders. This thesis studies decision making procedures and decision rights allocation of two governance structures: cooperatives and contract farming. The main research questions are how authority coordinates upstream and downstream activities within various governance structures in a transitional institutional setting (China), and under what conditions one particular governance structure is efficient. The theoretical research focuses on the role of the board of directors in agricultural cooperatives, while the empirical research focuses on the organizational and strategic attributes of Chinese farmer specialized cooperatives and the contracting arrangements in the Chinese fruit and vegetable industry.

This thesis consists of five chapters. The first chapter introduces the research objective and research questions. The second chapter develops a game model to explore how endogenous screening rules affect efficient organizational choices and industrial structures. The third chapter describes the institutional setting in China and investigates how new farmer specialized cooperatives are organized in the particular setting from the perspective of systems of attributes. The fourth chapter examines 12 fruit and vegetable contracting networks to explain the determinant factors for the allocation patterns of decision rights and the extent of completeness of agricultural contracts. The fifth chapter concludes.

The main conclusions are as follows. Firstly, the board of directors adds value to cooperatives when screening investment projects because of its dual screening

characteristic. The screening levels are strategic substitutes. Secondly, the Chinese farmer specialized cooperatives are co-governed by both core members and non core-members based on their relations (*guan-xi* in Chinese) and abilities. Human asset specificity in terms of establishing and maintaining relations and access to markets seems to be more important than physical asset specificity in accounting for governance structure choice in the current institutional setting. Thirdly, the extent of completeness of agricultural contracts and the allocation pattern of decision rights vary substantially across different supply chains in China. Under contract farming, many decision rights are shifted from farmers to firms. Quality and market uncertainty determines the completeness of agricultural contracts. Quality, reputation and specific investments by firms positively influence the number of decision rights allocated to agri-business firms, while monopsony-oligopsony power and specific investments by farmers do not determine the allocation pattern of decision rights.

# Acknowledgement

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I reserve my most profound thanks to my family. My father is always the first one backing me up, no matter what difficulties I face. My mother is the one who says little but does a lot to support me. The encouragement, love and trust from my parent, parent-in-law, and my brother and sister-in-law have blessed and supported me. My greatest thank is due to Mingsheng, my husband, and Eric, my son. They are the source of my happiness, and the ones always standing with me, shoulder-to-shoulder.

Yamei Hu
Rotterdam, August 2007

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# 1 Introduction

## 1.1 Background and Problem Statement

We live in a world where the market mechanism is the dominant form of governance of transactions. However, most people are involved in organizations which are obviously different from market governance, such as firms, universities, political parties, to name a few. An efficient organization is at least as important as a well-functioning system of markets. Thus, it is significant for us to truly understand how various organizations function. New developments regarding the theory of the firm provide us with rich approaches to explore the issues regarding internal functioning and outside coordinating of organizations. According to Williamson (1985), both market and all kinds of other organizations including investor-owned firms, co-cooperatives, franchising, etc could be treated as a particular kind of governance structure which organizes production and transactions as well as coordinating the allocation of resources.

In recent decades, the organization of transactions with agricultural products has undergone major changes. Boehlje, Hofing and Schrader (1999) observe that the modern food production and distribution systems in the U.S.A are moving away from open markets to more tightly aligned supply chains, driven by increased specificity of end-user demands, product differentiation and complexity of product processes. The Dutch Cooperative Council (NCR, 1990) distinguishes three developments regarding the changing environment. First, production of a large number of agricultural products has reached self-sufficiency at the level of the European Union. Second, a different product assortment is required in order to be successful in a market which has changed from a seller market to a buyers market. Thirdly, the emergence of the internal market in Europe induced many merger activities which have resulted in a few large, multinational private corporations. Bijman (2002) points out that the most fundamental one is the shift from production orientation to market orientation in the strategy of producers. All these changes raise challenges to efficient ways of vertical co-ordination in the agricultural industry.

Various institutional arrangements regarding vertical co-ordination are viable in agrifood sectors, such as investor-owned agribusiness firms, agricultural cooperatives, and contract farming. An investor-owned agribusiness firm is a firm owned by investors and is active at one stage of agricultural production. An agricultural cooperative is a partly vertical integrated firm, where the primary growers act as the owners of the firm and thus

forward integrate into downstream activities. Contract farming is the contractual arrangement regarding vertical coordination among the production stage and processing/marketing stage. These arrangements have been significantly influenced by the above mentioned changes. For example, cooperatives used to be an efficient governance structure to organize farmers into the value-added supply chains and thus share the benefit from vertical coordination and industrialization. However, a traditional cooperative may not adjust well for the changes, thus becomes less efficient and need restructuring. Similar to cooperatives, investor-owned firms and contract farming have their own advantages and disadvantages.

How could we classify and characterize various governance structures in agricultural sectors? Are there efficient governance structures regarding vertical coordination in the rapidly changing environment? If there are, could we specify the circumstances under which a certain kind of governance structure or a sort of governance structures is efficient? How do various governance structures coordinate upstream and downstream activities in different institutional settings? How do governance structures affect inter-firm and inside-firm activities and to what extent? These questions will be addressed in this thesis.

## 1.2 Research Objectives and Questions

Out of the introduction of the research background and identification of the problems, we now formulate the research objectives. The objective is made more concrete by specifying research questions.

The research objectives of this thesis consist of theoretical, empirical and managerial ones:

(1) To add new knowledge regarding cooperatives by highlighting the role and added value of board of directors in screening investment projects (theoretical objective);
(2) To add to the research on systems of attributes by incorporating and aligning complex and interacted organizational properties (empirical objective);
(3) To contribute to the advancement of research in the field of incomplete contracting by exploring contractual completeness as well as allocation patterns of decision rights under contract farming (theoretical and empirical objective);
(4) To provide useful insights and categories for managers of agribusiness to tackle practical problems in the governance of quality and standardization of agro-food as well as the aligning various stakeholders' interests (managerial objective).

The research objectives will be approached by addressing the following research questions:

Q1: What are the difference between cooperatives and investor-owned firms regarding the structure of the decision making process?
Q2: How does the difference influence the efficiency of various governance structures?
Q3: How are the new farmer specialized cooperatives in China organized?
Q4: What determines the form and extent of decision rights allocation between farmer growers and downstream processors in contract farming?

These questions will be addressed in Chapter 2 to 4. Chapter 2 focuses on the first and second research questions, and Chapter 3 deals with the third question, while chapter 4 addresses the fourth question.

## 1.3 Core Concepts

Governance, cooperatives and contract farming are core concepts in this thesis. A clear definition of these concepts prevents confusions and misunderstanding, thus, we will specify these concepts in this section.

**Governance**

Governance concerns the organization of transactions, whereas a governance structure consists of a collection of rules structuring the transactions between the various stakeholders (Pencavel, 2001; Hendrikse, 2003). Hansmann (1996) has defined a governance structure as the allocation of decision rights and income rights over relevant assets. *Decision rights* in the form of authority and responsibility address the question 'Who has authority or control (regarding the use of assets)?'. Decision rights concern all rights and rules regarding the use and deployment of assets (Hansmann, 1996). They specify who directs the firm's activities, i.e. the allocation of authority. Important themes regarding authority are its allocation ('make-or-buy' decision), formal versus real authority, relational contracts, access, decision control (ratification, monitoring), decision management (initiation, implementation), task design, conflict resolution, and enforcement mechanisms.

Decision rights matter because contracts are in general incomplete, and the incompleteness of contracts is completed by allocating authority to somebody to decide in

circumstances not covered by the contract.[1] Decision rights can be further distinguished as specific control rights and residual control rights (Grossman and Hart, 1986). Specific control rights (or specific decision rights) are those which are explicitly specified by contracts or laws, whereas all non-specified rights are residual control rights (or residual decision rights).

*Income rights* address the question 'How are benefits and costs allocated?'. Income rights specify the rights to receive the benefits, and obligations to pay the costs, that are associated with the use of an asset, thereby creating the incentive system faced by decision makers. They will be reflected in the composition of costs and payment schemes.[2] Important themes regarding income rights are payment schemes, cost allocation schemes, the compensation package for the CEO and the other members of the board of directors, and the effects of horizontal as well as vertical competition.

**Cooperatives**

Agricultural marketing cooperatives emerged in the 19th century. They played an important role in organizing and coordinating agricultural production and transactions in many agricultural industries. There are several ways of defining a co-operative. One way is to look at its goals and activities; one way is to find out basic principles it follows; another alternative is by studying its governance structure. According to the first view, the main function of an agricultural cooperative is to further members' income by providing specific services that align with the activities of the member-firms (Bijman, 2002). On the basis of the activities carried out by the co-operative, NCR (1993) distinguishes five categories of agricultural co-operatives: co-operative purchasing and producing inputs for farming; co-operative processing and marketing agricultural and horticultural products; co-operative banks providing credit; co-operative auctions; cooperatives providing other services such as insurance, contract work, accountancy and farm relief. As cooperatives develop, they may expand their activities beyond the above descriptions, such as emergence of so-called environmental co-operatives (Slangen and Polman, 1999). Regarding the second view, the definition of the International Co-operative Alliance (ICA) is well accepted (1995). However, as market conditions experienced violent changes since 1980s, some new generation cooperatives emerged which changed some principles such as closed

[1] Incomplete contracting theory addresses decision rights / authority. The starting point is that the design of contracts is costly, which results in incomplete contracts. Incomplete contracts allocate decision power in situations left open by formal (incentive) contracts. The focus is on non-verifiable actions.

[2] The analysis of income rights / incentives is the realm of complete contracting theory in the form of agency relationships. The working hypothesis is that everything that is known, can and will be incorporated in the design of optimal remuneration schemes / contracts without costs.

membership and membership market, and in some cases new grower groups emerged (e.g., Hendrikse and Bijman, 2002).

The third perspective regarding a co-operative, which we follow in this thesis, goes beyond the legal definitions and abstracts from specific activities. It looks at who has control over and who receives income from the co-operative firm. In other word, the co-operative firm is treated as a particular governance structure in vertically coordinating activities and/or transactions among various production and distribution stages. A cooperative is a society of many independent growers/producers (horizontal relationship) who jointly own a downstream processor / retailer (vertical relationship). To clarify its organizational characteristics, many researchers compare a co-operative firm with an investor-owned firm (e.g., Staatz, 1987a; Hendrikse and Veerman, 1997; Hendrikse, 1998). For example, Hendrikse (1998) constructs a game-theoretic model of investment decisions in which the choice of organizational form (cooperative vs IOF) is the key st5rategic variable. Organizations are perceived as a collection of decision units. It is argued that the central difference between coops and IOFs in decision-making structure is the existence of two decision-making units in coops compared to one in IOFs.

A simple figure helps to classify cooperatives and investor-owned firms intuitively. Figure 1.1 shows that, contrasted with an investor-owned firm, a cooperative is by principle member-owned and member-used and thus the (formal) authority resides with members. These member-owned organizations are usually not stock-listed, and have distinguishing features (Commission of the European Communities, 2001, p12) like ‘an orientation to provide benefits to members and satisfy their needs, democratic goal setting and decision-making methods, special rules for dealing with capital and profit, and general interest objectives (in some cases)’.

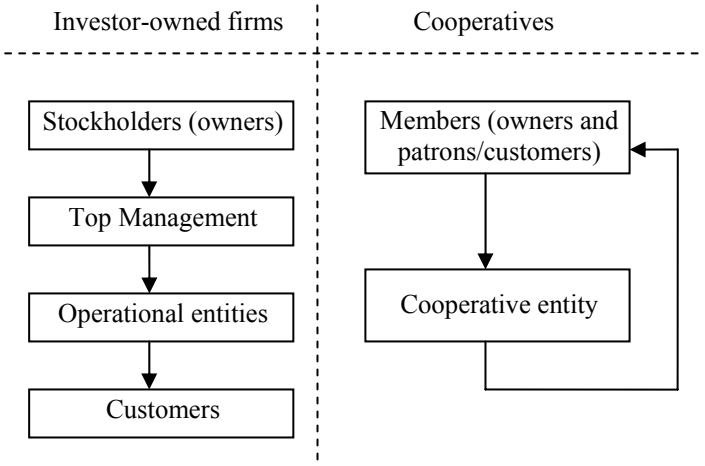


Figure 1.1 Investor-owned firms versus Cooperatives

**Contract farming**

Contract farming is mainly an agreement between a farmer and a firm, where the farmer produces a fresh or partially processed product and the firm has a commitment to buy it (Grosh, 1994). Contract farming operates as an intermediate economic institution between spot market and vertical integration (Grosh, 1994; Key and Runsten, 1999; Patrick, 2004), and rises as a response to changed consumer demands (Barkema, 1993; Reardon et. al. 2003), or to market imperfection, like in the area of credit, insurance, information, factors of production and product markets (Key and Runsten, 1999), or to controlling operational risks (Boehlje and Schrader, 1998).

## 1.4 Positioning the Thesis

This thesis can be positioned in the literature of new institutional economics, since we use major part of new institutional economics, i.e., transaction cost theory and new property rights theory as our theoretical foundations. Williamson distinguishes four levels of institutional analyses (2000). The most general level is Embeddedness, where informal institutions, customs, traditions, norms, and religion are at the center of analysis. Change occurs only once in 100-1000 years. Social theory is used for this analysis. Level 2, i.e., the Institutional Environment, is concerned with the formal rules of the game, like bureaucracy, polity, and the judiciary. Change occurs in 10-100 years. Economics of property is suitable for the analysis. The third level concerns Governance, which is about contracting and aligning governance structures with transactions. Changes occur in a time

frame of 1-10 years. Transaction costs economics is used here. Level 4 focuses on Resource Allocation and Employment. Neo-classical economics is used for the analysis. Our thesis can be classified into Level 3, where getting the governance structures right is the main purpose.

The two approaches, i.e., transaction cost theory and incomplete contracting theory are summarized here, and the application of the approaches will be further illustrated in Chapter 2 to 4.

**Transaction Costs Economics (TCE)**

Before Ronald Coase (1937) raised the famous question of 'why do firms exist ', mainstream neoclassical economics pays little attention to institutional arrangements, both macro-level and micro-level. The firm is simply treated as a production function subject to technology constraints, which could be vividly graphed as a black box with input on one side and outputs on the other side. The black box was initially opened by Coase in his famous article of 'The Nature of the Firm' (1937). He mainly answered two questions. Firstly, why do firms exist? Or alternatively, what is the nature of firm? Transaction costs, i.e. the costs associated with the price mechanism to establish efficient exchange, were introduced to explain why sometimes markets are substituted by firms. In certain circumstances, market exchange is more costly than exchange within a firm. The fundamental nature of the firm is therefore referred to as selective intervention. Secondly, what determines the boundary of the firm? The reason why a firm cannot expand unlimitedly is because transacting via the firm also involves costs. According to Coase, the size of a firm is determined by the point where the marginal cost of transacting in the market equals the marginal cost of additional mistakes and more administrative rigidity in the firm.

Although Coase formulated an agenda for developing organizational economics, he did not specify transaction costs. Williamson further developed the concept of transaction costs[3] and to some extent made the hypotheses of transaction costs empirically meaningful.

Instead of organization or firm, Williamson (1985) uses the term 'governance structure'. A starting-point for the analysis of governance structure choice is to assume that a governance structure is chosen in order to minimize total costs, i.e. the joint transaction and production costs. TCE simplifies this analysis by assuming that transaction costs and production costs are determined separately and can be added together in order to determine

[3] For example, Williamson distinguished two types of transaction costs: ex ante costs and ex post costs. Ex ante transaction costs are the costs of drafting, negotiating and safeguarding agreement (as

the total costs of a certain way of organizing. It implies that the choice of governance structure is driven by minimizing transaction costs.

One of Williamson's contributions to organizational theory is that he first specifies three-characteristics of transactions which together determine transactions costs, and then successfully links them with different governance structures. The three characteristics of transactions are the frequency with which a transaction occurs, the degree of asset specificity, and the degree of uncertainty which surrounds the transaction. Given critical behavioural assumptions of bounded rationality and opportunism, the three exogenous variables determine the endogenous variable, i.e. governance structure. For example, the higher the specificity of a transaction, the higher the corresponding transaction costs, as a result, a hierarchy is preferred. Originally, Williamson (1985) only made a distinction between two governance structures: spot market and hierarchy. Later he distinguished a third type -hybrid- in between market and hierarchy (Williamson, 1991). Other researchers have emphasized the continuum of governance structure, ranging from spot market as one extreme to hierarchy as the other extreme (e.g., Mahoney, 1992; Frank and Henderson, 1992).

TCE has been subject to quite some criticisms (e.g., Milgrom and Roberts, 1992; Holstrom and Roberts, 1998). Among others, Hart admitted that Williamson linked transaction costs to efficient governance structure, however, he did not convincingly explained how that happened. Now we will turn to incomplete contracting theory (or new property rights theory) which was formulated by Grossman and Hart to see how they convincingly provide the missing mechanism.

**Incomplete contracting theory**

Incomplete contracting theory starts from the basic idea that it is often difficult to write enforceable comprehensive contracts (Hart and Moore, 1999). Real world contracts are almost always incomplete in the sense that there are inevitably circumstances or contingencies that are left out of the contract, because they were neither unforeseen or simply too expensive to enumerate in sufficient detail. As contracts are incomplete, actions and payments must often be determined ex post, either unilaterally or through negotiation. Consequentially, contracting agents should be concerned ex ante with the possibility of opportunistic behaviour and the results of possible renegotiation. This is particularly problematic if ex ante transaction-specific investments must be made. These investments create the opportunity for ex post appropriation of quasi-surplus (surplus plus specific investment costs) by the non-investing agent to the transaction. The anticipation of

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suggested by Coase). Ex post transaction costs only rise when the contract has been put to work. Ex ante and ex post costs are preferred to be considered together because these costs are interrelated.

possible hold-up may lead to under-investment in the economic relationship. This is the (inefficient) hold-up problem (Klein et al., 1978). Klein et al. (1978) and Williamson (1979, 1985) have suggested that vertical integration may solve this inefficiency problem.

Grossman and Hart (1986) argued that vertical integration brings costs as well as benefits. GHM (Grossman and Hart, 1986 and Hart and Moore, 1990) define a firm as a collection of non-human assets under common ownership, where ownership means holding residual rights of control. Residual rights are all rights to an asset that are not expressly assigned to another agent. The allocation of residual rights of control influences the bargaining position of agents to a contract after they have made relationship-specific investments. In the absence of comprehensive contracts, property rights largely determine which ex post bargaining position will prevail. An agent owning assets that are essential for value creation in the relationship is in a position to reap at least some of the benefits from the relationship that were not explicitly allocated in the contract by threatening to withhold the assets otherwise. Thus, a shift of ownership affects the ex ante investment incentives of contracting agents.

The GHM model has been extended in various directions. For example, Brynjolfsson (1994) has extended the model by incorporating human capital, specially the productive knowledge of agents. Rajan and Zingalas (1998) apply GHM into the exploration of the sources of power. Baker, Gibbons and Murphy (2002) analyze relational contracts. Baker, Gibbons and Murphy distinguish decision from control rights.

A second way of positioning our thesis is to distinguish on the one hand various behavioural hypotheses and on the other hand various degree of rationality. Figure 1.2 acts as an illustration. There are three kinds of behavioral hypotheses, i.e., opportunistic-oriented agents, self-interested agents and idealistic agents. The degree of rationality can be classified into three levels: complete rationality, limited rationality and procedural rationality. In our thesis, the assumptions of opportunistic agents and limited rationality are adopted.

| | | Behavioural hypothesis | | |
|---|---|---|---|---|
| | | Opportunistic | Self-interested | Idealistic |
| Degree of rationality | Complete rationality | | | |
| | Limited rationality | × | | |
| | Procedural rationality | | | |

Figure 1.2 Positioning of the theoretical perspective (Hendrikse, 2003, p. 201)

## 1.5 Research Methodology

To answer the first research question, we use non-cooperative game theory as a tool to construct model.[4] To answer the second and third research question, we use multiple case studies as our research method. Figure 1.3 is taken from the classical book by Yin (2003) regarding case studies. It illustrates the various aspects involved in multiple cases studies. They will be dealt with extensively in the chapter 3 and 4.

To answer the second and third research question, we use multiple case studies as our research method. Figure 1.3 is taken from the classical book by Yin (2003) regarding case studies. It illustrates the various aspects involved in multiple cases studies. They will be dealt with extensively in the chapter 3 and 4.

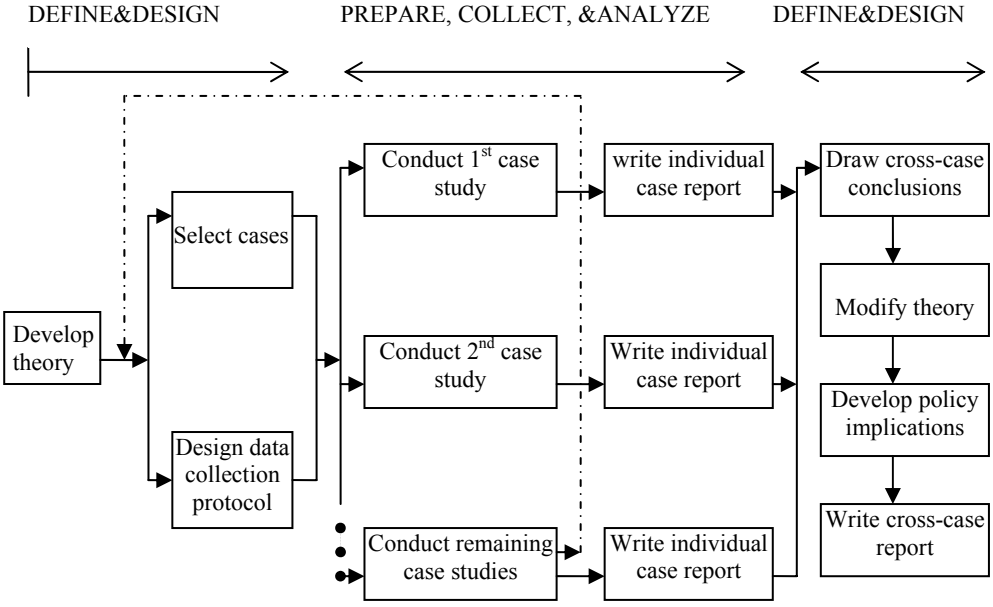


Figure 1.3 Multiple case study (Yin, 2003, p.50)

[4] Non-cooperative game theory is a mathematical method to describe the interactions between different players.

## 1.6 Structure of the Thesis

This thesis consists of an introduction (Chapter 1), three essays on agricultural cooperatives and contract farming (Chapter 2, 3, and 4), and conclusions (Chapter 5). The structure of the thesis is depicted in Figure 1.4.

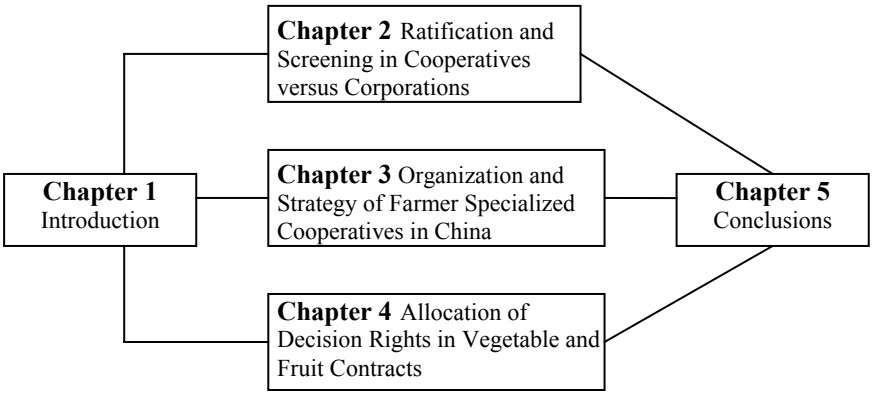


Figure 1.4 Structure of the thesis

This chapter has provided an introduction to the research subject and the definition of the problem, and specifies the research objective and research questions. In Chapter 2, we develop a game model to capture the differences between cooperatives and investor-owned firms by focusing on the structure of the internal decision making process. A cooperative consists of a society of (upstream) members and a (downstream) enterprise, whereas a corporation consists of only an enterprise. This difference will be explored in a ratification model with endogenous screening rules at the level of the society of members as well as the enterprise. A lower screening level is chosen in a cooperative in order to compensate for its hierarchical decision-making structure. Screening levels are strategic substitutes because a lower screening level by the rival enterprise makes it more likely that the market has to be shared when a project is good. The payoff maximizing response is to increase the screening level at local bureaus. A governance structure externality is identified as well as a behavioral heterogeneity independent of the ratification structure. Conditions are specified for the coexistence of cooperatives and corporations.

In Chapter 3, we explore agricultural cooperatives in the setting of a transitional economy, i.e., China, from the perspective of a system of attributes. How are the new farmer specialized cooperatives in China organized? This question is addressed by presenting data at three levels. First, data are presented regarding the historical development of farmer cooperatives in China. Second, data are presented regarding the

membership composition of a sample of 66 farmer cooperatives in the Zhejiang province. Third, data are presented regarding the various attributes (governance, quality control system, and strategy) of a watermelon cooperative in this province. Many cooperatives are being transformed in organizations with a market orientation. The data indicate that cooperatives exhibit substantial heterogeneity, in terms of farmers being member and skewness in the distribution of control rights. Human asset specificity in terms of establishing and maintaining relations and access to markets seems to be more important than physical asset specificity in accounting for governance structure choice in the current institutional setting.

In Chapter 4, we focus on the use of contracts as a way of organizing transactions between primary farmers and downstream agri-business. Contract farming is spreading in many agricultural sectors. One observation is that many restrictive arrangements are adopted in agricultural contracts. The restrictive contractual arrangements specify issues/decisions ex ante, and/or move decision rights across fixed firm boundaries. What determines the extent and form of decision rights allocation under contract farming? Based on several theoretical and empirical studies, we identify quality, reputation and uncertainty as the explanatory factors leading to various degree of completeness of contracts, and quality, reputation, specific investment and monopoly-oligopsony power as the explanatory factors for different allocation patterns of decision rights. 12 vegetable and fruit contracting networks in China are examined to test the relevance of the explanatory variables.

In Chapter 5, we summarize the main findings from the research and present the main conclusions of the thesis.

# 2 Ratification and Screening in Cooperatives versus Corporations

'In an investor-owned firm, the chief executive officer (CEO) often has a large, if not dominant voice, in selecting the board of directors. Strong CEOs look for persons who share their vision for the future of the company and respect their managerial ability in selecting directors. When a new CEO takes over, directors who do not share his or her views are often encouraged to relinquish their seats on the board. This places the manager in a position of strong control over both setting and implementing company policy. In a cooperative, the CEO usually has significantly less influence over who sits on the board. Incumbent directors may have outlasted several managerial changes. When a board seat opens up, the influence of the CEO in the selection of the new director varies greatly depending on the culture of the association. Some cooperatives look for guidance from the manager, others deeply resent any involvement by the manager. As a result, directors often do not feel beholden to the manager for their position and have the independence, if they choose to exercise it, to question management decisions and reject its recommendations.'

USDA (2002, p11)

## 2.1 Introduction

Cooperatives and investor-owned firms (IOFs) are alterative forms of business organizations that buy, sell, and produce goods and services. Contrasted with investor-owned firm, a cooperative is by principle member-owned and member-used. A cooperative is a society of many independent growers/producers (horizontal relationship) who jointly own a downstream processor / retailer (vertical relationship). These producer-owned organizations are usually not stock-listed, and have distinguishing features (Commission of the European Communities, 2001, p12) like 'an orientation to provide benefits to members and satisfy their needs, democratic goal setting and decision-making methods, special rules for dealing with capital and profit, and general interest objectives (in some cases)'.

Various studies show that cooperatives and investor-owned firms behave differently. For example, Van der Krogt (2005) shows that these organizations differ in their growth strategies. Cooperatives choose mainly alliance and consolidation strategies, whereas IOFs prefer take-over strategies. Hendrikse and Van Oijen (2004) show that cooperatives are active in fewer industries than corporations and that cooperatives have a

higher ratio of unrelated to total diversification than corporations. There are not only differences between these two classes of organizations, but there is also behavioral heterogeneity within a class. For example, Chaddad and Cook (2004) describe a striking variety of choices regarding the financing of dairy cooperatives around the world.

Another empirical observation is that cooperatives and investor owned firms coexist in many agricultural markets. This is puzzling from the perspective of standard economic theory. It predicts that the efficient organizational form will drive out those that are not, resulting in an industry structure consisting of identical enterprises. However, the data suggest that organizational heterogeneity is pervasive, e.g. grain, fertilizers, pesticides, seeds, pork, wheat poultry, forestry, eggs, vegetables in Sweden (Nilsson, 1997), pork, beef, poultry, eggs, milk, sugarbeet, grain, fruit, vegetables in Europe (Hendrikse, 1998), and hogs, corn, soybeans, wheat, and cattle in the USA (Carriquiry and Babcock, 2004).

These observations generate an interesting question: why and when different governance structures co-exist in a market? Prior literature shows that a cooperative, as a governance structure, has a number of advantages and disadvantages compared to an investor-owned firm (Vitaliano, 1983; Cook, 1995). One obvious disadvantage is that a cooperative faces restrictions to issue claims against the residual profits of the organization. Not being listed in the stock market implies that cooperatives must finance investments through internally generated funds and debt, rather than issuing common stock. The absence of a stock listing also implies that equity-based compensation cannot be used and that there is no active takeover market replacing poorly performing managers. Thus, a cooperative has less freedom to design incentive compensation schemes to motivate managers. However, cooperatives exist in many industries. So, there must also be advantages of adopting a cooperative as a governance structure.

One advantage may be related with tax preference. Cooperatives often receive favourable tax treatment compared to an investor owned firm. However, tax preferences for cooperatives become less common in developed countries. A second advantage may be related with market-related costs. Using markets entails costs (Coase, 1936; Williamson, 1975). Bonus (1986) shows that the upstream concentration of bargaining power by upstream ownership of assets creates value when asset specificity is relatively important at the upstream stage of production.

A third advantage may derive from different decision making structure. It is well known that there are differences regarding the board of directors (Vitaliano, 1983). Board monitoring is a public good, but more active participation by members in board monitoring is expected in cooperatives due to the substantial financial stake in the cooperative by the members (Hendrikse and Veerman, 2001). Bebchuk and Fried (2003) address the relationship between shareholders and the board of directors in stock-listed enterprises.

They argue that there is substantial scope for managerial power due to actual incentives of directors being geared towards the interests of the CEO rather than the interests of the owners. One source of this managerial power is that the CEO has superior information about product markets, which may result in the choice of investment projects having a high personal value for the CEO. Another source is that the CEO has most likely superior information about the compensation packages for his position. However, managerial power is according to them limited by three variables: outrage costs, outsiders' perception of a CEO's compensation, and 'camouflage'. The extent of rent-extraction by the CEO depends on how much 'outrage' a proposed compensation arrangement is expected to generate among relevant outsiders. Outrage costs are likely to be higher in cooperatives than in stock listed enterprises due to the considerable financial involvement of the members in the cooperative, the regular member meetings, and the feature that shares of a cooperative are not traded in the stock market. Similarly, the background and interests of members in a cooperative have a favourable impact on their recognition of rent extraction and makes camouflage activities more difficult.

We focus on the value of screening and ratifying the decisions of the board by members in a cooperative. The above argument and the USDA citation motivate characterizing a cooperative by a dual screening decision process, whereas an investor-owned firm consists of a single screening decision process. The organization of the screening process matters, because it affects the errors made by individuals within the organization, and how those errors are aggregated at the organizational as well as industry level. A model highlighting the difference in the structure of the internal decision making process of these two governance is developed to see how the screening process influences behaviours and performance of business organizations.

It is shown that a corporation is prone to accept more investment projects than a cooperative because a cooperative requires approval of the society of members as well as the management of the cooperative. However, lower screening levels are chosen in a cooperative in order to compensate for its hierarchical decision-making structure. Cooperatives are predicted in markets with attractive portfolio compositions because the cooperative is good at rejecting bad projects. Similarly, corporations thrive in markets with bad portfolio compositions because they select good projects more frequently than cooperatives. Governance structure choice entails an externality because choosing a corporation as organizational form makes the market less attractive for the rival enterprise. The heterogeneity of behaviour of enterprises with the same governance structure as well as the coexistence of cooperatives and corporations is driven by the same trade-off. The advantage of being more frequently a monopolist compensates for accepting more bad projects.

Our model can be positioned in the literature in various ways. First, Sah and Stiglitz (1986) argue that individuals' judgement entails errors, and that the architecture of an organization affects the errors made by the organization as well as individuals in the system. The term 'architecture' is used to describe the decision-making units, how they are arranged together in a system, how the decision-making authority and ability is distributed within a system, who gathers what information, and who communicates what with whom. In our setting, different screening structures influence performance of the organization, where an organization can be viewed as a collection of decision-making units. A cooperative is in their terminology described by two decision-making units or bureaus, whereas a corporation consists of one bureau. Fulton (1990) adopts the Sah and Stiglitz framework to distinguish three cooperative structures: federated, centralized, and mixed-decentralized. Our characterization of a cooperative is most close to her mixed-decentralized type, i.e. 'All projects are first reviewed centrally and, if accepted, are forwarded to the decentralized firms which independently evaluate and accept or reject projects.' (Fulton, 1990, p16). The focus of the analysis is on how expenditure on information varies with organization structure in a monopolistic setting. Hendrikse (1998) extends the model of Sah and Stiglitz to a competitive setting when screening levels are exogenous. The focus is therefore on ratification only. This article considers how endogenous screening rules, i.e. each individual decision-making unit chooses its acceptance/rejection probabilities, affect behaviour and performance of cooperatives versus corporations.

Second, Williamson (1985) distinguishes in his economic analysis of the institutions of capitalism two behavioural assumptions, opportunism and bounded rationality, and three aspects of transactions, asset specificity, uncertainty, and frequency. Opportunism and asset specificity are dominant in his transaction costs analysis, whereas our model highlights the behavioural assumption of bounded rationality by people making mistakes in screening, and uncertainty regarding the nature of the product that is being evaluated.

Third, according to the agency theory (Fama and Jensen, 1983), the decision process can be separated into the two compound components of decision management (i.e., the initiation and implementation of decisions) and decision control (i.e., the ratification and monitoring of decisions). For modern firms, including cooperatives and corporations, this separation of the decision process is common. Our model has initiation of decisions at the processor stage of production in the cooperative as well as the corporation. The difference between these organizations is in the ratification process. The cooperative requires that the society of members ratifies an investment proposal in addition to the ratification at the downstream stage of production, whereas the corporation does not.

Finally, Teece, among others, (1994, p19) characterizes organizational competence by allocative competence, i.e. deciding what to produce and how to price it; transactional competence, i.e. deciding whether to make or buy, and whether to do so alone or in partnership; and administrative competence, i.e. how to design organizational structures and policies to enable efficient performance. Our model is about the relationship between administrative competence and allocative efficiency regarding the adoption of projects at the downstream, or processing, stage of production.

Understanding the differences between decision-making processes in various organizational forms is significant to both organisational economics and industrial organization because it provides insights in the efficient governance of enterprises and efficient industry structures. Dual screening may not only generate superior performance by the cooperative, but may also create competitive advantage. The paper is organized as follows. In section 2, we present the model and analyse the monopoly case. Section 3 is dedicated to the duopoly case. Section 4 formulates a summary and indicates possibilities for further research.

## 2.2 Model

We consider a production and processing stage of production. Farmers grow agricultural products at the upstream stage, while the produce is processed at the downstream stage. A crucial difference between a cooperative (C) and an investor owned firm (F) is that farmers own the downstream stage of production in C, while they do not in F. The focus of the model is on the selection of projects at the downstream stage of production. A new project is evaluated at the downstream stage of production in both governance structures. If the project is accepted by the downstream bureau, then it is accepted by enterprise F. Acceptance of a new project by the enterprise C requires also screening and approval by the upstream bureau. A Cooperative consists therefore of an upstream and a downstream bureau, whereas a Firm consists of just a downstream bureau. Figure 2.1 depicts these differences between C and F.

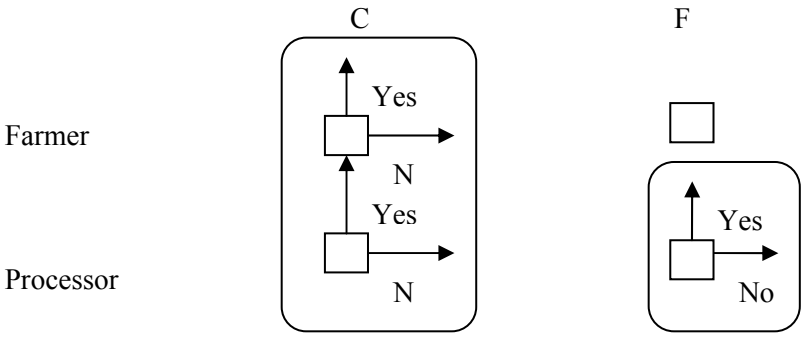


Figure 2.1 Ratification structure in Cooperative (C) versus Firm (F)

Define x as the net benefit of a project, where x = V with probability $\alpha$ and x = -W with probability 1 - $\alpha$. Assume that the project evaluator observes $y = x + \theta$, where $\theta$ is uniformly distributed and independent of x. Denote the density function of $\theta$ by $m(\theta)$ and its distribution function by $M(\theta)$. The uniform distribution of $\theta$ is summarized by $U(-\varphi,\varphi)$. Imperfect screening is assumed and entails that $V - \varphi < -W + \varphi$, i.e. there is an interval of y-values where x can be either a good or a bad project. Project evaluators use reservation screening levels for screening: a project is accepted if its observed profit is above the reservation screening level S, and is rejected otherwise. The screening function p(x,S) is defined as the probability that a project is judged to be good. It depends on its quality x and the screening level S, i.e. $p(x,S) = Prob[y \geq S] = 1-M(S-x)$.

Our model consists of a four stage game. The first stage consists of the choice of architecture. Screening levels are chosen in the second stage of the game. Third, nature chooses the type of project. Finally, project acceptance decisions are made by the organization. Backward induction will be used as solution method, i.e. the screening level will be determined first as a function of the choice of architecture (section 2.1), and subsequently the choice of architecture is determined (section 2.2).

### 2.2.1 Screening Level Choice

We notice that the expected payoff maximizing screening level of an architecture will never be set lower than $V - \varphi$ or higher than $-W + \varphi$. It will never be set lower than $V- \varphi$ because that will only increase the probability of accepting bad projects, i.e. increasing the number of type II errors, while screening levels higher than $-W + \varphi$ will only increase the probability of rejecting good projects, i.e. increasing the number of type I errors. The

expected payoff maximizing screening level of an architecture will therefore be in the interval [V - φ,-W + φ].

A Firm chooses its screening level S in order to maximize

$$\alpha V \frac{V + \varphi - S^i}{2\varphi} - (1-\alpha)W \frac{-W + \varphi - S^i}{2\varphi}$$

The parts independent of $S^i$ do not matter, therefore $S^i((1-\alpha)W - \alpha V)/2\varphi$ has to be maximized. This is a linear function in S. It implies that either V-φ or –W+φ is the expected payoff maximizing screening level of the firm. The Firm chooses V-φ when $(1-\alpha)W - \alpha V < 0$, otherwise it chooses -W+φ. It reflects that the expected payoff maximizing screening level is high when the portfolio of projects is bad, i.e. either V is low, or W is large, or α is low. Similarly, the low screening level V-φ is chosen when the portfolio of projects is attractive.

Assume that screening levels are chosen simultaneous and independent by bureau i and bureau j in a Cooperative.[5] Bureau i chooses $S^i$ in order to maximize

$$\alpha V \frac{V + \varphi - S^i}{2\varphi} p(V, S^j) - (1-\alpha)W \frac{-W + \varphi - S^i}{2\varphi} p(-W, S^j)$$

The parts independent of $S^i$ do not matter, therefore $\{(1-\alpha)Wp(-W, S^j) - \alpha Vp(V, S^j)\}S^i$ has to be maximized. This is a linear function in $S^i$. Again, it implies that either V - φ or –W + φ is an expected payoff maximizing screening level. The Cooperative chooses V-φ when $(1-\alpha)Wp(-W, S^j) - \alpha Vp(V, S^j) < 0$, otherwise it chooses -W+φ.

[5] Notice that figure 1 indicates the possibility of Bayesian updating when the upstream bureau receives a project from the downstream bureau for a second evaluation. We do not take this into account because it does not change the qualitative results of our paper. Sah and Stiglitz (1988) address this issue.

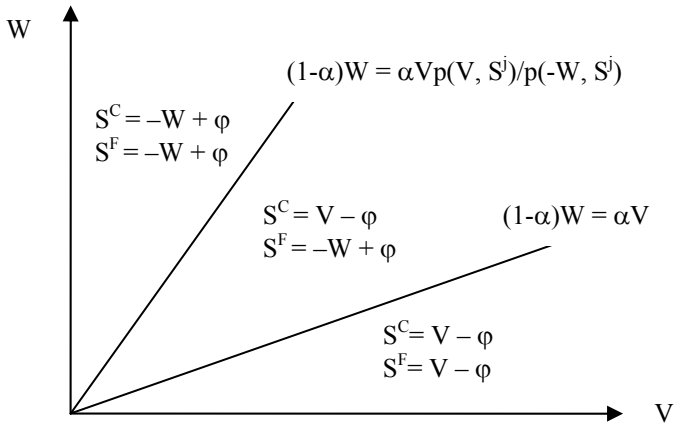


Figure 2.2 Screening level choice by a monopolist

Figure 2.2 summarizes the payoff maximizing screening level choice in the second stage of the game as a function of V and W for the Firm as well as the Cooperative, given the level of $\alpha$. There are two areas where the payoff maximizing screening level is the same for both governance structures. If W is relatively large compared to V, i.e. the portfolio is relatively bad, then the high screening level $-W+\varphi$ is chosen in order to prevent that bad projects are accepted. Similarly, if V is relatively large compared to W, i.e. the portfolio is relatively good, then the low screening level $V-\varphi$ is chosen in order to prevent that good projects are rejected. There is also a set of values of V and W where the Cooperative chooses the low screening level $V-\varphi$ and the Firm the high screening level $-W+\varphi$. It captures that a Cooperative will adjust the screening level downwards due to its tendency to commit a relatively large number of type I errors, while a Firm will adjust the screening level upwards due to its tendency to commit a relatively large number of type II errors. These results are in line with Sah and Stiglitz (1986).

These screening level choices determine the composition and the size of the product portfolio of these enterprises. If V is large and W is small, then both governance structures accept all good projects, and some bad projects. However, the Cooperative will accept fewer bad projects than the Firm. It implies that the portfolio of projects of a Cooperative is smaller, but it is on average of higher quality, than the portfolio of projects accepted by a Firm when the number of projects evaluated by both governance structures is identical. If V is small and W is large, then the quality of the portfolio of accepted products of both governance structures is again identical because they accept only good projects. However, the size of the portfolio of the Firm is larger than the size of the portfolio of a Cooperative, because the Cooperative commits more type I errors. Finally, if

V is roughly the same as W, i.e. the intermediate section in figure 2.2, then these results are reversed. The average quality of the portfolio of accepted projects is highest in the Firm because it only accepts good projects, whereas a Cooperative accepts all good projects and some bad projects. The size of the portfolio of accepted projects of the Cooperative is therefore also larger than the portfolio of a Firm. Figure 2.3 summarizes these results.

| Screening level<br>Portfolio feature | $S^C = V - \varphi$<br>$S^F = V - \varphi$ | $S^C = V - \varphi$<br>$S^F = -W + \varphi$ | $S^C = -W + \varphi$<br>$S^F = -W + \varphi$ |
|---|---|---|---|
| Largest size | F | C | F |
| Highest average quality | C | F | F=C |

Figure 2.3 Portfolio features of Cooperatives and Firms

### 2.2.2 Architecture Choice

Figure 2.4 presents the payoff maximizing architecture choice by a monopolist. The economic intuition is formulated in terms of a ratification and a screening effect. The ratification effect captures the single versus double screening of the two governance structures, whereas the screening effect focuses on the number of type I versus type II errors committed due to the screening level choice. Distinguish again the three areas of figure 2.2. Suppose that the values of V and W are such that the expected payoff maximizing screening level choice is V–φ for a Cooperative as well as a Firm, then p(V, V–φ) = 1 and p(–W, V–φ) > 0. There is no screening effect because the bureaus in both governance structures use the same screening level. However, there is a ratification effect because p(-W, V–φ) > 0, i.e. there are type II errors. (There are no type I errors because p(V, V–φ) = 1.) The expected payoff maximizing architecture choice is a Cooperative, because a Cooperative is good at preventing type II errors. Similarly, a Firm is chosen when the expected payoff maximizing screening level choice is -W+φ for both architectures. There is again only a ratification effect. The choice –W+φ entails that p(V, -W+φ) < 1 and p(-W, -W+φ) = 0, i.e. there are only type I errors because 1-p(V, -W+φ) > 0. A Firm is good at preventing type I errors.

Finally, there is a ratification and a screening effect in the intermediate region. The ratification effect entails that the Cooperative is more conservative in accepting projects than a Firm. This is attractive from the perspective of preventing type II errors, but not from the perspective of preventing type I errors. The screening level effect, i.e. the effect of lowering the screening level from –W+φ in a Firm to V-φ in a Cooperative,

increases the likelihood of type II errors, but reduces the type I errors committed by the Cooperative. This screening effect dominates the conservative ratification effect of a Cooperative when the portfolio is relatively good. It implies that a Cooperative is chosen in the intermediate region if and only if when W is smaller than a certain level of V. To be more specific, the governance structure Firm is chosen when $(1-\alpha)W < \alpha V/(1-(V+W)/2\varphi)$.

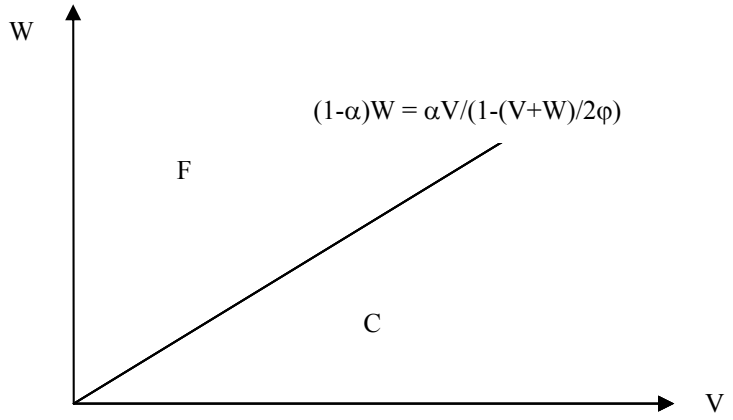


Figure 2.4 Architecture choice by a monopolist

## 2.3 Duopoly

The four stage game of the previous section is used again to analyse the competitive effects of governance structure choice in a duopoly setting. It is assumed that architecture choices are made simultaneously and independently in the first stage of the game. Screening levels are chosen in the second stage of the game. Third, nature chooses the type of project. Finally, project acceptance decisions are made by the organization. Again, acceptance decisions are made simultaneously and independently.

This section is organized as follows. The duopoly payoffs are specified in section 3.1. Section 3.2 determines the screening level choice and a governance externality in the choice of screening level. Equilibrium screening levels are determined in section 3.3. Architecture choices are the focus of section 3.4.

### 2.3.1 Duopoly Payoffs

An enterprise faces two possible values of accepting a good project in a duopoly because it depends on whether or not the market has to be shared with a rival. If the rival enterprise rejects the project, then the monopoly payoffs of the previous section apply. However,

when the rival enterprise also accepts the project, then the market has to be shared. We assume that the gains associated with a good project are split equally between the two enterprises when both accept the project. The loss associated with accepting a bad project is again W, independent of market structure.

Different competitive scenarios can be distinguished in a competitive setting, like Cournot competition, Bertrand competition, and collusion. We summarize the intensity of competition by a parameter $\beta \in [0,.5]$. If the intensity of competition is very intense, like Bertrand competition in a market with homogeneous products and unlimited capacity, then $\beta=0$. Sharing the market in a situation with a cartel is captured by $\beta=.5$. The case of Cournot competition is characterized by $\beta \in (0,.5)$. An enterprise will therefore encounter three types of projects: a good project with value V, or a good project with value $\beta V$, or a bad project with value $-W$. Figures 2.5A and 2.5B summarize these assumptions.

| Architecture 1 \ Architecture 2 | Accept | Reject |
|---|---|---|
| Accept | $(\beta V, \beta V)$ | $(V,0)$ |
| Reject | $(0,V)$ | $(0,0)$ |

Figure 2.5A Duopoly payoffs when the project is good

| Architecture 1 \ Architecture 2 | Accept | Reject |
|---|---|---|
| Accept | $(-W,-W)$ | $(-W,0)$ |
| Reject | $(0,-W)$ | $(0,0)$ |

Figure 2.5B Duopoly payoffs when the project is bad

### 2.3.2 Reaction Functions

Figure 2.2 illustrates that the payoff maximizing screening level choice of a bureau depends on V, W, $\alpha$, $\varphi$, and the choice of architecture. The screening level and architecture choice of the rival enterprise has to be added to this list in a duopoly. In order to address the impact of competition on the choice of screening level and architecture, we define reaction function $R^{ij}$ as the payoff maximizing screening level choice of a bureau in architecture i, facing architecture j.

Section 2.1 has determined that the payoff maximizing screening level choice of a bureau is either $V-\varphi$ or $-W+\varphi$. The slope of the reaction function is therefore piecewise vertical. Suppose that the screening level in architecture j is at least $V+\varphi$, i.e. architecture 2 rejects all projects. Architecture i will choose its screening level independent of the choice

of screening level in architecture j, i.e. the monopoly situation is actual. It entails that the reaction function is vertical and does not depend on the choice of screening level in architecture j. Suppose that the screening level of architecture j is at most V-φ, i.e. architecture j accepts all good projects. Architecture i will choose its screening level independent of the choice of screening level of architecture j. This situation is very similar to the monopoly situation, except that V has to be replaced by βV.

There may be a discontinuity in the reaction function of architecture i at an intermediate level of the screening level in architecture j. If the screening level of architecture j drops below a certain level, then the payoff maximizing screening level of architecture i increases. Suppose that the screening level of architecture j is in the interval [V-φ,V+φ]. If the values of V and W are such that the choice of screening level in architecture i is –W+φ in the monopoly situation, then it will also be –W+φ in the duopoly situation. The reaction function is vertical and does not depend on the choice of screening level of architecture j. However, if the values of V and W are such that the choice of screening level of architecture i is V–φ in the monopoly situation, then there are cases where the choice of screening level depends on the screening level choice in architecture j. The screening level in architecture j may decrease to such an extent that the lower expected payoff of a good project makes it attractive for architecture i to increase the screening level choice from V-φ to –W+φ. Figure 2.6 depicts this case. The reaction function shows the payoff maximizing screening level choice of a bureau in architecture i as a function of the screening level choice of a bureau in the architecture of rival j. If the screening level choice $S^j$ decreases, then the expected payoff of a good project decreases (or stays the same). Figure 2.6 implies that the payoff maximizing screening level will increase (or stays the same). It reflects that a decrease in $S^j$, i.e. the competitor is more frequently in the market, makes the market less attractive for architecture i. Architecture i will respond by increasing its screening level $S^i$ because it becomes more important to reject bad projects. In sum, an organization will never reduce its screening levels when its competitor reduces its screening levels. Screening levels are therefore strategic substitutes (Fudenberg and Tirole, 1984).

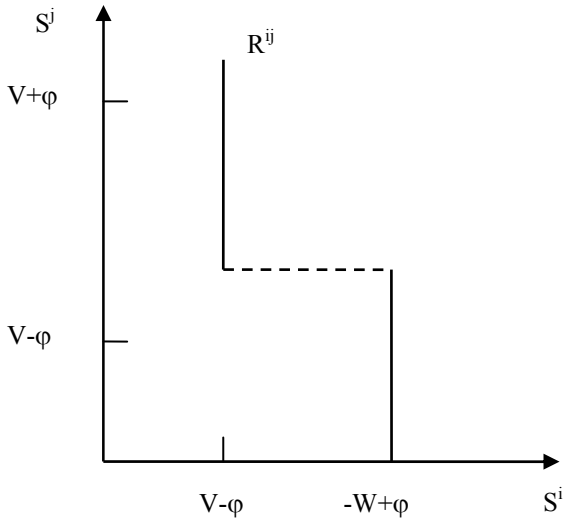


Figure 2.6 Reaction function of a bureau in architecture i, facing architecture j

The switching point in figure 2.6 depends on the choice of architecture of both organizations. Figure 2.7 addresses the impact of architecture i on the payoff maximizing level of $S^i$, while figure 2.8 shows the impact of architecture j on the payoff maximizing level of $S^i$. The impact of the choice of architecture on the payoff maximizing screening level choice is presented in figure 2.2. A Cooperative has never a higher screening level than a Firm. The translation of this result in terms of figure 2.6 is that the switching point is lower for a Cooperative than for a Firm. Competition has an impact on the expected value of a good project, but not on the value of a bad project. A lower value of $S^j$ reduces the expected value of a good project for a bureau in architecture i, given the choice of architecture of the rival. Figure 2.2 shows that there exists for every value of W a range of values of V for which a Cooperative chooses a low screening level and a Firm a high screening level. Figure 2.7 presents this result.[6]

[6] Appendix 2-1 shows this formally.

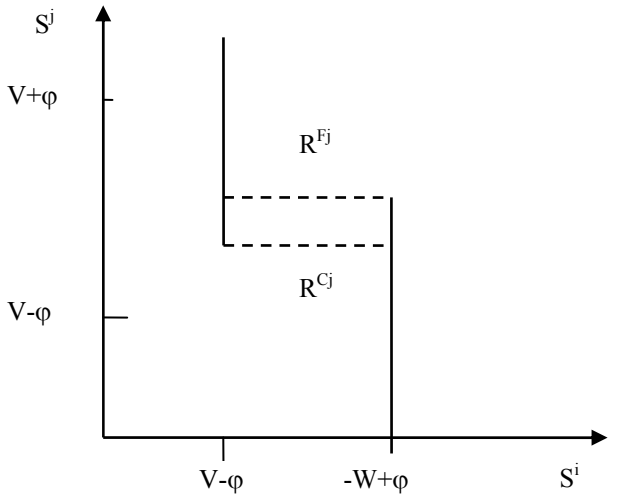


Figure 2.7 Screening level choice of a bureau in architecture i (=C,F) facing architecture j

The choice of architecture by rival j exerts an externality on the screening level choice of a bureau in architecture i. A Firm will never accept fewer projects than a Cooperative when $S^j$ is fixed. It implies that architecture i has to share the market more frequently with rival j when j has adopted architecture F rather than C. The payoff maximizing response of a bureau to a lower expected payoff of a good project is to increase the screening level (Figure 2.2). There is therefore a range of values of $S^j$ where the payoff maximizing $S^i$ is equal to V-φ when facing a Cooperative, and -W+φ when facing a Firm. The switching point of the reaction function is therefore highest when facing a Firm. Figure 2.8 presents this governance externality.[7]

[7] Appendix 2-1 shows this formally.

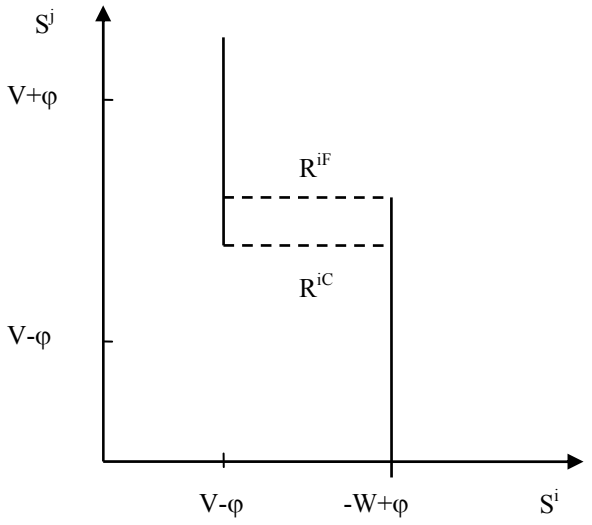


Figure 2.8 Governance externality of architecture j on the screening level choice of a bureau in architecture i

It follows directly from combining the figures 2.7 and 2.8 that the level of $S^j$ at which the discontinuity in the reaction function occurs is lowest for $R^{CC}$ and highest for $R^{FF}$ for all parameter values. The ranking of the level of $S^j$ for the intermediate cases $R^{CF}$ and $R^{FC}$ depends on the parameter values. So, there are only two cases regarding the ranking of switching points of the four reaction functions.

### 2.3.3 Equilibrium Screening Level Choice

The equilibrium screening levels in the second stage of the game depend on the architecture choices in the first stage of the game. Figure 2.9 presents the common features regarding equilibrium screening level choice for *all* industry configurations as a function of V and W, given the level of $\alpha$ and $\beta$.[8] The comparative statistic results regarding the portfolio composition and intensity of competition parameters are straightforward. A worsening of the portfolio, i.e. a lower level of $\alpha$, or an increase in the intensity of competition, i.e. a lower level of $\beta$, decreases the range of parameters for which low screening level V-φ is chosen. Preventing type-II errors becomes more important because the expected benefit of good projects decreases, while the expected costs of bad projects does not decrease.

[8] The appendix 2-2 distinguishes all cases.

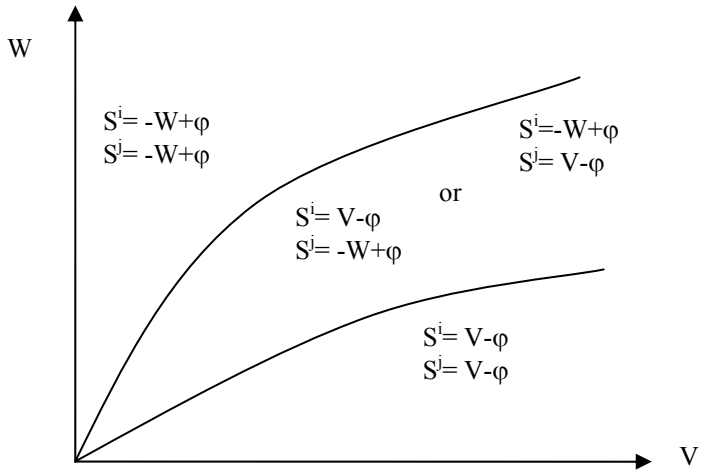


Figure 2.9 Equilibrium screening level choice, i,j=C,F

There are two areas where the equilibrium screening level is the same for both enterprises regardless their choice of architecture. If W is relatively large compared to V, i.e. the portfolio is relatively bad, then the high screening level -W+φ is chosen by each organization in order to prevent that bad projects are accepted. No organization is inclined to depart from this screening level, because the additional expected loss from accepting more bad projects with low screening level V-φ outweighs the additional expected benefit from accepting more good projects. Similarly, if V is relatively large compared to W, i.e. the portfolio is relatively good, then the low screening level V-φ is chosen by each organization in order to prevent that good projects are rejected.

Figure 2.9 shows that there is always a set of values of V and W where one organization chooses the low screening level V-φ and the other the high screening level -W+φ. This result applies to an industry consisting of two Firms, an industry consisting of two Cooperatives, as well as an industry consisting of a Firm and a Cooperative. It is therefore entirely explained by the screening effect. Suppose that both organizations choose their screening level at -W+φ, i.e. they reject all bad projects as well as some good projects. There are values of V and W such that one organization is able to increase its expected payoff by lowering its screening level to V-φ, i.e. all good projects are accepted as well as some bad ones. The advantage of being sometimes a monopolist compensates for accepting once in a while a bad project. However, it is not a Nash equilibrium that both organizations choose V-φ because this would reduce the probability of being a monopolist to such an extent that it does not compensate for the loss associated with the increased

probability of accepting bad projects. Two Cooperatives, or two Firms, in the same industry may exhibit therefore different behaviour, despite having the same ratification structure.

### 2.3.4 Equilibrium Architecture Choice

2.10 presents the strategic form regarding architecture choice, where $Y_{ij}$ is defined as the profit of architecture i facing architecture j. The value of $Y_{ij}$ depends on the equilibrium screening level choice, and therefore on the value of V as well as W. A large number of cases have been identified in the previous section. The Nash equilibrium architecture choice has to be identified in each case.

| Architecture i | Architecture j | |
|---|---|---|
| | Cooperative | Firm |
| Cooperative | $(Y_{CC,}\, Y_{CC})$ | $(Y_{CF,}\, Y_{FC})$ |
| Firm | $(Y_{FC,}\, Y_{CF})$ | $(Y_{FF,}\, Y_{FF})$ |

Figure 2.10 Strategic form of architecture choice game

Figure 2.11 presents the common features regarding equilibrium architecture choice as a function of V and W, given the level of $\alpha$ and $\beta$.[9] Three segments of the parameter space are distinguished and duopoly choices are indicated. For example, (F,C) indicates that the duopoly will consist of one Firm and one Cooperative in equilibrium. Both enterprises choose a Cooperative when the portfolio is relatively good. All good projects will be accepted by Firms as well as Cooperatives when the screening level is V-$\varphi$, i.e. there are no type I errors, but the conservative decision making in a Cooperative is better at preventing type II errors due to its ratification structure of dual screening. Similarly, both enterprises choose a Firm when the portfolio is relatively bad. All bad projects will be rejected by Firms as well as Cooperatives when the screening level is –W+$\varphi$, i.e. there are no type II errors, but the Firm is better at preventing type I errors due to screening only once.

[9] Appendix 2-3 provides the details.

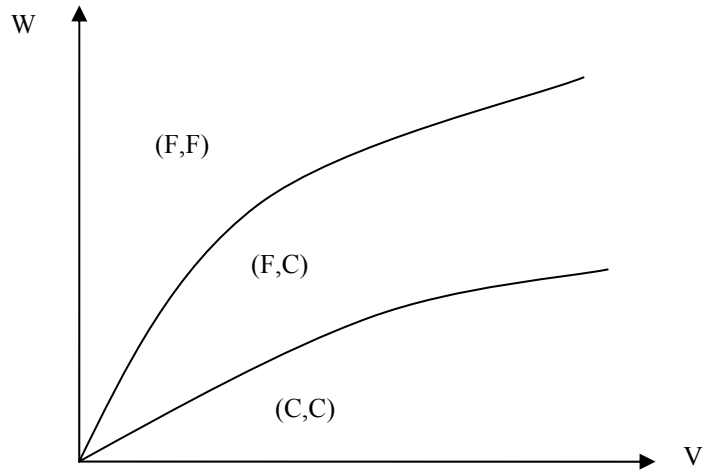


Figure 2.11 Equilibrium architecture choices

Figure 2.11 shows that there is a set of values of V and W where a Cooperative and a Firm coexist in equilibrium. An explanation similar to the explanation of the intermediate region of figure 2.8 applies, but the emphasis is now on the impact of difference in ratification structure. Suppose that both organizations choose a Cooperative. One organization is able to increase its expected payoff by switching to a Firm ratification structure. The advantage of being sometimes a monopolist compensates for accepting more frequently a bad project. However, it is not a Nash equilibrium that both organizations switch to Firm because this would reduce the probability of being a monopolist to such an extent that it does not compensate for the loss associated with the increased probability of accepting bad projects. A Cooperative and a Firm may therefore coexist in the same industry.

The comparative statistc results regarding the intensity of competition are the same as in the monopoly situation. More intense competition, i.e. $\beta$ decreases, reduces the attractiveness of the Cooperative as architecture choice. Equilibrium screening levels are high in a market with intense competition, i.e. all bad projects are rejected. A Firm is the preferred choice of architecture because it commits fewer type I errors than a Cooperative. More intense competition results in less centralized governance structures.[10]

[10] Notice that the equilibrium architecture choices may constitute a prisoners dilemma. There are two possible cases. Either both organizations choosing a Cooperative is a prisoners dilemma when $Y_{CC} < Y_{FF}$, $Y_{FC} < Y_{CC}$, and $Y_{FF} < Y_{CF}$, or both organizations choosing a Firm is a prisoners dilemma when $Y_{CC} > Y_{FF}$, $Y_{FC} > Y_{CC}$, and $Y_{FF} > Y_{CF}$. The first case is not possible.

The assumption regarding the first stage of the game is that architecture choices are made simultaneously. However, there is scope for strategic architecture choice when one organization is able to choose its architecture before the other organization is choosing. According to Fudenberg and Tirole (1984), three variables have to be specified in order to determine the profit maximizing organisational choice/investment in a strategic setting: the nature of investment, the nature of competitive process, and the entry condition. First, define the investment as the extent of decentralized decision-making. A Cooperative is less decentralized than a Firm due to its double screening ratification procedure. More decentralized decision structures entails that more projects are accepted, which will reduce rival firm' profit in a market. Thus, the investment is hard, because it establishes a negative relationship between investment in decentralized decision-making and profits of rival firms. Second, the nature of the competition process is characterized as strategic substitutes (figure 2.6). Third, two cases regarding the condition of market entry have to be distinguished (Fudenberg and Tirole, 1984): entry is inevitable or it is not. However, the payoff maximizing investment choice is the same in both cases when the market is characterized by a hard investment and strategic substitutes. The profit maximizing investment profile is to be aggressive in order to elicit a passive response by the rival, i.e. over-invest in a decentralized ratification procedure, i.e. a Firm.

## 2.4 Conclusion and Further Research

A model is developed to explore how endogenous screening rules affect efficient organizational choices and industrial structures. It is shown that a corporation is prone to accept more investment projects than a cooperative because a cooperative requires approval of the society of members as well as the management of the cooperative. However, lower screening levels are chosen in a cooperative in order to compensate for its hierarchical decision-making structure. Cooperatives are predicted in markets with attractive portfolio compositions because the cooperative is good at rejecting bad projects. Similarly, corporations thrive in markets with bad portfolio compositions because they select good projects more frequently than cooperatives. More intense competition results in less centralized governance structures in order to increase the likelihood of accepting good projects. Screening level choice may therefore outweigh architecture choice. The heterogeneity of behaviour of enterprises with the same governance structure as well as the coexistence of cooperatives and corporations is driven by the same trade-off. The advantage of being more frequently a monopolist compensates for accepting more bad projects.

There are a number of avenues for future research, theoretical as well as empirical. First, the model is geared towards projects, but silent regarding the composition of the diversification portfolio of enterprises. It is important to know in this context what is meant by a project. Screening and ratification may be regarding accepting a new project, or divesting an existing project. The current model does not distinguish these two cases. Second, our result regarding lower screening levels in cooperatives is the same as in Cook (1994, p46), but his rationale is quite different. He states that the more offensive attitude of cooperatives nowadays might be explained by '…A start-up threshold with a lower expected return because of user demand.' Our result is driven by the ratification procedure of a cooperative, whereas his remark seems to be driven by voting of a farmer in order to maximize his portfolio of farm assets rather than the portfolio of assets of the Cooperative. Third, in agriculture markets where cooperatives are active players, drastically increased competition since the 1980s has been reported in the literature. At the same time, many cooperatives are also reported to change the traditional structure in many ways, including switching to investor-owned firm structure or adopting more Firm relevant properties. This is in line with the predictions of the model, but alternative explanations may be formulated. Empirical analyses have to provide guidance.

## Appendix 2-1: Discontinuity in the four reaction functions

This appendix consists of four parts. Section A1.1 determines the payoff maximizing screening level. Section A1.2 and A1.3 show mathematically the difference in the switching points in the figures 2.7 and 2.8. Section A1.4 focuses on the difference between $R^{CF}$ and $R^{FC}$.

*A1 Payoff maximizing screening level*

Denote $R^{ij}$ as the payoff maximizing screening level $S^i$ in architecture i (either F or C), given architecture j (either F or C). Denote $m(X,S^i)$ as the probability that architecture i with screening level $S^i$ accepts a project with payoff X and $n(X,S^j)$ as the probability that architecture j with screening level $S^j$ accepts a project with payoff X. Architecture i will choose its payoff maximizing screening level by

$$\max_{S^i} \alpha m(V,S^i)\left[n(V,S^j)\beta V + \left(1-n(V,S^j)\right)V\right] - (1-\alpha)m(-W,S^i)W ,$$

where

$$m(V,S^i) = \begin{cases} p(V,S^i), when\, i = F \\ p(V,S^i)^2, when\, i = C \end{cases},$$

and

$$m(-W,S^i) = \begin{cases} p(-W,S^i), when\, i = F \\ p(-W,S^i)^2, when\, i = C \end{cases},$$

and

$$n(V,S^i) = \begin{cases} p(V,S^j), when\, j = F \\ p(V,S^j)^2, when\, j = C \end{cases}.$$

Architecture i will either choose V-φ or –W+φ. V-φ is chosen when

$$\begin{aligned} &\alpha m(V,V-\varphi)\left(n(V,S^j)\beta V + (1-n(V,S^j)V)\right) - (1-\alpha)m(-W,V-\varphi)W \\ &\geq \alpha m(V,-W+\varphi)\left(n(V,S^j)\beta V + (1-n(V,S^j)V)\right) - (1-\alpha)m(-W,-W+\varphi)W \\ &\Leftrightarrow \left(1-(1-\beta)n(V,S^j)\right)\alpha V - (1-(1-\beta)n(V,S^j))m(V,-W+\varphi)\alpha V \\ &\quad \geq m(-W,V-\varphi)(1-\alpha)W \\ &\Leftrightarrow 1-(1-\beta)n(V,S^j) \geq \frac{m(-W,V-\varphi)(1-\alpha)W}{(1-m(V,-W+\varphi))\alpha V} \\ &\Leftrightarrow n(V,S^j) \leq \frac{1}{1-\beta} - \frac{m(-W,V-\varphi)(1-\alpha)W}{(1-m(V,-W+\varphi))\alpha(1-\beta)V} \end{aligned} .$$

Thus, we have

$$S^{i^*} = \begin{cases} V-\varphi, when\, n(V,S^j) \le \dfrac{1}{1-\beta} - \dfrac{m(-W,V-\varphi)(1-\alpha)W}{\big(1-m(V,-W+\varphi)\big)\alpha(1-\beta)V} \\ -W+\varphi, otherwise \end{cases} .$$

*A2 Figure 2.7*

The difference in the switching point in figure 2.6 will now be determined. We will look at the impact of a switch in governance structure i on the location of $R^{ij}$, given a specific choice of j. One way to do this it to use the probability n(V, $S^j$) and the fraction $\dfrac{m(-W,V-\varphi)}{1-m(V,-W+\varphi)}$ of the above inequality.

Suppose j=F, i.e. $n(V,S^j) = p(V,S^j) = (V+\varphi-S^j)/2\varphi$ . m(X,$S^i$) depends in this case on i being either F or C.

Suppose i=F, then we have

$$\frac{m(-W,V-\varphi)}{1-m(V,-W+\varphi)} = \frac{(-W+\varphi-(V-\varphi))/2\varphi}{1-\big((V+\varphi-(-W+\varphi))/2\varphi\big)} = \frac{2\varphi-V-W}{2\varphi-V-W} = 1 \cdot$$

Suppose i=C. We have

$$\frac{m(-W,V-\varphi)}{1-m(V,-W+\varphi)} = \frac{[(-W+\varphi-(V-\varphi))/2\varphi]^2}{1-[\big((V+\varphi-(-W+\varphi))/2\varphi\big)]^2} = \frac{2\varphi-V-W}{2\varphi+V+W} < 1 \cdot$$

It means that the range of values of $S^j$ satisfying the inequality is smaller in a Firm than in a Cooperative. It implies that $R^{Cj}$ is left of $R^{Fj}$. This is presented in figure A2-1-1a.

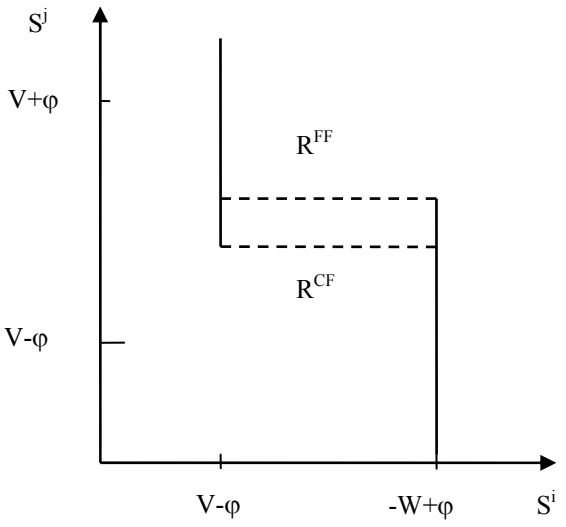


Figure A2-1-1a: Reaction functions $R^{ij}$ when j=F and i=F,C

Another way to determine the location of $R^{ij}$, given a specific choice of j, is to calculate the level of $S^j$ at which the switch occurs. The switching point occurs when the '$\leq$' is equal to '=' in the expression of the payoff maximizing screening level at the end of section A1.1. The discontinuity point of $R^{FF}$ is therefore equal to

$$S^j = V + \varphi - \frac{(\alpha V - (1-\alpha)W)}{\alpha(1-\beta)} 2\varphi \cdot$$

Similarly, the discontinuity point of $R^{CF}$ is therefore equal to

$$S^j = V + \varphi - \frac{(\alpha V - (1-\alpha)\frac{2\varphi - V - W}{2\varphi + V + W} W)}{\alpha(1-\beta)} 2\varphi \cdot$$

Obviously the latter is smaller than the former.

Suppose now that j=C, i.e. $n(V, S^j) = p(V, S^j)^2 = [(V + \varphi - S^j)/2\varphi]^2$ . The discontinuity point in $R^{FC}$ is determined by

$$[(V + \varphi - S^j)/2\varphi]^2 = \frac{1}{1-\beta} - \frac{(2\varphi - V - W)(1-\alpha)W}{(2\varphi - V - W)\alpha(1-\beta)V}, \text{ i.e.,}$$

$$S^j = V + \varphi - \sqrt{\frac{(\alpha V - (1-\alpha)W)}{\alpha(1-\beta)}} 2\varphi \cdot$$

The discontinuity point in $R^{CC}$ is determined by

$$[(V + \varphi - S^j)/2\varphi]^2 = \frac{1}{1-\beta} - \frac{(2\varphi - V - W)(1-\alpha)W}{(2\varphi + V + W)\alpha(1-\beta)V}, \text{ i.e.,}$$

$$S^j = V + \varphi - \sqrt{\frac{(\alpha V - (1-\alpha)\frac{2\varphi - V - W}{2\varphi + V + W} W)}{\alpha(1-\beta)}} 2\varphi \cdot$$

Obviously the latter is lower than the former. Figure A2-1-1b captures it.

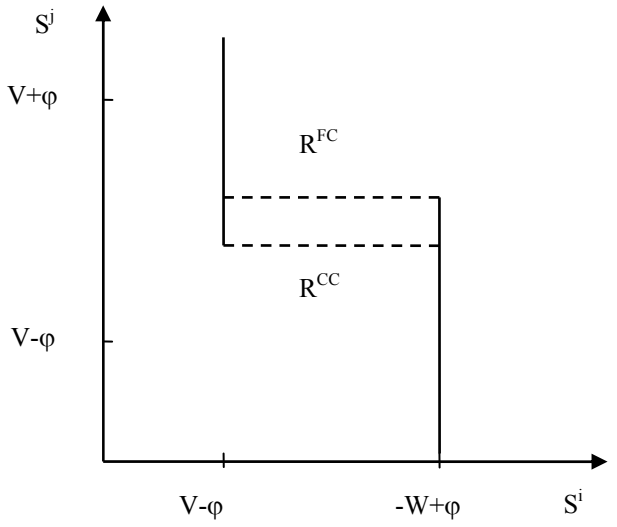


Figure A2-1-1b: Reaction functions $R^{ij}$ when j=C and i=F,C

The two figures are summarized by Figure 2.7 in the text, i.e. the discontinuity point of $R^{Cj}$ is lower than that of $R^{Fj}$.

*A3 Figure 2.8*

The impact of the choice of architecture of the rival firm on the reaction function is determined again by using the inequality of section A1.1.

We have $n(V,S^j) = p(V,S^j)^2 = [(V+\varphi-S^j)/2\varphi]^2$ when j=C, while $n(V,S^j) = p(V,S^j) = (V+\varphi-S^j)/2\varphi$ when j=F.

Let m(.) be fixed, i.e., i is either C or F. The difference between these two cases in term of the inequality of section A1.1 is captured by figure A2-1-2. The range of values of $S^j$ satisfying this inequality, and therefore the payoff maximizing $S^i$ equal to V-φ, is always at least as large for a Cooperative as for a Firm. It implies that $R^{iC}$ is left of $R^{iF}$.

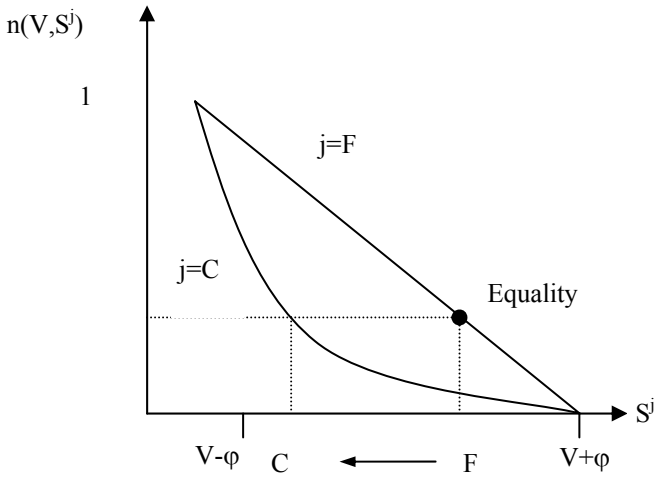


Figure A2-1-2: The impact of the choice of architecture of the rival on the range of values of $S^j$ for which the payoff maximizing screening level in V-φ

Figure A2-1-3a and A2-1-3b capture the cases where i=F and i=C respectively.

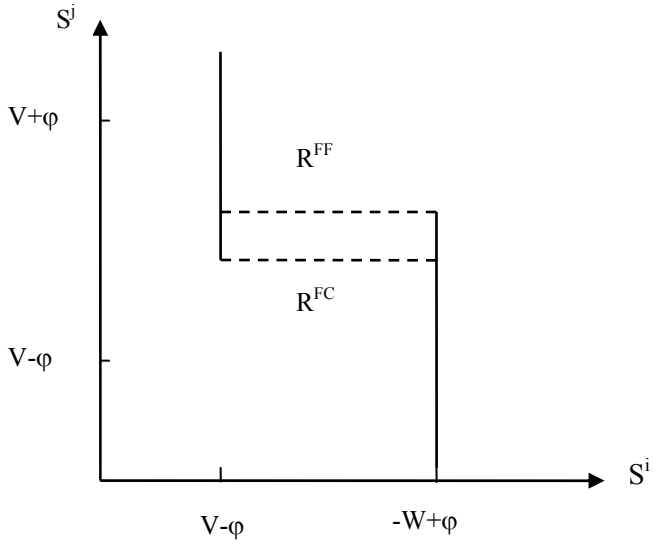


Figure A2-1-3a: Reaction function $R^{ij}$ when i=F and j=F,C

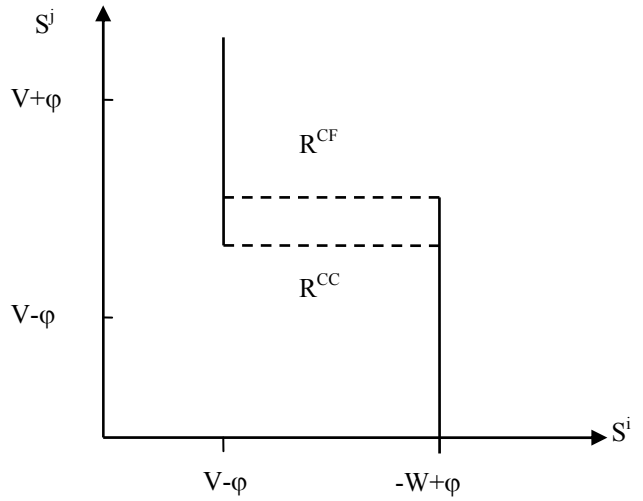


Figure A2-1-3b: Reaction function $R^{ij}$ when i=C and j=F,C

Figure 2.7 in the main text summarizes the above two figures, i.e., the discontinuity point of $R^{iC}$ is lower than that of $R^{iF}$.

*A4 The ranking of the level of $S^j$ of $R^{CF}$ and $R^{FC}$ at which the discontinuity in the reaction function occurs depends on the parameter values*

According to Figure 2.7A and Figure 2.6B, we have $R^{FF}>R^{FC}>R^{CC}$. According to Figure 2.6A and Figure 2.7B, we have $R^{FF}>R^{CF}>R^{CC}$. Thus, the discontinuity point in $R^{FF}$ is the highest, and the discontinuity point in $R^{CC}$ lowest, regardless of parameter values. However, the ranking of the level of $S^j$ of $R^{CF}$ and $R^{FC}$ at which the discontinuity in the reaction function occurs depends on the parameter values. Two cases can be distinguished.

The discontinuity point in $R^{CF}$ is larger than the discontinuity point in $R^{FC}$ when

$$(V+\varphi-\frac{(\alpha V-(1-\alpha)\frac{2\varphi-V-W}{2\varphi+V+W}W)}{\alpha(1-\beta)}2\varphi)\geq(V+\varphi-\sqrt{\frac{(\alpha V-(1-\alpha)W)}{\alpha(1-\beta)}}2\varphi)\,.$$

Denote $\omega=(V+W)/2\varphi$. The above inequality requires that

$$\frac{(\alpha V-(1-\alpha)\frac{1-\omega}{1+\omega}W)}{\alpha(1-\beta)} \le \sqrt{\frac{(\alpha V-(1-\alpha)W)}{\alpha(1-\beta)}}$$

$$\Leftrightarrow \left\{\frac{(\alpha V-(1-\alpha)\frac{1-\omega}{1+\omega}W)}{\alpha(1-\beta)}\right\}^2 \le \left\{\sqrt{\frac{(\alpha V-(1-\alpha)W)}{\alpha(1-\beta)}}\right\}^2$$

$$\Leftrightarrow (1-\alpha)(\frac{1-\omega}{1+\omega}-\alpha(1-\beta))W \ge \alpha(1-\alpha(1-\beta))V.$$

Consequentially, the discontinuity point in $R^{CF}$ is smaller than the discontinuity point in $R^{FC}$ otherwise. It is depicted by the following figure.

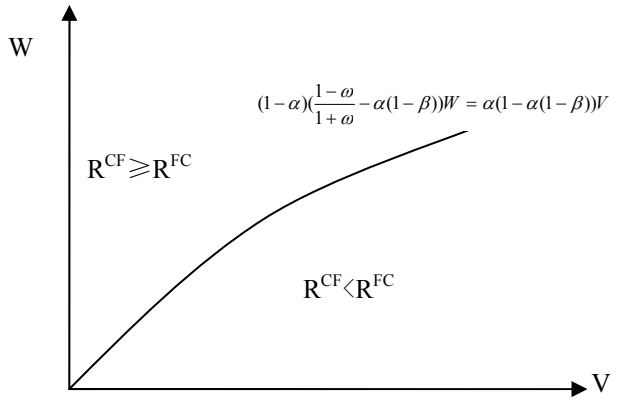


Figure A2-1-4 Ranking of the discontinuity point of $R^{CF}$ and $R^{FC}$

*A5 Reaction function when the portfolio is either very bad or very good*

Reaction function may be vertical when the portfolio is either very bad or very good. When the portfolio is very bad, architecture i will adopt tight screening to prevent type 2 errors, regardless screening choice of rival architecture. When the portfolio is very good, architecture i will adopt loose screening to prevent type 1 errors, regardless screening choice of rival architecture. In other word, for certain values of parameters, the optimum screening level for an architecture will holds as V-φ (–W+φ). In such cases, there is no governance externality. Figure A2-1.5. and A2-1.6 capture these.

In specific, we have

$$S^{F^*} = \begin{cases} V - \varphi, when \dfrac{1}{1-\beta} - \dfrac{(1-\alpha)W}{\alpha(1-\beta)V} \geq 1 \\ -W + \varphi, when \dfrac{1}{1-\beta} - \dfrac{(1-\alpha)W}{\alpha(1-\beta)V} \leq 0 \end{cases},$$

$$S^{C^*} = \begin{cases} V - \varphi, when \dfrac{1}{1-\beta} - \dfrac{(2\varphi - V - W)(1-\alpha)W}{(2\varphi + V + W)\alpha(1-\beta)V} \geq 1 \\ -W + \varphi, when \dfrac{1}{1-\beta} - \dfrac{(2\varphi - V - W)(1-\alpha)W}{(2\varphi + V + W)\alpha(1-\beta)V} \leq 0 \end{cases}.$$

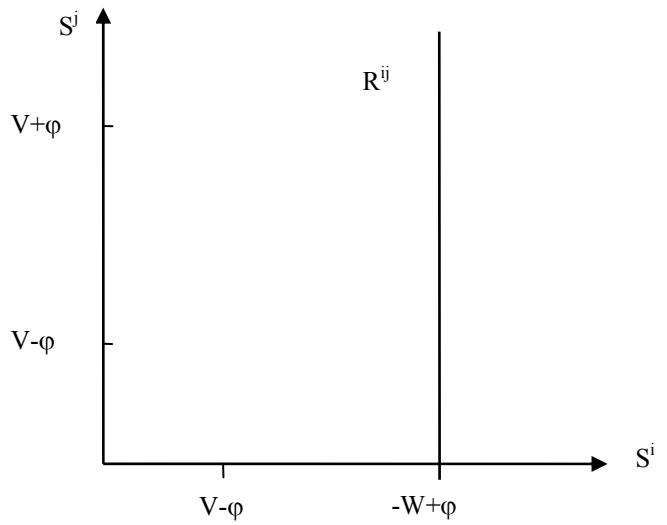


Figure A2-1-5: Reaction function $R^{ij}$ facing a very bad portfolio

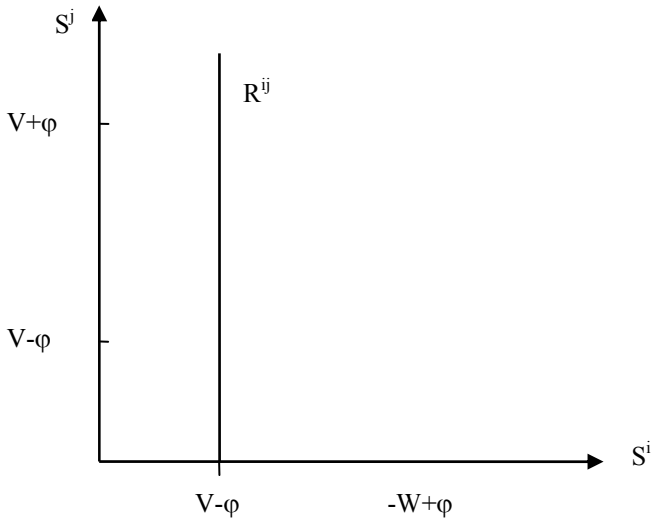


Figure A2-1-6: Reaction function $R^{ij}$ facing a very good portfolio

## Appendix 2-2: Equilibrium screening levels

This appendix consists of four sections. Section A1 depicts all possible market situations. The next three sections reflect that screening level choices are determined in the second stage of the game. The screening level choices are conditional on the choice of architecture in the first stage of the game. There are three possible industry configurations in the first stage of the game: both architectures choose Firm, both architectures choose Cooperative, and the two architectures choose different internal structures. The equilibrium screening levels are determined for each possible combination of architecture choices in the sections A2 to A4.

*A1 Market situations*

The shape of the reaction function $R^{ij}$ implies that there are 5 possible situations. Each market situation has an odd number of equilibria. Figure A2-2-1 presents the market situation with three equilibria, while the figures A2-2-2 to A2-2-5 present various possibilities with one equilibrium.

If there are three equilibria, then the two architectures choose different screening levels in the two pure strategy equilibria. This is reflected in figure A2.2.

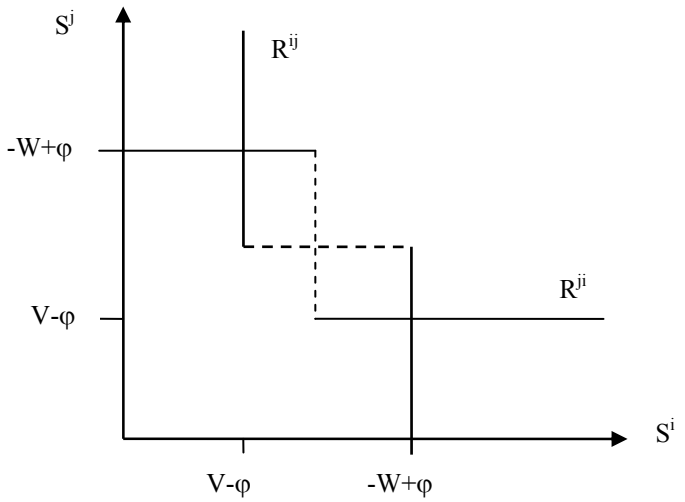


Figure A2-2-1: Three equilibria

Figure A2-2-2 presents a situation with one equilibrium and different screening level choices by the two architectures.

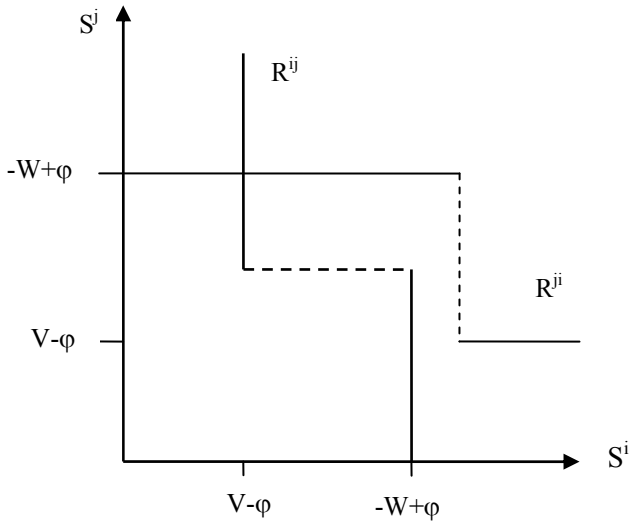


Figure A2-2-2: Architecture i chooses V-φ and architecture j chooses –W+φ

Figure A2-2-3 presents also a situation with one equilibrium and different screening level choices by the two architectures.

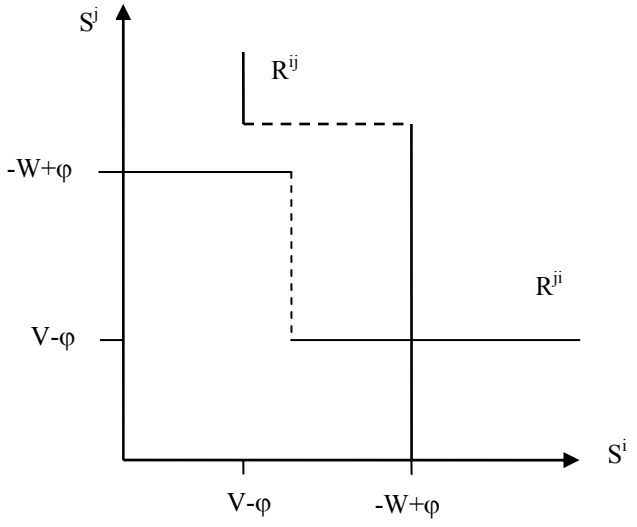


Figure A2-2-3: Architecture i chooses –W+φ and architecture j chooses V-φ

Figure A2-2-4 presents a situation with one equilibrium and both architectures choose the high screening level.

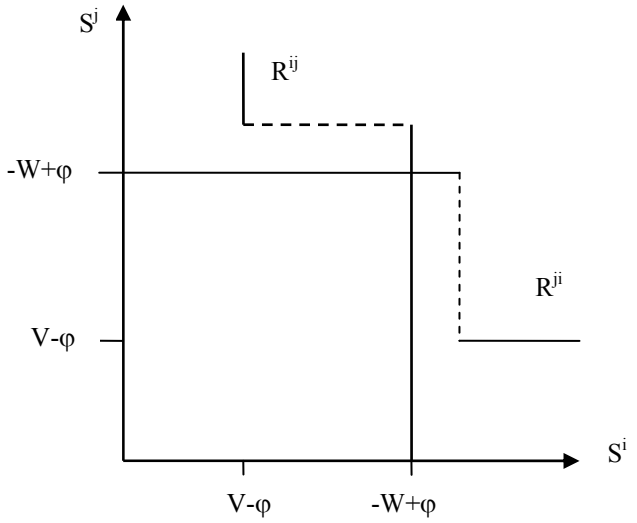


Figure A2-2-4: Both architectures choose –W+φ

Figure A2-2-5 presents a situation with one equilibrium and both architectures choose the low screening level.

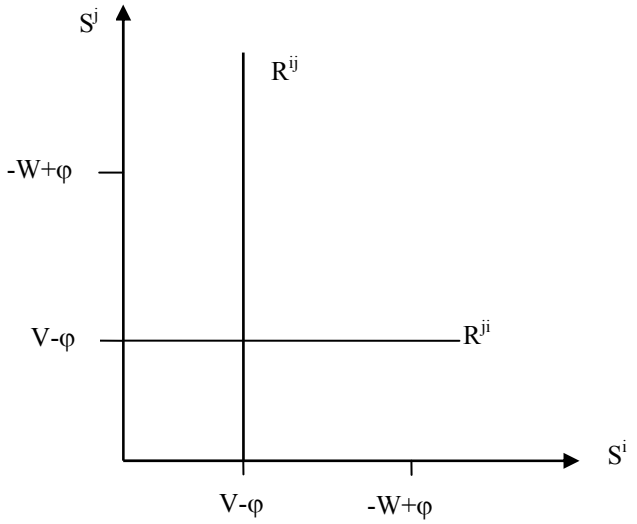


Figure A2-2-5: Both architectures choose V-φ

*A2 Both architectures choose Firm*

Figure A2-2-6 presents the strategic form when both architectures have chosen Firm. Notation is simplified by defining ω = (V+W)/2φ.

| $S^i$ / $S^j$ | V-φ | -W+φ |
|---|---|---|
| V-φ | $(\alpha\beta V-(1-\alpha)(1-\omega)W,\ \alpha\beta V-(1-\alpha)(1-\omega)W)$ | $(\alpha(\omega\beta+(1-\omega))V-(1-\alpha)(1-\omega)W,\ \alpha\beta\omega V)$ |
| –W+φ | $(\alpha\beta\omega V,\ \alpha(\omega\beta+(1-\omega))V-(1-\alpha)(1-\omega)W)$ | $(\alpha\omega(\omega\beta+1-\omega)V,\ \alpha\omega(\omega\beta+1-\omega)V)$ |

Figure A2-2-6: Strategic form when both architectures have chosen Firm

Three cases are distinguished regarding the values of parameters. First, if $\alpha\beta V-(1-\alpha)(1-\omega)W>\alpha\beta\omega V$, and $\alpha(\omega\beta+(1-\omega))V-(1-\alpha)(1-\omega)W>\alpha\omega(\omega\beta+1-\omega)V$, then $S^i$=$S^j$= V-φ. This corresponds with figure A2-2-5. Second, if $\alpha\beta V-(1-\alpha)(1-\omega)W<\alpha\beta\omega V$, and $\alpha(\omega\beta+(1-\omega))V-(1-\alpha)(1-\omega)W>\alpha\omega(\omega\beta+1-\omega)V$, then there are two pure strategy equilibria, i.e., $S^i$=V-φ and $S^j$= -W+-φ, or, $S^i$=-W+-φ and $S^j$=V-φ, and one mixed strategy equilibrium. This corresponds with figure A2-2-1. Third, if $\alpha\beta V-(1-\alpha)(1-\omega)W<\alpha\beta\omega V$, and $\alpha(\omega\beta+(1-\omega))V-(1-\alpha)(1-\omega)W<\alpha\omega(\omega\beta+1-\omega)V$, then $S^i$= $S^j$= -W+-φ. This corresponds with figure A2-2-4. Figure A2-2-7 presents and summarizes these results in terms of the values of good and bad projects.

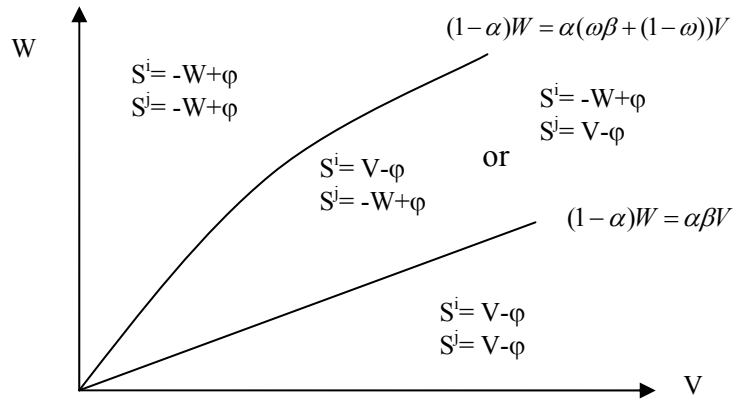


Figure A2-2-7: Equilibrium screening level choice when both architectures have chosen Firm

*A3 Both architectures choose Cooperative*

Figure A2-2-8 presents the payoffs of architecture i and j when both i and j choose Firm.

| $S^i$ \ $S^j$ | V-φ | -W+φ |
|---|---|---|
| V-φ | $(\alpha\beta V-(1-\alpha)(1-\omega)^2 W,$ $\alpha\beta V-(1-\alpha)(1-\omega)^2 W)$ | $(\alpha(\omega^2\beta+(1-\omega^2))V-(1-\alpha)(1-\omega)^2 W,$ $\alpha\beta\omega^2 V)$ |
| –W+φ | $(\alpha\beta\omega^2 V,$ $\alpha(\omega^2\beta+(1-\omega^2))V-(1-\alpha)(1-\omega)^2 W)$ | $(\alpha\omega^2(\omega^2\beta+(1-\omega^2))V,$ $\alpha\omega^2(\omega^2\beta+(1-\omega^2))V)$ |

Figure A2-2-7: Strategic form when both architectures have chosen Cooperative

Three cases are distinguished regarding the values of parameters. First, if $\alpha\beta V-(1-\alpha)(1-\omega)^2 W>\alpha\beta\omega^2 V$, and $\alpha(\omega^2\beta+(1-\omega^2))V-(1-\alpha)(1-\omega)^2 W>\alpha\omega^2(\omega^2\beta+(1-\omega^2))V$, then $S^i$=$S^j$= V-φ. This corresponds with figure A2-2-5. Second, if $\alpha\beta V-(1-\alpha)(1-\omega)^2 W<\alpha\beta\omega^2 V$, and $\alpha(\omega^2\beta+(1-\omega^2))V-(1-\alpha)(1-\omega)^2 W>\alpha\omega^2(\omega^2\beta+(1-\omega^2))V$, then there are two pure strategy equilibria, i.e., $S^i$=V-φ and $S^j$= -W+-φ, or, $S^i$=-W+-φ and $S^j$=V-φ, and one mixed strategy equilibrium. This corresponds with figure A2-2-1. Third, if $\alpha\beta V-(1-\alpha)(1-\omega)^2 W<\alpha\beta\omega^2 V$, and $\alpha(\omega^2\beta+(1-\omega^2))V-(1-\alpha)(1-\omega)^2 W<\alpha\omega^2(\omega^2\beta+(1-\omega^2))V$, then $S^i$= $S^j$= -W+-φ. This corresponds with figure A2-2-4. Figure A2-2-8 presents and summarizes these results in terms of the values of good and bad projects.

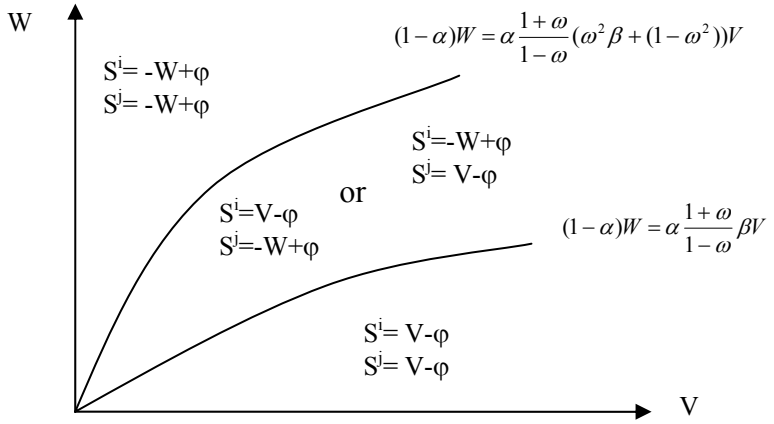

Figure A2-2-9: Equilibrium screening level choice when both architectures have chosen Cooperative

*A4 One Firm and one Cooperative*

Without loss of generality, we assume architecture i chooses Firm and architecture j chooses Cooperative. The payoffs are shown in the strategic form in Figure A2-2-10.

| $S^j$ / $S^i$ | V-φ | -W+φ |
|---|---|---|
| V-φ | $(\alpha\beta V-(1-\alpha)(1-\omega)^2 W,$ $\alpha\beta V-(1-\alpha)(1-\omega)W)$ | $(\alpha(\omega\beta+(1-\omega))V-(1-\alpha)(1-\omega)^2 W,$ $\alpha\beta\omega V)$ |
| –W+φ | $(\alpha\beta\omega^2 V,$ $\alpha(\omega^2\beta+(1-\omega^2))V-(1-\alpha)(1-\omega)W)$ | $(\alpha\omega^2(\omega\beta+(1-\omega))V,$ $\alpha\omega(\omega^2\beta+(1-\omega^2))V)$ |

Figure A2-2-10: Strategic form when one architectures has chosen Firm and the other Cooperative

The values of parameters can be grouped by four lines, i.e., line 1 characterized by $(1-\alpha)W=\alpha\frac{1+\omega}{1-\omega}(1-(1-\beta)\omega)V$, line 2 characterized by $(1-\alpha)W=\alpha(1-(1-\beta)\omega^2)V$, line 3 characterized by $(1-\alpha)W=\alpha\frac{1+\omega}{1-\omega}\beta V$, and line 4 characterized by $(1-\alpha)W=\alpha\beta V$. It is easy to see that line 4 is the lowest line. Ranking of the rest three lines, which reflects different combination of parameter values, remains to be determined.

Technically, there are 6 possible ranking situations (in descending order), i.e., line 1,2,3; line 1,3,2; line 2,1,3; line 2,3,1; line 3,1,2; line 3,2,1. The latter three situations are impossible, because line 1 is always higher than line 3.

The ranking of line 2,1,3 requires that line 2 is higher than line 1, which means that $[(1+\omega)/(1-\omega)][1-(1-\beta)\omega)]<[1-(1-\beta)\omega^2]$, i.e., $[(1+\omega)\omega-(1-\omega)\omega^2)]\beta<0$. It is possible because $\omega$ and $\beta$ are non-negative. Thus, only first two rankings are possible. Ranking of line 1,2,3 is captured by figure A2-2-11a, whereas ranking of line 1,3,2 is captured by figure A2-2-11b.

Figures A2-2-11a and A2-2-11b capture the equilibria depending on the values of parameters. Figure A2-2-11a applies when $\beta < (1+\omega)(1-\omega)^2/(1+\omega-(1-\omega)\omega^2)$, i.e. competition is intense, while figure A2-2-11b applies when $\beta > (1+\omega)(1-\omega)^2/(1+\omega-(1-\omega)\omega^2)$, i.e. competition is not intense.

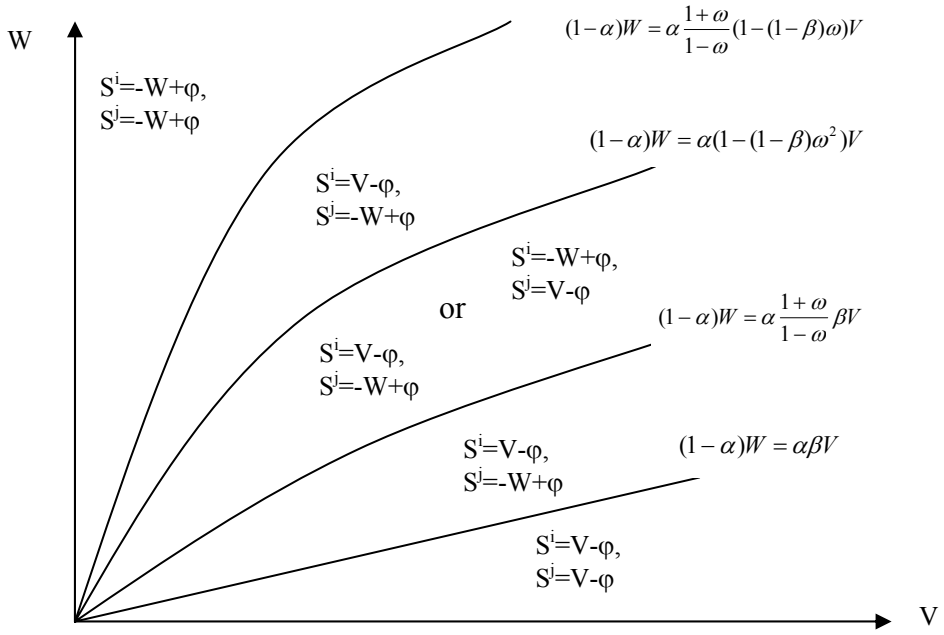


Figure A2-2-11a: Equilibrium screening level choice when one architecture has chosen Firm and the other Cooperative and competition is intense

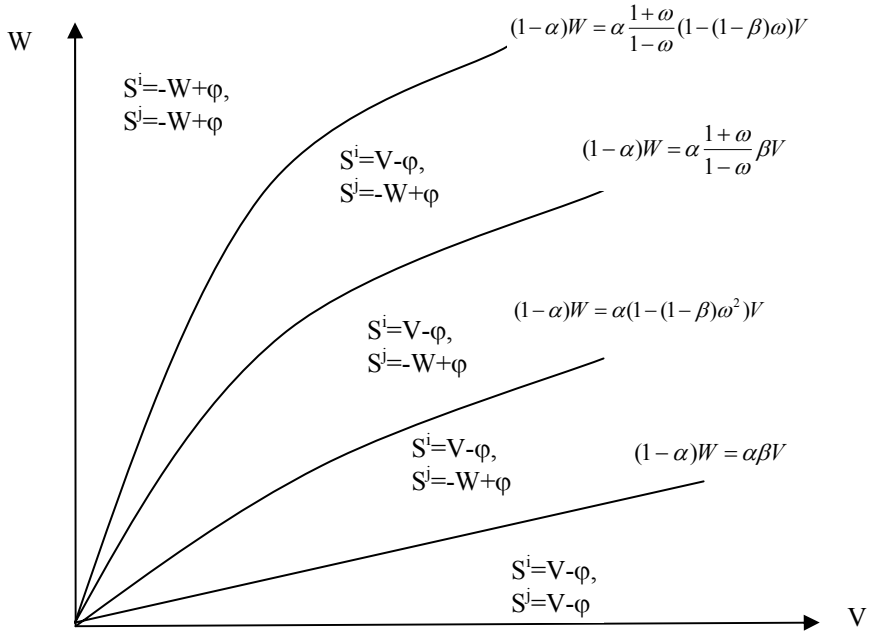


Figure A2-2-11b: Equilibrium screening level choice when one architectures has chosen Firm and the other Cooperative and competition is not intense

## Appendix 2-3: Equilibrium architecture choice

We distinguish three cases regarding the values of the parameter variables. The architecture choice at equilibrium will be calculated in the following.

*A1 the values of the parameters satisfying the sub-game Nash equilibrium screening level (V-φ, V-φ)*

In this case, both organizations choose loose screening level V-φ in order to maximize its payoff. Define the expected payoff for one organization as $Y_{ij}$, where ij means firm i (either F or C) facing the competition of firm j (either F or C). Loose screening implies entails that both organizations accept all good projects and accept some bad projects as well, i.e. p(V, V-φ)=1 and 0<p(-W, V-φ)<1.

Figure A2-3-1 summarizes the payoffs in the payoff matrix when the equilibrium screening level is (V-φ, V-φ).

| Architecture i | Architecture j | |
|---|---|---|
| | Cooperative | Firm |
| Cooperative | $(\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)^2W,$ $\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)^2W)$ | $(\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)^2W,$ $\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)W)$ |
| Firm | $(\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)W$ , $\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)^2W)$ | $(\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)W,$ $\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)W)$ |

Figure A2-3-1 Payoff matrix when the equilibrium screening level is (V-φ, V-φ)

Given its rival choosing the architecture of Cooperative, the expected payoff maximizing architecture for the organization is Cooperative, because $Y_{CC}>Y_{FC}$. Given its rival choosing Firm, the expected payoff maximizing architecture for the organization is still Cooperative, because $Y_{CF}>Y_{FF}$. In sum, if organizations are rational and try to maximize their expected payoffs, choosing investor owned firm is one dominant strategy. Therefore, (C,C) constitutes Nash equilibrium.

The economics behind this is that there are no type I errors when organizations choose loose screening levels V-φ. It is important to prevent type II errors in this case. Since Cooperative is good at preventing type I errors, it immediately follows that two organizations will both choose the architecture of Cooperative to increase their expected payoffs. No organization has motives to deviate from such an outcome, which constitutes exactly what is defined as Nash equilibrium.

It is worth pointing out that the market structure of (C,C) is also an efficient structure in this case. In case that the equilibrium screening levels are low enough to accept all good projects, reject bad projects as much as possible will bring more profits from the perspective of whole society. Since Cooperative is good at preventing type II errors, the market structure consisting of two Cooperative choosing loose screening level is more efficient than any other industrial structures.

*A2 the values of the parameters satisfying the sub-game Nash equilibrium screening level (-W+φ, -W+φ)*

In this case, both organizations choose tight screening level (-W+φ,-W+φ) in order to maximize its payoff. Tight screening entails that both organizations reject all bad projects while reject some good projects as well, i.e., p(-W, -W+φ)=0 and 0<p(V, -W+φ)<1.

Figure A2-3-2 summarizes the payoffs in the payoff matrix when the sub-game Nash equilibrium is (-W+φ,-W+φ).

| Architecture i | Architecture j | |
|---|---|---|
| | Cooperative | Firm |
| Cooperative | $(\alpha p(V,-W+\varphi)^2[1-(1-\beta)p(V,-W+\varphi)^2]V,$ $\alpha p(V,-W+\varphi)^2[1-(1-\beta)p(V,-W+\varphi)^2]V)$ | $(\alpha p(V,-W+\varphi)^2[1-(1-\beta)p(V,-W+\varphi)]V,$ $\alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)^2]V)$ |
| Firm | $(\alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)^2]V,$ $\alpha[1-(1-\beta)]V-(1-\alpha)p(-W,V-\varphi)^2W)$ | $(\alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)]V,$ $\alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)]V)$ |

Figure A2-3-2 Payoff matrix when the equilibrium screening level is (-W+φ,-W+φ)

Given its rival choosing the architecture of Cooperative, the expected payoff maximizing architecture for the organization is Firm, because $Y_{FC}>Y_{CC}$. Given its rival choosing Firm, the expected payoff maximizing architecture for the organization is still Firm, because $Y_{FF}>Y_{CF}$. In sum, if organizations are rational and try to maximize their expected payoffs, choosing investor owned firm is one dominant strategy. Therefore, (F,F) constitutes Nash equilibrium.

The economics behind this is that there are no type II errors when both organizations choose tight screening level $-W+\varphi$. It is therefore important to prevent type I errors in this case. Since Firm is good at preventing type I errors, it immediately follows that two organizations will both choose the architecture of Firm to increase their expected payoffs. No organization has motives to deviate from such an outcome, which constitutes exactly what is defined as Nash equilibrium.

Notice that both organizations choosing a Firm may constitute a prisoners dilemma. It happens when $Y_{CC} > Y_{FF}$, $Y_{FC} > Y_{CC}$, and $Y_{FF} > Y_{CF}$.

*A3 the values of the parameters satisfying the sub-game Nash equilibrium screening level (V-φ, -W+φ)*

In this case, sub-game Nash equilibrium is either *(V-φ, -W+φ)* or *(-W+φ, V-φ )* for organization i and j. Without loss of generality, suppose that organization i choose tight screening $-W+\varphi$ and organization j choose loose screening $v-\varphi$ at equilibrium. It entails that firm i rejects all bad projects while firm j accepts all good projects, i.e. 0<p(V, -W+φ)<1 and p(-W, -W+φ)=0 for organization i, and, p(V, V-φ)=1 and 0<p(-W, V-φ)<1 for organization j.

Figure A2-3-3 presents the payoffs in the payoff matrix.

| Archi-tecture i | Architecture j | |
|---|---|---|
| | Cooperative | Firm |
| Coop | $(\alpha p(V,-W+\varphi)^2[1-(1-\beta)]V,$ $\alpha[1-(1-\beta)p(V,-W+\varphi)^2]V-(1-\alpha)p(-W,V-\varphi)^2W)$ | $(\alpha p(V,-W+\varphi)^2[1-(1-\beta)]V,$ $\alpha[1-(1-\beta)p(V,-W+\varphi)^2]V-(1-\alpha)p(-W,V-\varphi)W)$ |
| Firm | $(\alpha p(V,-W+\varphi)[1-(1-\beta)]V,$ $\alpha[1-(1-\beta)p(V,-W+\varphi)]V-(1-\alpha)p(-W,V-\varphi)^2W)$ | $(\alpha p(V,-W+\varphi)[1-(1-\beta)]V,$ $\alpha[1-(1-\beta)p(V,-W+\varphi)]V-(1-\alpha)p(-W,V-\varphi)W)$ |

Figure A2-3-3 Payoff matrix when the equilibrium screening level is (-W+φ, V-φ)

Let us check the payoff maximizing strategy for organization i first. Given its rival choosing the architecture of Cooperative, the expected payoff maximizing architecture for the organization is Firm, because $Y_{FC}>Y_{CC}$. Given its rival choosing Firm, the expected payoff maximizing architecture for the organization is still Firm, because $Y_{FF}>Y_{CF}$. Thus, organization i has a dominant strategy regardless its rival' strategies, i.e. Firm.

Now the payoff maximizing strategy for organization j remains to be solved. Similarly, given its rival choosing Cooperative, the expected payoff maximizing architecture is Cooperative, because $Y_{CC}>Y_{FC}$. Given its rival choosing Firm, the expected payoff maximizing architecture is still Cooperative, because $Y_{CF}>Y_{FF}$. Therefore, organization j also has a dominant strategy regardless its rival' strategies, i.e. Cooperative.

In sum, if organizations are rational and try to maximize their expected payoffs, (F,C) constitutes Nash equilibrium when organization i chooses tight screening and organization j chooses loose screening.

This result can be explained from another approach. For organization i, this situation is very similar to the monopoly situation, except that V has to be replaced by βV. Because there are no type II errors, preventing type I errors are significant. Consequentially, the architecture of Firm is preferred because it is good at preventing type I errors. On the contrast, there are no type I errors for organization 2. Because there are no type I errors, it is important to prevent type II errors and thus the architecture of Cooperative is preferred. Therefore, (F, C) constitutes the equilibrium architecture choice.

## Appendix 2-4: Strategic architecture choice

In this appendix we will examine if strategic considerations may influence firms' architecture choice. Assume now one firm acts first. It has to decide if it should take Firm or Cooperative. Its action will be observed by the other firm. The other firm decides, after observing the exiting firm's decision, if it would enter market or not, and in the case of entering market which architecture form it should take. The figure 2-4-1 gives the extensive form of this game.

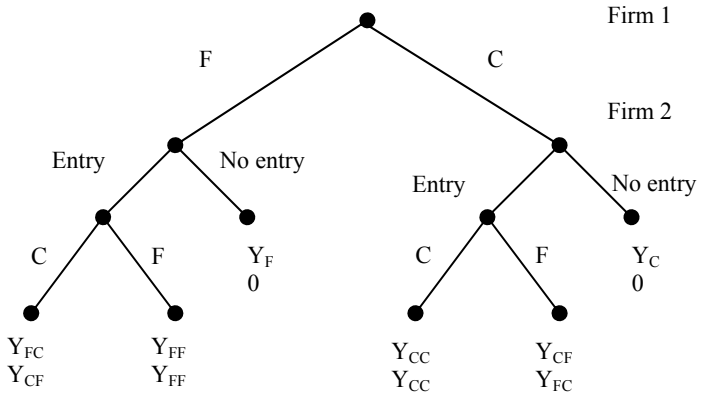


Figure 2-4-1 Extensive form of strategic choice game

*A1The values of the parameters satisfying the sub-game Nash equilibrium screening level (V-φ, V-φ)*

If firm 2 decides to enter the market, firm 2 will choose C because there are no type 1 errors and Cooperative is good at preventing type 2 errors. However, firm 2 may not enter the market.

If firm 1 takes Firm, then firm 2 enter the market, if and only if $Y_{CF}>0$, i.e.,

$$\begin{aligned} Y_{CF} &= \alpha p(V, V-\varphi)^2[1-(1-\beta)p(V, V-\varphi)]V-(1-\alpha)p(-W, V-\varphi)^2 W > 0 \\ &\Leftrightarrow \alpha\beta V > (1-\alpha)[(-W+\varphi-(V-\varphi))/2\varphi]^2 W \\ &\Leftrightarrow (1-\alpha)W < \alpha\beta\,(1/(1-\omega)^2)V. \end{aligned}$$

If firm 1 take Cooperative, then firm 2 enter the market, if and only if $Y_{CC}>0$, i.e.,

$$Y_{CC} = \alpha p(V,V-\varphi)^2[1-(1-\beta)p(V,V-\varphi)^2]V-(1-\alpha)p(-W,V-\varphi)^2W > 0$$
$$\Leftrightarrow \alpha\beta V > (1-\alpha)[(-W+\varphi-(V-\varphi))/2\varphi]^2 W$$
$$\Leftrightarrow (1-\alpha)W < \alpha\beta(1/(1-\omega)^2)V.$$

It means that firm 2 will enter the market as Cooperative no matter whether firm 1 take Firm or Cooperative, when $(1-\alpha)W < \alpha\beta(1/(1-\omega)^2)V$; otherwise, firm 2 will choose No Entry. However, the latter situation is possible, because the subgame Nash equilibrium is not (V-φ, V-φ) when $(1-\alpha)W \geq \alpha\beta(1/(1-\omega)^2)V$.

Thus, market entry is inevitable in this case, and firm 2 chooses Cooperative. Firm 1 is as in monopoly case except that all benefits have to be shared with firm 2. Thus, firm 1 will choose Cooperative because Cooperative is good at preventing type 2 errors. Figure 2-4-2 captures the above equlibria.

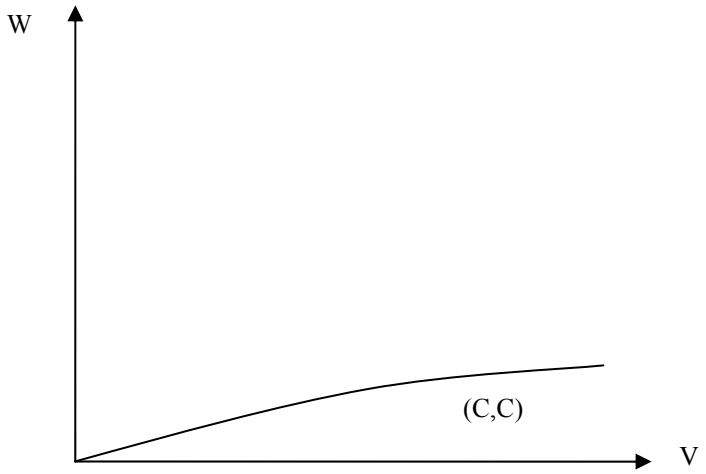


Figure 2-4-2: Strategic architecture choices by an existent firm and an entrant firm when the parameters satisfy the subgame Nash equilibrium (V-φ, -W+φ)

*A2 The values of the parameters satisfying the sub-game Nash equilibrium screening level (-W+φ, -W+φ)*

If firm 2 decides to enter the market, firm 2 will choose Firm because there are no type 2 errors and Firm is good at preventing type 1 errors. However, firm 2 may not enter the market.

If firm 1 takes Firm, then firm 2 enter the market as Firm, if and only if $Y_{FF}>0$, i.e.,

$$Y_{FF} = \alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)]V-(1-\alpha)p(-W,-W+\varphi)W > 0$$
$$\Leftrightarrow \alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)]V > 0.$$

The above inequality will always hold. It means that firm 2 will enter market as long as it observes firm 1 taking Firm.

If firm 1 take Cooperative, then firm 2 enter the market as Firm, if and only if $Y_{FC}>0$, i.e.,

$$Y_{FC} = \alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)^2]V-(1-\alpha)p(-W,-W+\varphi)W>0$$
$$\Leftrightarrow \alpha p(V,-W+\varphi)[1-(1-\beta)p(V,-W+\varphi)^2]V>0.$$

It is obvious too that the above inequality always holds. It means that firm 2 enters the market as Firm as long as it observes firm 1 taking Cooperative.

In sum, market entry is inevitable and firm 2 will enter market as Firm. Since market entry is not evitable, firm 1 will choose Firm because $Y_{FC}>Y_{CC}$ when there is no type 2 errors. Figure 2-4-3 captures the above equilibrium.

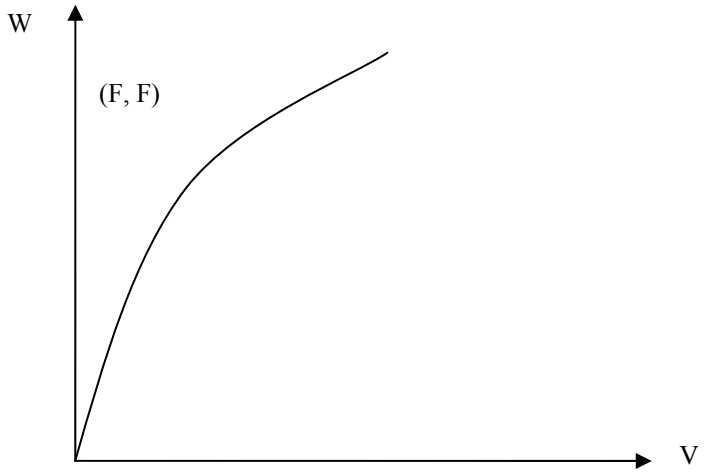


Figure 2-4-3: Strategic architecture choices by an existent firm and an entrant firm when the parameters satisfy subgame Nash equilibrium (V-φ, -W+φ)

*A4.3 the values of the parameters satisfying the sub-game Nash equilibrium screening level (V-φ, -W+φ)*

Consider first firm 1 takes Cooperative. For firm 2, we have

$$Y_{FF} = \alpha p(V,-W+\varphi)[p(V,V-\varphi)\beta V+(1-p(V-\varphi))V]-(1-\alpha)p(-W,-W+\varphi)W$$
$$=\alpha p(V,-W+\varphi)[1-(1-\beta)]V,$$
$$Y_{CF} = \alpha p(V,-W+\varphi)^2[p(V,V-\varphi)\beta V+(1-p(V,V-\varphi))V]-(1-\alpha)p(-W,-W+\varphi)^2W$$
$$=\alpha p(V,-W+\varphi)^2[1-(1-\beta)]V.$$

It follows immediately that firm 2 will choose F, as long as it decides to enter the market. However, firm may not enter the market. Firm 2 will choose No Entry, if and only if

$$Y_{FC} < 0 \Leftrightarrow \alpha p(V,-W+\varphi)\left[1-(1-\beta)p(V,V-\varphi)^2\right] < 0.$$

It is obvious that the above inequality will never hold. It means that firm 2 will enter the market as Firm as long as it observes that firm 1 chooses Cooperative.

Assume now firm 1 take Firm. For firm 2, we have

$$\begin{aligned}
Y_{FF} &= \alpha p(V,V-\varphi)[p(V,-W+\varphi)\beta V + (1-p(V,-W+\varphi))V] - (1-\alpha)p(-W,V-\varphi)W \\
&= \alpha[1-(1-\beta)p(V,-W+\varphi)]V - (1-\alpha)p(-W,V-\varphi)W, \\
Y_{CF} &= \alpha p(V,V-\varphi)^2[p(V,-W+\varphi)\beta V + (1-p(V,-W+\varphi))V] - (1-\alpha)p(-W,V-\varphi)^2 W \\
&= \alpha[1-(1-\beta)p(V,-W+\varphi)]V - (1-\alpha)p(-W,V-\varphi)^2 W.
\end{aligned}$$

It follows immediately that firm 2 will choose Cooperative, as long as it decides to enter the market. However, firm may not enter the market. Firm 2 will choose No entry, if and only if

$$\begin{aligned}
&Y_{CF} < 0 \Leftrightarrow \alpha[1-(1-\beta)p(V,-W+\varphi)]V - (1-\alpha)p(-W,V-\varphi)^2 W < 0 \\
&\Leftrightarrow \alpha\left[1-(1-\beta)\left|(V+\varphi-(-W+\varphi))/2\varphi\right|\right]V - (1-\alpha)((-W+\varphi-(V-\varphi))/2\varphi)^2 W < 0 \\
&\Leftrightarrow (1-\alpha)W > \alpha[(1-(1-\beta)\omega)/(1-\omega)^2]V.
\end{aligned}$$

Thus, when $(1-\alpha)W > \alpha[(1-(1-\beta)\omega)/(1-\omega)^2]V$, firm 2 will choose NO Entry after observing that firm 1 choose Firm; and, firm 2 will choose Cooperative otherwise.

Because firm 1 can expect what firm 2 acts too, it will take Firm when $(1-\alpha)W > \alpha[(1-(1-\beta)\omega)/(1-\omega)^2]V$, if and only if

$$\begin{aligned}
Y_F > Y_{CF} &\Leftrightarrow \alpha p(V,-W+\varphi)V - (1-\alpha)p(-W,-W+\varphi)W \\
&> \alpha p(V,V-\varphi)^2[1-(1-\beta)p(V,-W+\varphi)]V - (1-\alpha)p(-W,V-\varphi)W \\
&\Leftrightarrow (1-\alpha)p(-W,V-\varphi)W > \alpha[1-\beta p(V,-W+\varphi)]V \\
&\Leftrightarrow (1-\alpha)[(-W+\varphi)-(V-\varphi)/2\varphi]W > \alpha[1-\beta((V+\varphi-(V-\varphi))/2\varphi)]V \\
&\Leftrightarrow W > [\alpha/(1-\alpha)][(1-\beta\omega)/(1-\omega)]V.
\end{aligned}$$

Firm 1 will take Firm when $(1-\alpha)W \le \alpha[(1-(1-\beta)\omega)/(1-\omega)^2]V$, if and only if

$$
\begin{aligned}
Y_{FC} > Y_{CF} &\Leftrightarrow \alpha p(V,-W+\varphi)[1-(1-\beta)p(V,V-\varphi)^2]V-(1-\alpha)p(-W,-W+\varphi)W \\
&> \alpha p(V,V-\varphi)^2[1-(1-\beta)p(V,-W+\varphi)]V-(1-\alpha)p(-W,V-\varphi)^2W \\
&\Leftrightarrow (1-\alpha)p(-W,V-\varphi)^2W > \alpha(1-2\beta)p(V,-W+\varphi)V \\
&\Leftrightarrow (1-\alpha)[(-W+\varphi-(V-\varphi)/2\varphi]^2W > \alpha(1-2\beta)((V+\varphi-(-W+\varphi))/2\varphi)]V \\
&\Leftrightarrow (1-\alpha)W > \alpha[(1-2\beta)/(1-\omega)]V.
\end{aligned}
$$

Figure 2-4-4 captures the above equlibria.

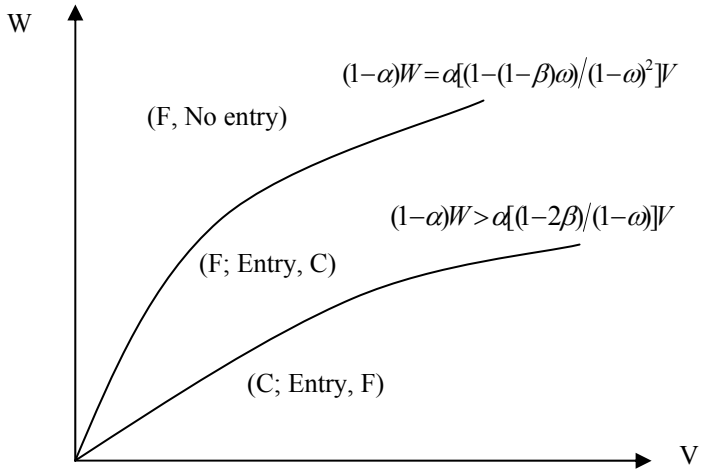


Figure 2-4-4: Strategic architecture choices by an existent firm and an entrant firm when the parameters satisfy subgame Nash equilibrium (V-φ, -W+φ)

*A 4 Summary*

Figure 2-4-4 summarizes strategic architecture choices by an existent firm and an entrant firm in three cases.

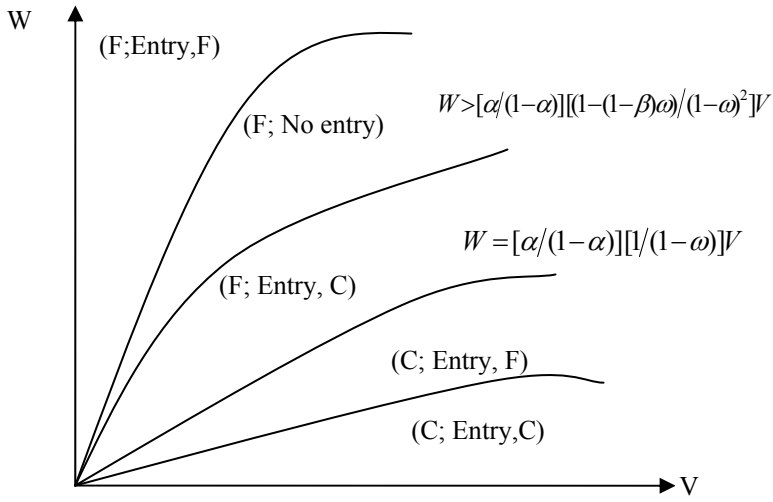


Figure 2-4-5: Strategic architecture choices by an existent firm and an entrant firm

# 3 Organization and Strategy of Farmer Specialized Cooperatives in China

## 3.1 Introduction

The economic organization of agriculture is a timely research topic. Among other organizational forms, cooperatives have always been a prominent organizational form. Broadly defined, a cooperative is an organizational form of many independent growers (horizontal relationship) who jointly own a downstream processor / retailer (vertical relationship). Cooperatives are important to agriculture in developed as well as developing countries. For example, there are 132,000 cooperatives with 83.5 million members and 2.3 million employees in the European Union in 2001, 47,000 cooperatives with 100 million members in the United States of America in 2001, and 94,771 cooperatives with 1,193 million members in China in 2002.

Studying agricultural cooperatives in China is of particular interest for three reasons. First, as noted by new institutional economists such as North and Williamson, the *institutional environment* interacts with the governance structure of firms. Menard and Klein (2004, p.750) point out, 'These background conditions should not be regarded merely as constraints that hamper modernization. They also create incentives for the discovery of more efficient modes of organization. Comparing firms across different institutional environments to see what settings facilitate organizational innovation and what settings hamper it contributes dramatically to our understanding of the dynamics of a market economy'. The institutional environment in a transition country like China is quite different from those in developed countries such as U.S.A and Western European countries. China provides the necessary variety in institutional environment in order to gain insight in the relationship between the governance of enterprises and the institutional environment.

China's economy is unique in many aspects. There are more than 200 million farmer households (i.e. a vast population of 0.8 billion farmers), each farming a plot of land that is similar to a garden plot elsewhere. For these small farmers, a major problem in the transition period is the breakdown of the relationships of the farm with input suppliers and output markets. They face serious constraints in accessing essential inputs, such as feed, fertilizer, seed, capital, and in selling their products. Our main research question is therefore: How are the new farmer specialized cooperatives in China organized?

This descriptive question will be addressed at three levels. They are inspired by the levels of institutional analysis distinguished by Williamson (2000). The most general level is Embeddedness, where informal institutions, customs, traditions, norms, and religion are at the center of analysis. Change occurs only once in 100-1000 years. The Institutional Environment is concerned with the formal rules of the game, like bureaucracy, polity, and the judiciary. Change occurs in 10-100 years. Governance is about contracting and aligning governance structures with transactions. Changes occur in a time frame of 1-10 years. The first level requires investigating whether the Chinese cultural and institutional background matters for the cooperative as a governance structure? We will provide a brief history of farmer cooperatives in China.

Second, compared with stock listed corporations, cooperatives have their own salient characteristics such as member-ownership and member-control (Staatz 1987; Vataliano 1983; Cook 1995; Hendrikse 1998; Hendrikse and Veerman 1997). However, these characteristics are described and examined mainly against the background of developed economies/agricultural sectors. Are these characteristics also descriptive of agricultural cooperatives in countries in *transition*? Since the late 1980s, new farmer cooperative organizations have emerged and developed rapidly all over China. These new cooperative organizations are quite different from the cooperatives in the 1950s and 1960s. What are the governance structure choices in these cooperative organizations? What are the factors driving such choices?

Third, appropriately organizing the farmers into the agricultural *chain of production*, transaction and consumption will not only benefit farmers but also benefit the overall performance of the economy. As China entered WTO, world industrial markets as well as agricultural markets have been affected by this vast economy. The study on how to organize and position Chinese farmers in agricultural supply chains is meaningful for the health of the Chinese economy as well as the world economy. Are Chinese cooperative organizations a feasible organizational form to the organization of farmers in an increasingly global agri-food supply chain? We address this question from the perspective of systems of attributes (Milgrom and Roberts 1995). Attributes like decision rights, income rights, quality control systems and branding are distinguished.

Addressing these questions contributes to the literature on comparative institutional analysis as well as to the theory of the firm. The article is organized as follows. Section 2 describes the history of farmer cooperatives in China (2.1), i.e. Institutional Environment, and Chinese society (2.2), i.e. Embeddedness in the terminology of Williamson (2000). This provides the background for our study. Section 3 is institutional analysis at the level of Governance. It presents the data regarding 66 farmer cooperatives in Zhejiang province. In section 4, we will enrich the observations of section 3 by

describing the interaction between the attributes governance structure, strategy, and quality control system of a specific cooperative. In section 5, we look at these developments from a number of theoretical perspectives and formulate various conclusions. Section 6 concludes.

## 3.2 Farmer Cooperatives in China during the Last Century

This section consists of two parts. We start with a brief history regarding cooperatives in China in subsection 2.1. Subsection 2.2 is dedicated to a number of observations regarding Chinese society because it plays a role in understanding farmer cooperatives in China.

### 3.2.1 One Century of Cooperatives in China

Cooperative organizations are not new phenomena in China. Their history dates back to the beginning of the twentieth century. Five periods are distinguished. First, cooperatives emerged in some part of China as early as in 1920s. Cooperatives experienced a rapid increase from 722 in 1928 to 168,864 in 1948 (Du 2002, p.299). There is no detailed information regarding farmer cooperatives during this period, but it is clear that they were quite different from what we see today. One main reason is land ownership. Independent farmer households were the conventional farming units in the rural China. Landlords owned 40% of the cultivated rural land, and leased it to farmer households at a very high rent. The rent was often as high as 50% of the value of the crops.

Second, New China was established by the Communist Party coming to power in 1949. The central government gradually confiscated land from landlords and rich farmers, and then distributed it for free to poor and landless farmers. At the same time, to help farmers, who were short of tools and skills, to grow crops efficiently, various kinds of cooperative organizations were set up, motivated and later even directly organized by the government, to pool resources. Among many cooperative forms, 'the Mutual Aid Team' was most popular. On the basis of voluntary participation, four or five neighboring households pooled farm tools and draft animals and exchanged labor on a temporary or permanent basis, while land and harvests still belongs to individual households. From 1949 to 1955, the cooperative form of 'Mutual Aid Team' was adopted as the primary way to pool resource in order to increase production.

Third, from 1955 to 1979, the so-called 'Cooperative Movement' took place, and cooperative organizations were gradually deprived of their voluntary character and became a way for the government to centrally control and manage agricultural production, exchange and consumption. Agricultural production became collectivized. The

'Elementary Co-operative' emerged in 1954 and was the main choice of farmers during 1954 to 1956. Compared to the Mutual Aid Team, more households (normally 20 or 30) participated in the Elementary Co-operative, and members pooled their land, besides farm tools and draft animals, together under a unified management. The net income of the co-operative was distributed according to two principles: one payment for the input of land, draft animals, and farm contributed by each member; one payment for the labor input by each member. In this period, the attitude towards the cooperative development was cautious, and farmers were encouraged to participate in different kinds of cooperative organizations on voluntary basis.

Among the various cooperative forms, 'the Advanced Co-operative' emerged around 1955, having a number of salient characteristics. All means of production including land were collectively owned, and members worked according to centralized management, and remuneration was solely based on the labor input from each member. In 1955, the central government decided to accelerate the pace of collectivization. As a result, the voluntary participation principle was deliberately omitted and farmers were persuaded or forced to participate in the Advance Co-operative. From 500 Advance Co-operatives in 1955, the number rose toward 753,000 in 1957, covering 119 million households.

In 1958 a new form of cooperative, the so-called 'People's Commune' was introduced and played a decisive role in rural areas until 1978. One 'People's Commune' consisted of about 30 Advanced Cooperatives and consisted of, on average, 5,000 households and 10,000 acres of cultivated land. Unified production, management and distribution were adopted within the People Commune. Initially, payments in the commune was based partly according to subsistence needs and partly according to the work performed. However, delegation of production and management to smaller units, i.e. the 'Production Team' which consisted of about 20-30 neighboring households, occurred in 1962. Since then, production teams were the basic producing, operating and accounting unit. Team members grow crops together, and working time was recorded under the title of 'Working Points'. At the end of year, income was distributed to individual members according to accumulated working points. The system of collective farming remained until 1979.[11]

Under the system of collective farming, supplying of farming inputs, producing and selling products are all centrally planned by governments. The so-called 'Supplying and Marketing Cooperatives' in rural areas were government organizations which supplied inputs and consumption goods to farmers. Agricultural products were collected and

[11] The cooperative organizations in 1960s and 1970s were not farmer-owned and farmer-controlled by nature. They turned into government or quasi-government organizations performing both economic and political functions.

distributed by governments, and were normally not allowed to trade freely in markets. In general, before 1980s, the 'Unified Purchasing and Supplying System' (UPSS, i.e. 'tong-gou-tong-xiao' in Chinese) was adopted as the basic institution governing government and farmers regarding producing sales of agricultural products until early 1980s.[12]

Fourth, China started an economic and political transition in 1978. Central planning of economic activities was gradually transformed to a market-oriented system. This ongoing institutional change has far-reaching influences for individuals as well as organizations. Firstly, the collective-based farming has been substituted by family-based farming. The Household Responsibility System (HRS) was initially adopted in 1978 by the farmers in An'hui province and provided the farmers with temporary control and income rights to land. The HRS is characterized by collective ownership of land on the one hand and farmer households as independent producing units on the other hand. The land is collectively owned by villages, while is leased to the households according to the number of people and workers in a household. The tenure specified in the contract was set to be one to three years at first, and then was extended to 15 years. In 2002, the contract duration for a new round was re-extended to 30 years. The contract specifies the household's obligations to fulfill state procurement quotas and to pay various forms of local fees and taxes. The household then retains any residuals in excess of the stated obligations. It induces strong incentives for farmers to work and invest in the leased land. For example, as the reforms spread rapidly across the other parts of the rural areas, farm output rose by more than 30% in six years.

Secondly, the centrally planned agri-food purchasing and supplying system was gradually transformed to a market-oriented system. As the reform on rural land went on, UPSS was progressively abandoned by the government to encourage free trade in agricultural markets. As early as 1982, the government encouraged farmers to sell products in markets. In 1985, the central government decided to cancel UPSS.[13] Since then, the government purchases grain and cotton by contracting, and pork, sea-food, vegetables and other products are open to free trade.

As China transits from centrally-planned economy to market-oriented economy, traditionally small farmers are facing a new situation. Under the old collective producing and distribution system, farmers did not decide what to produce, how much to produce, and how to sell products. In the transitory period, they have to make these decisions by themselves. However, it is not easy to successfully make such decisions. The survival of

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[12] The central government decided to take 'planned purchasing and planned supplying' on oil agri-products and grain on November 1953, and expanded the planning spectrum to include cotton on September 1954. The policy issued on August 1955 specified the details.

[13] 'Ten Policies on Further Activate Rural Economy', issued by the Central Committee of the Communist Party and State Council on January 1, 1985, specified the details.

farmers depends on how, and to what extent, they meet the demands of final consumers. It implies that they have to produce efficiently on the one hand, and to predict and meet market demands on the other hand. However, it is well known that small farmers lack access to inputs, technology, information, and markets. This puts them in a weak position in supply chains. Choosing appropriate strategies, which provide the access to inputs, technology, information, and markets and to added value of supply chain, is therefore crucial to them.

Motivated by the new situation since the 1980s, new cooperative organizations emerged in many provinces of China in the late 1980s. At the beginning, the cooperative organizations, called the 'Technology Association', were established to communicate and promote new technologies among farmers. Local technologists, big specialized growers, and science associations were major players initiating and organizing such cooperative organizations. As the reform of the agricultural product circulation system proceeded in the 1980s, more farmer cooperative organizations emerged. Some cooperative organizations operate across different production stages, such as supplying agricultural inputs and/or selling products. At the same time, more players are involved in establishing cooperative organizations, such as large processing enterprises, state-owned supplying and marketing cooperatives, local rural governments, and villages etc. Since the 1990s, the development of cooperative organizations is speeding up in many provinces. Up to 2004, the number of new cooperative organizations is more than 150,000 (RDI CASS and RSECT NBSC [14], p157).

The new cooperative organizations that have emerged since the 1980s may take different forms. In general, we can distinguish two basic forms: farmer specialized associations and farmer specialized cooperatives. Farmer specialized associations account for 65% and farmer specialized cooperatives account for 35% of the 150,000 cooperative organizations in 2004 (RDI CASS and RSECT NBSC, p.157). The main difference between the two forms is the ownership of fixed assets and performing functions like production, marketing, or processing. In general, specialized cooperatives are registered at the Administration of Industry and Commerce, have fixed assets, and are like cooperatives in western countries in terms of their production, marketing, and processing activities. Farmer specialized associations are registered at the Civil Affairs Bureau, have no fixed assets, charge no membership fee, provide some technical assistance, and share information. However, this distinction is too crude. The Farmer Specialized Association' (FSA) is a very broad name, which consists of very large association supplying technology,

[14] RDI CASS is the abbreviation for Rural Development Institute Chinese Academy of Social Sciences, and RSECT NBSC is the abbreviation for Rural Social and Economic Census Team National Bureau of Statistics of China.

information, to thousands or tens of thousand members as well as very small associations communicating technology and experience among several farmers. Some specialized associations are even cooperative enterprises and acts just like specialized cooperatives. This overlap can be explained partly by the fact that the cooperative law in China is quite new. The national cooperative law was enforced on 1 July, 2007. At the provincial government level, local laws on cooperatives are also limited. The first local cooperative law was enacted by the Zhejiang provincial government in January 2005. It needs more time to normalize cooperative organizations.

### 3.2.2 Chinese Society

Farmers choose a certain organizational form (i.e., a governance structure) to realize a fair return on investment. This choice is not independent of the society in which the farmer lives. It is important to realize that a person is not only a natural or economic person, but also a social person. He (she) lives in a society, which can be viewed as a nexus of various relations. This is particularly true for Chinese farmers with characteristics like community life, influence of traditional culture, and the imperfections of the current market system. There are three basic ways for most of Chinese farmers to participate in the society. The first is kinship, i.e., the relations between an individual and his or her spouse, parents, sisters and brothers, and cousins. The second is social relations, i.e., the relations between an individual and his or her friends, classmates, and colleagues. The third is potential relations, i.e., the relations between an individual and strangers; it is actually based on the first two relations.

The origin and development of farmer cooperatives in China have therefore an informal institutional background based on relations. The kinship (or relation) plays an important role in the cooperatives. First, as an organization based on the rural communities, the farmer cooperative is characterized by kinship. Second, the kinship is an important way for Chinese farmers to access to various resources. It's particularly important at the initial stage of farmer cooperatives. Third, the governance and operation of farmer cooperatives also relies on the principle of kinship. It's a principle combining kin, loyalty and abilities. Therefore, it's natural for the farmer cooperatives to have some characteristics of traditional social relations in the process of their development and operation. Such rural social relations are combined by kinship and market rules. A lot of farmer cooperatives in Zhejiang province find an effective balance in such social relations. The internal transaction costs based on such relations is quite low.

### 3.2.3 Farmer Cooperatives in the Zhejiang Province

This section presents the data of a sample of 66 farmer cooperatives in Zhejiang province in China. Zhejiang province is located south of Shanghai, with 46 million inhabitants. It was the pilot province for farmer specialized cooperative organizations chosen by the Ministry of Agriculture, China. To a certain extent, the institutional arrangement of farmer cooperatives in Zhejiang not only reflects the common characteristics of farmer cooperatives in the coastal areas of China, but may also represent the development trend of farmer specialized cooperatives in China.

Farmer cooperatives in Zhejiang have experienced a rapid development since 1990s. Like other regions in China, Zhejiang's farmer cooperatives can be divided into specialized cooperatives and specialized associations. Both specialized cooperatives and specialized associations have increased rapidly, however, specialized cooperatives increase at faster rate than specialized associations. The farmer specialized cooperatives increased from 791 in 2002 to 1,789 in 2004. The number of farmer specialized associations was 1,019 in 2004. The total number of the farm households joined in farmer cooperatives reached 554,000 and the total number of the farm households involved in farmer cooperatives reached 2,029,500 in 2004.[15]

Table 3.1 Ownership structure of 66 sample cooperatives

| Co-ops | No. of member | No. of share-holder | Capital stock [¥] | Per-capita capital stock [¥] | Share-holders to members | $R_1$ | $R_3$ | $R_5$ | $R_8$ | $R_{10}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Max value | 1000 | 812 | 7010000.00 | 584166.67 | 1.00 | 0.82 | 1.00 | 1.00 | 1.00 | 1.00 |
| Min value | 36 | 2 | 6800.00 | 47.22 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 |
| Mean value | 259 | 102 | 365089.00 | 23001.77 | 0.45 | 0.25 | 0.44 | 0.55 | 0.64 | 0.67 |
| Standard deviation | 216 | 145 | 896312.41 | 75027.32 | 0.42 | 0.22 | 0.29 | 0.32 | 0.32 | 0.32 |

A sample of 66 farmer specialized cooperatives was chosen randomly from the Zhejiang province. Data regarding membership and ownership were collected by face to face interviews and archival research. Table 3.1 shows the number of members, the number of shareholders, the capital stock, the capital stock per-capita, the ratio of shareholders to all members and the shareholding concentration rate.[16]

[15] Source: Zhejiang Provincial Department of Agriculture.

[16] Shareholding concentration ($Ri$) refers to the ratio of the sum of the capital stock owned by the top $i$ member(s) in a descending sort to the total capital stock in a cooperative. In

Several observations can be formulated regarding table 3.1. Firstly, in our sample of 66 farmer cooperatives, the size of cooperatives varies a lot. In terms of membership, the largest cooperative has 1,000 members, while the smallest cooperative has just 26 members. In terms of capital stock, the cooperatives vary from as low as 6,800 yuan to over 7 million yuan. Table 3.2 provides the additional information regarding the size distribution of cooperatives. The number of cooperatives with more than 500 members and the cooperatives with less than 100 members are limited. Over half of cooperatives have more than 100 and less than 200 members.

Table 3.2 Interval distribution of number of members

| No. of members | ＞800 | ＞500 | ＞300 | ＞200 | ＞100 | ＞50 | ＞0 |
|---|---|---|---|---|---|---|---|
| No. of co-ops | 4 | 8 | 20 | 27 | 62 | 65 | 66 |
| Frequency [%] | 6.06 | 12.12 | 30.30 | 40.91 | 93.94 | 98.48 | 100.00 |

Secondly, according to table 3.1, all cooperatives have shareholders. However, the numbers of shareholders of the sample cooperatives varies also drastically. The number of shareholders varies from 2 to 812. Table 3.3 illustrates the interval distribution of the number of shareholders in our sample. The cooperatives with more than 200 shareholders and those with less than 5 shareholders are fairly limited. 20 cooperatives, almost one third of the sample, have between 100 and 200 shareholders; 26 cooperatives, over one third of the sample, have between 5 and 30 shareholders.

Table 3.3 Distribution of the number of shareholders

| No. of shareholders | ＞200 | ＞100 | ＞50 | ＞30 | ＞10 | ＞5 | ＞0 |
|---|---|---|---|---|---|---|---|
| No. of co-ops | 9 | 29 | 31 | 34 | 48 | 60 | 66 |
| Frequency [%] | 13.64 | 43.94 | 46.97 | 51.52 | 72.73 | 90.91 | 100.00 |

Thirdly, the capital stock of the cooperatives varies between 7,000 and 7,000,000 yuan; and the per-capita capital stock varies between 50 and 50,000 yuan. Table 3.4 shows the interval distributions of capital stock and per-capita capital stock. Regarding capital stocks, only two cooperatives held a capital stock of more than 1,000,000 yuan, and the cooperatives with a capital stock of more than 500,000 yuan are limited. For about one

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detail, $R_m = \sum_1^m X_i \Big/ \sum_1^n X_i \ (m \le n)$; Where *Xi* refers to the sum of the capital stock owned by the top *i* member in a descending sort; where *N* refers to the number of cooperative members.

third of the cooperatives, their capital stock is between 10,000 and 200,000 yuan. Regarding per-capita stock, about one third of cooperatives have more than 10,000 yuan per-capita capital stock, and about one third of cooperatives have a per-capita capital stock between 1,000 and 5,000 yuan. There is only one cooperative with less than 100 yuan per-capita capital stock, and there are quite a few cooperatives whose per-capital capital stock is between 100 and 1,000 yuan.

Fourthly, shareholding among members is pervasive. However, member shareholding varies a lot. The rate of shareholders to members is as large as 1 at one extreme and as small as 0.01 at the other extreme, with the mean value being equal to 0.45 (see column 6, table 3.2). Table 3.5 further shows the detailed information on members' shareholding. There are strong contrasts on the member shareholding structures in the sample. In 21 cooperatives, the rate of shareholder members to all members is higher than 90%; in 24 cooperatives, this rate is lower than 10%, and in 15 cooperatives, this rate is between 10% and 50%. These cooperatives therefore can be divided into two groups: one group with high member shareholding, and the other group with low member shareholding.

Table 3.4 Interval distributions of capital stock and per-capita capital stock

| Capital stock [10,000¥] | ＞100 | ＞50 | ＞20 | ＞10 | ＞5 | ＞1 | ＞0 |
|---|---|---|---|---|---|---|---|
| No. of co-ops | 2 | 8 | 27 | 42 | 54 | 65 | 66 |
| Frequency [%] | 3.03 | 12.12 | 40.91 | 63.64 | 81.82 | 98.48 | 100.00 |
| Capital stock per-capita [¥] | ＞10000 | ＞5000 | ＞1000 | ＞500 | ＞200 | ＞100 | ＞0 |
| No. of co-ops | 21 | 26 | 54 | 60 | 62 | 65 | 66 |
| Frequency [%] | 31.82 | 39.39 | 81.82 | 90.91 | 93.94 | 98.48 | 100.00 |

Table 3.5 Interval distribution of the proportion of shareholder members to all members

| Proportion of shareholder members to all members | >0.9 | >0.8 | >0.7 | >0.6 | >0.5 | >0.4 | >0.3 | >0.2 | >0.1 | >0.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of Co-ops | 21 | 23 | 25 | 27 | 27 | 28 | 28 | 36 | 42 | 66 |
| Frequency [%] | 31.83 | 34.85 | 37.88 | 40.91 | 40.91 | 42.42 | 42.42 | 54.55 | 63.64 | 100 |

Fifthly, shareholding is not uniformly distributed among shareholders, and large shareholders' dominance in the provision of capital is salient. Table 3.1 shows, on average,

the top 5 largest shareholders account for 50% of the provision of capital in a cooperative, and the top 10 largest shareholders contribute for almost two thirds of the capital stock. Table 3.6 further captures how shareholdings are concentrated in cooperatives. In 11 cooperatives, the largest shareholder provides more than 50% of equity capital; in 25 cooperatives, the top three largest shareholders provide more than 50%; the top 5 largest shareholders provide more than 50% of equity capital in half of the sample cooperatives.

Table 3.6 Concentration of shareholding

| | $R_m$> 0.9 | $R_m$ > 0.8 | $R_m$> 0.7 | $R_m$> 0.6 | $R_m$ > 0.5 | $R_m$ > 0.4 | $R_m$ > 0.3 | $R_m$ > 0.2 | $R_m$ > 0.1 | $R_m$ > 0.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| $R_1$ | 0 | 1 | 4 | 5 | 11 | 17 | 21 | 26 | 45 | 66 |
| $R_3$ | 5 | 9 | 15 | 20 | 25 | 31 | 39 | 47 | 59 | 66 |
| $R_5$ | 14 | 18 | 24 | 28 | 33 | 40 | 47 | 57 | 59 | 66 |
| $R_8$ | 22 | 26 | 31 | 37 | 40 | 49 | 53 | 58 | 60 | 66 |
| $R_{10}$ | 26 | 31 | 35 | 40 | 42 | 51 | 55 | 58 | 62 | 66 |

In sum, most cooperatives are small; shareholding is pervasive among most cooperatives; the cooperatives are usually composed of a minority of core members (usually big shareholders) and a majority of common members (usually users or patrons); the cooperatives can be generally divided into two types: one is with a minority of members as its shareholders; the other is with a majority or all members as its shareholders. For most cooperatives, shareholding is quite concentrated; big shareholders play a dominant role in providing capital.

## 3.3 Wenling City Ruo-heng Watermelon Cooperative

In this section, we will examine a specific cooperative in the Zhejiang province in order to enrich the observations of the previous section. Wenling City Ruo-heng Watermelon Cooperative (we call it Ruo-heng watermelon cooperative hereafter) is located in Ruoheng town, Wenling city, Zhejiang province.[17] It was initiated in July 2001 by 29 farmers including the present General Director, and was registered as a share-cooperative enterprise by the local Industry and Commerce Administration in February 2002. The main

[17] Wenling is a city of 780,000 citizens in Zhejiang province, China; Ruoheng is a town south of Wenling.

business of the cooperative involves growing and selling watermelons.[18] In 2004, it had 129 members with the fixed capital of 2.96 million Yuan.

Organizations, and therefore cooperatives, can be characterized in many different ways. We adopt the systems of attributes characterization of Holmstrom and Milgrom (1994). Three clusters of attributes are distinguished in describing this cooperative: governance structure (4.1), quality control system (4.2), and strategy (4.3). We conclude the section by paying attention to the complementarities between these attributes (4.4).

### 3.3.1 Governance Structure

We follow Hansmann (1996) by distinguishing decision and income rights of a governance structure. Decision rights specify who directs the firm's activities, i.e. the allocation of authority. Various decision rights in Ruo-heng watermelon cooperative will be described, like membership composition, share contribution requirement, restricted ownership, delivery rights, quasi-individual ownership title, formal versus real authority, and member involvement. Income rights specify who appropriates the net earnings of the enterprise, i.e. delineate incentives.

#### 3.3.1.1. Decision Rights

Ruo-heng watermelon cooperative has 129 members. Most members are watermelon growers and about 20 members are watermelon sellers. The cooperative requires all members to buy shares, where the number of the shares which members have to buy is determined by the planting scale. The larger the planting scale is, the more shares a member has to buy. However, the maximum shareholding for one member is set to be 20%.

Membership is closed in this cooperative. Although the charter stipulates the membership policy as 'free entry and free exit', the practice of membership is different. On the one hand, to become a member, farmer growers have to reach a certain scale of growing watermelons and have to meet a certain technical requirement. The cooperative is very cautious to accept new members. For example, the cooperative will monitor the performance of a potential member for one year before making a final decision. On the other hand, to leave the cooperative, current members are required to submit a written application to the cooperative. The member can get their equity investment back when the application to leave is accepted by the board of directors. However, current members are not allowed to leave when the cooperative is experiencing losses.

[18] It also sells farming medicines, fertilizer, etc as a side business.

Delivery rights are restricted in Ruo-heng watermelon cooperative. Firstly, delivery rights are restricted in terms of quality requirements. Members have rights to deliver products to the cooperative, but their products must meet ex ante specified quality standards. Sample inspection and internal grading will be used to distinguish high quality products from low quality products. Secondly, delivery rights are restricted in sense that the delivery amount for one member is almost ex ante determined.

Although Ruo-heng watermelon cooperative is collectively owned by members, each member's claim on the cooperative seems to be clearly defined. Firstly, individual members' ownership is specified in terms of shares. Members are required to buy shares according to their planting capability/expected patronization. Secondly, the cooperative allows the members to participate in decision making according to shareholding structure. The one-member-one-vote principle is substituted by the restricted one-share-one-vote principle. The latter voting rights will motivate members to collect/commute information to participate in management of cooperatives. Thirdly, shares can be redeemed when members quit cooperative. Thus, members can get back his financial stakes in cooperatives. These facts illustrate that the ownership title is not strictly collective. However, the ownership title can not be viewed as individual either. Property rights in the cooperative can not be traded outside the cooperative. When transferring the property rights within the cooperative, it is the board of directors, not the involved members, having the power to decide whether the transaction can be performed. In sum, the ownership title in the cooperative is a hybrid-form between individual one and collective one. 'Quasi-individual' may be a suitable name.

Ownership defines the allocation of formal authority. Figure 3.1 captures how formal authority is allocated in this cooperative. It resides with the member (representative) assembly. The (representative) assembly provides members with formal channels to revise organizational charters, elect and/or replace board members, determine finance and development plan, determine total share-value, per-share-value and the maximum number of shares purchased by one member, decide issues regarding merger, cooperation, etc. The member assembly will meet once or twice a year. When it is difficult for all members to come all together, members elect the representatives. The representative members constitute the representative assembly. Representative members have a three-year term and could be re-elected for many terms. Members participate in the (representative) member assembly by a restricted 'one-share-one-vote' principle. Voting rights are based on 'one-share-one-vote', but one member has at most 20 votes. The decision making process in the (representative) member assembly is by a qualified majority. A decision is reached when more than 2/3 of the votes are in favour.

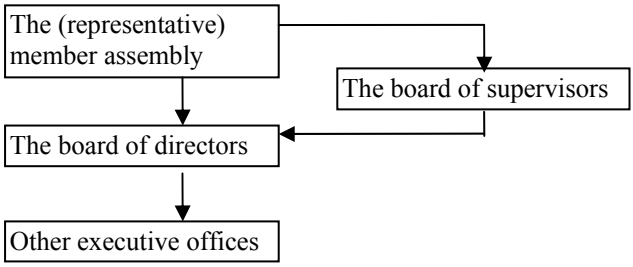


Figure 3.1 Allocation of formal authority

Although formal authority clearly resides with the members and the assembly, real authority may reside with the others. Actually, many decisions have to be delegated to other groups. Normally, these groups include the board of directors and/or a group of managers. In Ruo-heng Watermelon Cooperative, the board of directors is having effective control of the cooperative. The board consists of three members, and they are elected by the general assembly. The General Director is elected by the board and is the legal representative of the cooperative.

The board of supervisors is assigned with the rights to monitor the board of directors. The board of supervisors consists of 3 members elected by the (representative) member assembly. The supervisor members have a three-year term and can be re-elected for multiple terms. The supervisor members are expected to be independent from director members, thus, the charter clearly stipulates that the current director members and recently retired members and their relatives can not be supervisor members.

Table 3.7 Allocation of decision power to non-Director members

| | No extent or to a very limited extent | To some extent | To large extent |
|---|---|---|---|
| Input decision | × | | |
| Quantity decision | | | × |
| Price decision | × | | |
| Quality standards decision | | | × |
| Accounting system decision | | × | |
| Advertisement decision | | | × |
| Technology training decision | | | × |
| Investment decision | | | × |
| Financing decision | | × | |
| Recruiting decision | | × | |

The allocation of real authority may vary widely within one formal organizational arrangement. This issue is illustrated by the outcome of a short questionnaire on the involvement of non-director members in decision making. The results are summarized in table 3.7.

First, members give up their decision rights regarding inputs and price to director members. The cooperative requires standardization of production by members. What inputs are to be used, and how/when to use them are contracted ex ante between the cooperatives and members. For the cooperative, this is a method to control quality of products; for the members, they like to give up such decision rights to gain technical guidance on how to produce and to acquire inputs such as fertilizers and seeds supplied by the cooperative at production costs. The members give up their decision rights regarding price because their production scale is small and the inefficiencies in information collection. For member growers, small production scale implies that it is costly to collect market information and it is hard to access markets. In contrast, the cooperatives have better capabilities to gather and analyze market information and a larger scale to gain access to markets.

Second, non-Director members are actively involved in making such decisions as quantity, quality standards, technology training, and investment. Quantity decisions are important for all members, because how much to produce will determine how much to contribute to the cooperative by buying shares. Normal members are motivated enough to participate in this decision. Regarding the high involvement of normal members in setting up quality standards decisions, it reflects that quality is now an important attribute of commodities. Since cooperatives are organized around one or several similar products, formulating quality standards is an important measure to regulate members' behavior and reduce the adverse selection problem.

It is not surprising that members are strongly motivated to take technical training decisions. In China, small farmer growers are lack of technology. As the market condition changes from shortage of supply to abundance of supply, consumers demand high quality products or more customer-friendly products. To meet such changes, new technologies and technological innovations are required. Because small growers are keen on technological training, they are motivated to decide the training projects and training frequency. The result is that providing technology services is one of important measures to test the performance of Chinese cooperatives.

Third, financing decisions are mainly made by director members. This observation is a bit surprising, because normal members are expected to be cautious for financial issues in order to prevent risks and therefore are expected to tightly keep decision rights on financing. The reason is that normal members are too small to take a stake in

financing and director members are normally larger growers who contribute a lot to financing issues. For example, the general director is a big grower, and his shares count for 20% of all shares.

In sum, in Ruo-heng Watermelon Cooperative, ownership is restricted to members; members are required to buy shares; membership is closed; delivery rights are restricted; the ownership title is quasi-individual; director members have substantial power in deciding prices, inputs, finance, recruiting, etc; non-director members participate actively in making most decisions regarding quantity, quality, standards, investments, and technological training.

#### 3.3.1.2. Income Rights

The cooperative will allocate the shares among members according to their planting scale, which in turn determine their expected patronization on the cooperative. Since the share allocation is set up before the production of watermelon, the expected patronization and consequently the payment for delivering for individual members are almost fixed. By combining delivery rights and share-holding policy, the cooperative aligns the principle of patronization-based allocation with the principle of share-based allocation. Since member growers are required to purchase shares on the basis of expected patronage, the usage and the capital investment are perfectly aligned.

Members have rights to share the yearly net returns of the cooperative according to shares. Generally, some parts of the share yearly net returns will be retained within the cooperative for further development and public use, and the rest will be allocated to members according to their shares. Ruo-heng Watermelon Cooperative does not directly allocate returns to members, because there are sub-units called 'production bases'. These production bases are not only the units performing production tasks allocated by the cooperative, but also the units of accounting and allocating surplus. For each production base, the surplus to be allocated is the net returns in a production season deducted by the cost of production and management. The cooperative collects the risk insurance fund (10%) [19] and the public accumulation and public benefit fund (5%) from each production base; the rest of the allocable surplus in each production base is allocated to the base members proportional to individuals' shares. Since the shares are determined ex ante by

[19] Note that the risk insurance fund is used for reimbursement for heavy losses caused by the production and marketing of production bases and is allocated to each member's share account according to shares. For example, in 2003, one production base suffered a great loss from bad weather. The average loss for the members of this base was about 8,000 yuan per mu. The cooperative used the insurance fund to reimburse a part of loss of this production base. After reimbursing, members of this base lost only 2,000 yuan per mu.

expected patronage of the cooperative, allocation by shares/capital are perfectly aligned with allocation by patronage. In sum, members share the benefits (or costs) of the cooperative according to shares. The cooperative takes quality considerations into account in its pricing policy. It will pay different prices according to grading. In some cases, members are even punished (fined) to deliver bad products.

#### 3.3.1.3. Complementarities between Decision Rights and Income Rights

Table 3.8 presents the values of the attributes of the governance structure in Ruo-heng watermelon cooperative. Decision rights are not uniformly distributed among the members. Director members have real control on important issues such as pricing, financing, investment screening, etc. Meanwhile, sharing benefits/costs among members are not solely based on membership. Income rights are confined by share contributions.

Table 3.8 Attribute choices in the cluster Governance

| | Income rights | |
|---|---|---|
| | Share-based | Membership-based |
| Decision rights | | |
| Uniform | | |
| Skewed | × | |

In traditional cooperatives, benefit sharing based on patronization is essential for members, and capital returns are not important or deliberately limited to all members. In Ruo-heng watermelon cooperative, ownership is allocated in such a way that benefit sharing based on patronization and benefit sharing based on capital contribution is perfectly aligned. Since members benefit from the cooperative proportional to their share contribution/expected patronization, a skewed allocation of decision rights encourages members either to contribute to the cooperative or to make knowledge / access to market channels available.

### 3.3.2 Quality Control System

For agricultural products, as well as for other products, quality is an important attribute nowadays. The importance of quality is particularly pronounced for fruits and vegetables because these commodities are among the most likely to be observed and evaluated by consumers in their primary and unprocessed form. However, member growers have more information on quality of products than the cooperatives. Asymmetric information on

quality may lead to over-supply of low quality products. Thus, quality management is essential for cooperatives. Markets coordinate quality mainly by incentives (such as prices), and hierarchies coordinate quality mainly by administrative controls (monitoring of the activities). We define the system a cooperative uses to direct behavior of its member users and to motivate them to act in ways that benefit the cooperative as the quality control system.

### 3.3.2.1. Quality Coordination Methods through Multiple Production Stages

For the agri-business involved in multiple stages of production and distribution of products, vertical coordination on quality is necessary. Various methods could be used to vertically manage quality. We identify three quality coordination methods through multiple production stages in this cooperative: inputs control, production standardization, and unified packaging and marketing. Figure 3.2 illustrates the production stages involved by the cooperative and coordinating methods through these stages.

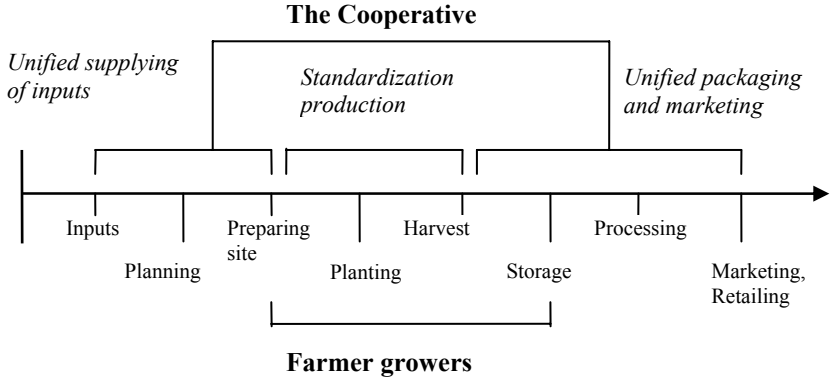


Figure 3.2 Stages of production and coordination methods (adapted from Figure 9.3, Allen and Lueck, 2003, p.184)

Although Ruo-heng watermelon cooperative is a marketing cooperative, its activities are not limited to selling. The figure shows the cooperative is involved in multiple stages of inputs, storing, and processing and marketing/retailing. Ruo-heng watermelon cooperative purchases inputs for members from outside companies. The procurement of inputs by the cooperative serves two purposes: firstly, quality of inputs is controlled; secondly, members acquire inputs at cheaper prices because the cooperative has considerable bargaining power towards input suppliers.

Main activities of member growers are preparing sites, planting, and harvesting. The cooperative influences member growers' activities by production standardization

requirements. Production methods, technical guidance, and detailed planting descriptions of production procedures are formulated by the cooperative. All members receive a guidance book with detailed standardized growing procedures, specifying detailed requirements regarding seeds, fertilizers, production procedures, and technologies regarding different stages of production. In sum, the cooperative coordinates members' production in multiple stages of production by a unified supply of inputs, standardized production requirements, and unified packaging and marketing.

#### 3.3.2.2. Other Control Tools and Incentive Tools

In addition to unified supply of inputs, standardized production methods, and unified packaging and marketing, several other control instruments are identified. One control instrument is the team based production / inspection. By working together on rural lands, member growers supervise each other. Production and quality management is organized in a three-layer structure. Figure 3.3 depicts this structure. The board of directors, on behalf of the cooperative, rents rural land each year and assigns members to grow watermelons on it. These lands are called 'production bases'. In 2004, the cooperative had 8 production bases across the Zhejiang province. In 2005, the cooperative has 12 production bases. In each production base, member growers are grouped into 8 to 10 production groups. Each group hires farmer employees. The normal ratio is 1 farmer member to 3 hired farmer workers. These farmer workers are paid 900 yuan per month. Farmer members and workers grow watermelons together in a team. The cooperative provides inputs such as seeds, fertilizers and technical assistance. Farmer members provide technical guidance to farmer employees. At the end of one production cycle[20], each production base collects watermelons from its production teams. These watermelons are sorted, graded and packed with the cooperative brand. The board of directors determines prices based on the market situation. Subsequently, the cooperative assigns about two seller members to each production base. These seller members are in charge of selling watermelons for their production base.

[20] The number of production cycles is 6, due to its technology and skills. Most enterprises have 4 production cycles.

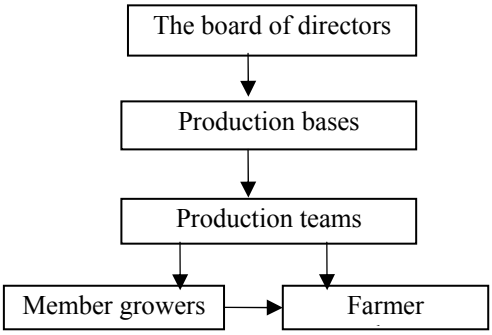


Figure 3.3 Quality management in Ruo-heng watermelon cooperative

Second, the products delivered by members are sorted and graded by the cooperative. By sorting and grading, the cooperative encourages members to adhere to ex ante specified quality standards. Third, members will be paid for their deliveries based on quality. Sample inspection, internal grading and sorting are used to measure quality differences, and then prices are paid accordingly. Quality-based pricing for deliveries is a salient incentive tool used by the cooperative to align interests of individual members with the entire cooperative.

Fourth, there is cash punishment for failing to deliver quality, even after the internal inspection process. It entails that a customer receives another watermelon when a bad one is returned. This instrument of quality control is explicitly used in the marketing policy for selling fresh watermelons. It is called 'double paying compensation'. Since the production team of each watermelon can be traced, all team members will be fined with a certain amount of money when losses occur due to delivering bad quality. A larger loss results in a higher cash punishment. This policy increases the incentives for group member' to monitor each other during production as well as incentives for team supervisors to strictly inspect sorting and grading.

#### 3.3.2.3. Complementarities in the Quality Control System

In Ruo-heng watermelon cooperative, the control tools include inputs control (i.e. unified supply of inputs), standardization, unified packaging and marketing, group production/inspection, sorting and grading, and incentive tools like quality-based pricing and cash punishment. The control tools are less efficient when pricing for deliveries is identical across all members. Tight control tools and flexible quality-sensitive pricing act in the same direction to manage members to adhere to quality standards and maintain the brand name. Table 3.9 depicts the choices regarding the attributes in the cluster quality

control at Ruo-heng watermelon cooperative. Compared with contract farming, the cooperative has low costs in enforcing quality. For example, field visits are not necessary, because members are motivated to supervise each other to prevent opportunist behavior. Low cost of control, complemented with high-powered incentives in terms of pricing, makes the cooperative efficient in managing quality in various stages of production.

Table 3.9 Attribute choices in the cluster Quality Control

| Quality incentives / Control | Yes | No |
|---|---|---|
| Tight | × | |
| Loose | | |

There are ongoing debates on whether incentives and control tools adopted in the quality assurance system are substitutes or complements. Hueth, e.a. (1999) examined incentive tools and control tools used in the contracts used by first handlers of fruits and vegetables in California, and claimed that the instruments of control may be complements or substitutes, depending on the context. If the control instruments and the incentive instruments are complements, then their alignment produces synergies in the Quality control system. This is what we observed in this Chinese fruit cooperative.

### 3.3.3 Branding Strategy and its Enforcement Mechanisms

A cooperative may choose different business strategies when selling products for members. For example, it may just pool all products delivered by members together and sell them by batches at wholesale markets; or, it may sell the products under one or several brand names. We define the branding strategy as the way in which products are marketed and sold under brand name.

The branding strategy determines the degree of commitment to ex ante specified high quality standards by a firm. To make this commitment credible, firms should have something valuable to loose. In Ruo-heng watermelon cooperative, this is the private brand ‘Yu-ling’. There are two mechanisms to signal quality to consumers: private brands and public certification (Raynaud, e.a. 2005). The reputation capital of the owner is at stake under a private brand. The general director is a big watermelon grower and an expert in growing watermelons. Before he joined the cooperative, his watermelons were recognized as high quality. Many local people buy the watermelon from the cooperative because they trust the general director. His personal reputation is at stake in building up the reputation

for the ‘Yu-ling’ brand. Under public certification, the credibility of a quality label relies on governmental enforcement.

Table 3.10 Attribute choices in the cluster Strategy

| Private brand | Public certification: Yes | Public certification: No |
|---|---|---|
| Yes | × | |
| No | | |

Since the two mechanisms play similar roles in signaling quality, they may act as substitutes. However, in Ruo-heng watermelon cooperative, public certification is not a substitute to private brands. It acts as a major method for building up the reputation of the private brand. The cooperative entered the certification process of the local government, which resulted in ‘Yu-ling’ being certified as ‘Famous Brand in Zhejiang’ by the Zhejiang provincial government agency in 2004. One reason for public certification being a complement to private brands is that the costs of public certification are low. Actually, local governments encourage cooperatives to participate in public certification procedures. Another reason is that public certification is used in advertising in addition to the private brand. The general director stated that the advertisement expenditure on newspapers, television, etc is ‘very limited’, while pubic certification or public rewards are necessary for promoting brands. Table 3.10 summarizes the observations regarding the cluster Strategy.

### 3.3.4 Complementarities between the Three Clusters of Attributes

How to sell products and what products to sell are two questions closely linked with each other. The branding strategy distinguishes itself in terms of creating the commitment to ex ante specified high quality standards and creating a new market niche with higher margins. To guarantee the commitment and to earn high margins, tight quality control is essential in cooperatives taking the brand strategy. The adoption of these systems is facilitated by having centralized / skewed governance. Figure 3.4 depicts the three clusters of attributes in Ruo-heng watermelon cooperative.

In Ruo-heng watermelon cooperative, the quality control system is tight in order to maintain high quality reputation/image of the cooperative. It is tight in three ways. Firstly, there are ex-ante contracted quality standards, which are agreed upon by all members and which are stricter than the legal requirements regarding fruits. Secondly,

many control tools are adopted to monitor and guide members through different stages of production. For example, input controls, production standardization, and group production/inspection are adopted to guarantee quality before and during the production process. Sample inspection and internal grading are used to measure members' efforts in meeting quality requirements. Failures of meeting quality requirements, which are not detected by the internal grading system, are dealt with by cash punishments. Since the bad products can be tracked down to production bases/groups, cash punishment provides a strong incentive to grow high quality watermelons. Thirdly, quality-based pricing is used to complement the control tools.

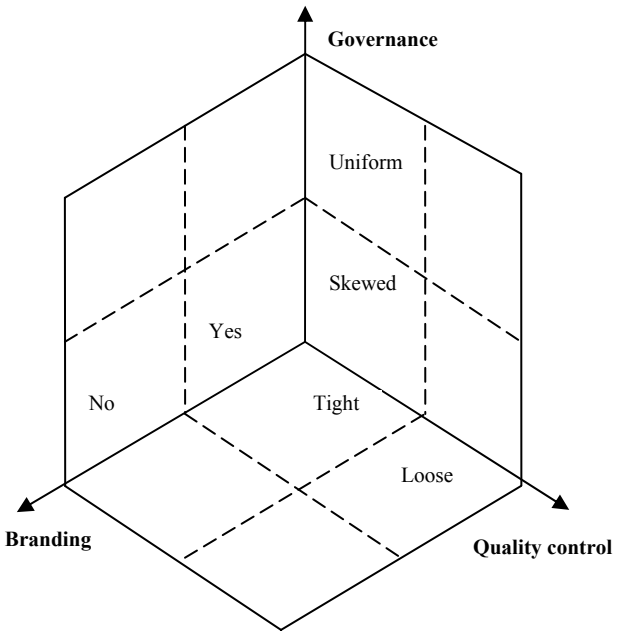


Figure 3.4 Cluster choices in Ruo-heng watermelon cooperative

## 3.4 Governance in the Institutional Environment of China: Abilities and Relations

The above sections show that the development of Chinese cooperatives is characterized by two facts. Firstly, the number of new cooperatives increases rapidly all over China. The emergence and spread of new cooperatives in China is in line with the wave of the agricultural industrialization and global competition. For farmers operating in only one stage of the supply chain, i.e. the production stage, their benefits are endangered by the

potential appropriation by other players in the supply chain. The cooperative is a safeguard to guarantee farmers' benefits by creating access to markets and produce value-added activities.

In the process of forward integrating into downstream activities, such as wholesaling and/or retailing, physical assets such as preservation facilities and wholesale markets are important. However, human assets such as knowledge/abilities regarding marketing and advanced technology are more important for Chinese farmers. Firstly, the agri-food markets are now characterized by oversupply, i.e. selling products is a problem for most farmers. Access to markets is decisive for farmers' survival. Secondly, in rural China, it is very difficult for farmers to get loans from business organizations such as banks because their scale is small and they may pose substantial risks for creditors. Only farmers with access to knowledge regarding technology and/or markets can get loans. These farmers are able to grow more products and/or sell more products. They distinguish themselves from other farmers by larger planting and/or selling scale. These signals give banks and other private creditors confidence that their loans will be paid back. So, human assets pave the way to build up physical assets.

Secondly, the governance structure of Chinese farmer cooperatives is a co-governance structure based on abilities and relations. The actual arrangements and operations are mainly based on the abilities of members. Trust and commitment derived from members' relationships underpins these institutional arrangements by confining control rights to core members.

The governance structure of Chinese cooperatives varies substantially. Members are heterogeneous in terms of farm size and supply of equity, and in some cases farmer members jointly own the cooperative with non-farmer members or firm members. The allocation of resources based on capital is pervasive at least in the coastal areas. There is usually a minority of core members (usually big shareholders) and a majority of normal members (usually users or patrons). Normal members enforce control rights by vote, voice and exit on the one hand, and delegate most control rights to core members on the other hand.

Farmers are heterogonous in terms of producing and/or selling capability even when they produce similar products. Farmers are stratified in terms of their abilities in producing products and in accessing markets. Some farmers have these abilities, while most farmers have not. However, farmers are in general in a weak bargaining position with other players in the agri-food supply chain, regardless their abilities to sell products and to perform value-added activities. Uniting farmers and pooling resources in the formation of cooperatives seems to be a suitable strategy for both types of farmers.

According to the incomplete contracting theory, it's efficient to allocate the control rights of cooperatives to the persons with superior access to market channels or having specific skills. In China, these persons are big farmer growers and/or sellers because they have either the abilities or relations to access downstream markets. They are granted substantial power in decision making decision in contingent situations. This is reflected in the skewness of the distribution of decision rights among core members/director members and normal members in the Zhejiang province. If there is a lack of big growers/sellers, agricultural firms and other non-farmers may be chosen and accepted by farmer members. The heterogeneity is much larger in this case, and the extent of the delegation of control rights to such core members is much larger. In some cases, normal members (pure farmer growers) only buy basic shares (i.e. membership shares) to get access to the cooperative, and most control rights are granted to big shareholders/core members. These diverse allocations of decision power among different stakeholders are confined by trust and commitment derived from the relationships among members. For small cooperatives, relationships play an important role in building trust and commitment. If core members have more close relationship with other members, normal members will be more willing to transfer (part of their) control rights to them. Thus, dominance of core members in ownership, and hence in residual control rights, is sustainable on the basis of kinships.

## 3.5 Conclusion and Future Research

Since the late 1980s, China has seen the rapid development of new cooperatives in rural areas. In general, the development of farmer cooperatives in China is still in an early stage. A number of features of these cooperatives are revealed by our data. Firstly, cooperatives are small, and most of them are local. Secondly, the organization and strategy of farmer specialized cooperatives in China are deeply influenced by the institutional environment. Human asset specificity in terms of establishing and maintaining relations and access to markets seems to be most important in the governance of cooperatives. The leader of a cooperative is often the person with the ability to access to downstream activities. Physical asset specificity and countervailing power seem to be the driving forces behind governance structure choice in Europe and the USA (Bonus 1986, Hendrikse and Veerman 2001a, 2001b).

Thirdly, farmer cooperatives in China are rooted in the traditional Chinese culture centering on personal relations. Therefore, the origin and development of cooperatives are not only determined by members' abilities but also subject to the informal institutions based on relations. A very effective way to conduct the governance of farmer

cooperatives in China may not be formal institution of, and commitment to cooperative concepts, but the personal relations or feelings. In a sense, the network of cooperative members is an effective mechanism to control the core members. This is in line with the findings of McMillan and Woodruff (1999) about the importance of inter-firm relationships. In short, both the control of core members based on ability and the constraints caused by members' relations can be regarded as the basic foundation for the co-governance of farmer cooperatives in China.

Fourthly, heterogeneity of members in farmer cooperatives in China is pervasive. There are various types of heterogeneity. Firstly, small farmer members and large farmer members co-exist in a cooperative. They are different in terms of abilities and social relations. Secondly, in some cooperatives, there are seller members who are specialized in selling member's products instead of production, and they may have different interests than pure farmer growers. A non-farmer or process firm can be accepted as a core member as long as he facilitates members' access to knowledge and/or markets. Core members/ director members are endowed with substantial decision power over normal members. Thirdly, in the cooperatives initiated by processor firms or other agri-food business firms, farmer members as well as non farmer members have decision rights. Fourthly, there are cooperatives with full-time farmer members and part-time farmers having different interests. Finally, members are heterogeneous in terms of education, age, and gender of members. The first three types of heterogeneity have been addressed in this article.

These observations raise a number of issues for further research. Firstly, do the results regarding the Zhejiang province extend to other provinces? Similarly, do the results regarding the watermelon cooperative extend to other cooperatives? Secondly, Hansmann (1996) has stressed the importance of the homogeneity of patrons in enterprises. The new cooperatives in the Zhejiang province exhibit a substantial heterogeneity in the membership. This raises the issue on structuring cooperatives in such a way that they accommodate member heterogeneity best. Thirdly, growth of the cooperatives is to be expected, even across provinces with different institutional settings. Will the members in the different provinces be treated the same? Fourthly, a great variety of the forms of cooperative organizations have been observed in rural China recently. The farmer specialized cooperative, which is the focus of this paper, is only one form of the spectrum of cooperative organizations. To what extent do other cooperative organizations differ from farmer specialized cooperatives? And, to what extent do these differences influence performance of each organizational form? This posts interesting research directions in the future work.

# 4 Allocation of Decision Rights in Fruit and Vegetable Contracts

## 4.1 Introduction

The use of contracts as a way of vertically organizing transactions is spreading in many agricultural sectors. Although cash markets are still important in coordinating supply and demands, however, different kinds of contractual arrangements gradually demonstrate their significance in providing links to all stakeholders. According to USDA/ERS (2006), contracts covered 39 percent of the value of U.S. agricultural production in 2003, up from 36 percent in 2001 and 28 percent in 1991. Commodities such as tomatoes and broilers have been produced almost exclusively under contracts between processors and independent growers for decades in the United States (Vukina and Leegomonchai, 2004). Developing countries in Africa have adopted contract farming as one effective way of developing the local agricultural economy for decades (Litte and Watt, 1994). Developing countries are experiencing a rapid increase in contract farming recently, driven by globalization, trade liberalization and agricultural industrialization (Cook and Chadda, 2000).

Growing and/or marketing agricultural products under contracts, or *contract farming*, is different from spot markets, because contract farming specifies a delivery requirement of a product or a service *ex ante* and a set of rules or provisions may be adopted for guarantying the final delivery. Contract farming is a vertical relationship in the sense of combining upstream primary producers and downstream marketing or processing firms *ex ante*. Contract farming is said to have advantages above spot markets like reducing uncertainty and providing access, while disadvantages are specified like excluding smallholders out of the contract farming system and agribusiness firms appropriating contracted farmers' surplus (MacDonald, 2004; Glover, 1984; Goldsmith, 1985; Wiliams and Karen, 1985; Warning, 2002; Glover and Kusterere, 1990; Little and Watts, 1994). In contrast to fully vertically integrated systems, such as investor-owned agricultural corporations, contract farming offers primary producers more independence in making decisions and primary producers remain independent entities.

Within the broad category of contract farming, contractual arrangements vary a lot across different supply chains/relations between downstream firms and primary grower.

*First*, some contracts assign the ownership of the commodity to the processor, while other contracts do not. For example, a DuPont high-oil corn contract specifies that farmers do not obtain any ownership rights to the crop because DuPont owns the crop; rather, farmers are caring for DuPont's property (Hamilton, 1999; Goodhue, 1999). Vukina and Leegomonchai (2004) observe similar contractual arrangements in the poultry industry, i.e., the processor hold the tile of ownership of chickens while the growers are compensated with fixed payments for raising chicken to market-weight.

Second, some contracts specify restrictive provisions regarding input choice, and/or production method. Several prior studies notice the input control aspect in contracts (Goodhue, 1999; Hueth et. al, 1999). A contractual relations survey regarding growers and first handlers in California fruit and vegetable markets shows that 46 of 88 firms specified or provided seeds to control seed variety, and, some firms even specified the planting, pruning and harvest (Hueth et.al, 1999). In broiler industry contracts, processors may control almost every aspect of production from the distribution of inputs (chicken and feed) to decisions about when to harvest the mature bird and repopulate the houses with new flocks (Vukina and Leegomonchai, 2004). Menard (1996, p.170) identifies three types of contracts in the French poultry industry: fixed-price contracts; buy-and-sell contracts; and contracts of the putting-out type. Fixed-price contracts are agreements in which growers remain fully independent, and growers commit to deliver a certain quantity of chickens with specified characteristics at a certain date. Contracts of this type specify a fixed amount of money to be paid to growers. Buy-and-sell contracts are arrangements in which growers buy chicks and sell chicken, dealing with the same firm at both ends. Growers usually remain in charge of intermediate products, though there may be restrictive clauses. Contracts of the putting-out type are agreements in which growers are provided with chicks, food, equipment or they must get them from specific firms.

Third, contracts are different in the pricing provisions to farmers. Some contracts purchase farmers' products at fixed prices specified ex ante, some contracts use tournament pricing when compensating farmers and some contracts do not adopt market-based pricing.

These observations illustrate that contract farming is characterized by various rules and incentives to govern the parties involved. It raises the question: how are these rules and incentives designed and/or aligned to deal with a specific transaction/product? One tentative treatment to the above observations is pursued by ERS/USDA (2003; 2006) in distinguishing production contracts and marketing contracts. Agricultural contracts fall into these two broad groups, where the ownership of the contracted commodity is treated as one distinguishing feature. ERS/USDA (2006, p.6) claims:

> *Under a production contract, the farmer provides a set of services to the contractor, who usually owns the commodity while it is being produced. The contract specifies the services to be provided by the farmer, the manner in which the farmer is to be compensated for the services, and specific contractor's responsibilities for provision of inputs.… Marketing contracts focus on the commodity as it is delivered to the contractor, rather than on the services provided by the farmer. They specify a commodity's price or a mechanism for determining the price, a delivery outlet, and a quantity to be delivered.'*

According to this classification, production contracts assign the ownership of transacted product to agricultural firms (i.e., contractor) while marketing contracts do not. In addition, production contracts are more complete than market contracts in the sense that more contingencies and activities are identified ex ante. As the result of ex ante assignment of ownership and ex ante specifications of various rules and rights, the spectrum of decision rights for one and/or two parties is reduced. This classification highlights that the allocation of decision rights between two parties varies among different contracts, however, it remains unclear under what circumstances a set of decision rights should be allocated to a party, and why[21]. This is important because the allocation of decision rights, as a way of coordinating activities across various production processes and motivating behaviour of various stake-holders, determines how effective contract farming is.

We address this gap by focusing on the details of decision rights in contractual arrangements commonly found under a contract farming governance structure. Decision rights in the form of authority and responsibility address the question 'Who has authority or control (regarding the use of assets)?'. Decision rights concern all rights and rules regarding the deployment and use of assets (Hansmann, 1996). They specify who directs the firm's activities. The allocation of decision rights between two parties varies. On the one hand, contract farming could be extensive by the processor allocating quota, controlling quality, controlling most production aspects, and even owing the residual claims of the commodity; on the other hand, contract farming could be limited by the processor to just a few dimensions of the transaction.

[21] In addition, this classification is not always accurate in terms of ownership allocation in some cases. For example, growers may leave the ownership of the contracted commodity to the contractors under production contracts, whereas seed, chemical inputs, and/or specifying planting/growing methods may be clearly specified and/or provided under marketing contracts.

Section 4.2 presents the research objective and the research question. Section 4.3 formulates the hypotheses regarding contract farming, while section 4.4 specifies the research design. The data is analyzed in section 4.5. Section 4.6 draws conclusions.

## 4.2 Positioning

This section starts with distinguishing three types of contracts (4.2.1). Subsequentially, contract farming is conceptualized and elaborated as one form of vertical coordination (4.2.2). The research question is developed consequentially (4.2.3).

### 4.2.1 Classifying Contracts

Three types of contracts have been identified conceptually in the literature (Bolton and Dewatripont, 2005). Complete contingent contracting refers to a contract specifying exactly what is expected of each party under *all possible* future contingencies. Complete contracting refers to a contract specifying exactly what is expected of each party under *all observable possible* future contingencies. Incomplete contracting refers to a contract which does not fully specify actions under each future contingency.

Figure 4.1 helps to clarify the conceptual difference of contracts from the perspective of specifying actions for situations/events/contingencies. Let s ($s \in [s_1,...,s_N]$) denote states/situations of a project, while a ($a \in [a_1,...,a_M]$) denotes a course of actions. A contract help parties to expect what other parties will do in the future contingencies/situations. However, it is not easy to specify in each situation a specific course of actions because of bounded rationality and/or high costs of formulating and enforcing the alignments (i.e., contracting costs). Thus, according to the extent of how a situation is described/linked with an action (or a course of actions), a contract can be classified into three categories: first, a complete contingent contract specifies a specific course of actions for every possible situation (i.e., r=d=0 in figure 4.1); second, a complete contract specifies a specific course of actions for each observable history (it is reflected by r≧2, d=0, s<r in figure 4.1); third, an incomplete contract specifies no specific actions, indicated by the symbol $\Phi$ in figure 4.1, in some situations.

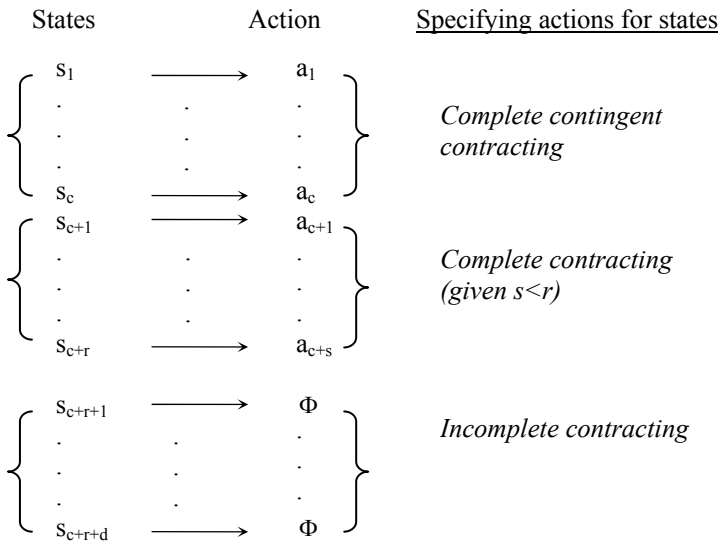


Figure 4.1 Contracts and mapping states into actions

The allocation of decision rights plays no roles when contracts are complete or complete contingent, because all relevant aspects are covered by the contract (Hendrikse, 2003). It starts to matter when some circumstances can not be covered by a contract. Contractual clauses have to be formulated regarding who has the rights to decide in such circumstances. Figure 4.2 classifies the three types of contracts.

| | | Behavioural hypothesis | | |
|---|---|---|---|---|
| | | Opportunistic | Self-interested | Idealistic |
| Degree of rationality | Complete rationality | *Complete contracts* | *Complete contingent contracts* | |
| | Limited rationality | *Incomplete contracts* | | |
| | Procedural rationality | | | |

Figure 4.2 Classifying contracts

### 4.2.2 Conceptualizing Contract Farming

An important insight of incomplete contracting theory is the need to allocate the right to make decisions about issues that can not be contractually specified (Lerner and Mergers, 1998). Decision rights in the form of authority and responsibility address the question 'Who has authority or control (regarding the use of assets)?'. Decision rights concern all rights and rules regarding the deployment and use of assets (Hansmann, 1996). They specify who directs the firm's activities, i.e. the allocation of authority. Incomplete contracting has far-reaching implications for both ex ante investment choices and the ex post bargaining process between the involved parties. This research adopts the incomplete contracting perspective to analyze contracts in agricultural markets.

Contract farming can be treated as a hybrid governance structure lying between the two polar forms of Spot Markets and Integration, which deal with successive production stages. Figure 4.3 distinguishes four governance structures from the perspective of allocating authority/ decision rights. The setting of a supply transaction involves an upstream party (farmer suppliers/growers), a downstream party (agribusiness/buyers) and two assets (e.g., production and processing equipment). The rectangles represent productive assets, the crosses inside rectangles represent decision rights of the assets, and the ovals represent the degree of vertical integration between the two parities. Three degrees of integration are distinguished. The degree of vertical integration is 0, i.e., no oval, when the governance structure Spot Market prevails. The degree of vertical integration is 1, i.e., solid oval, when either the governance structure Backward Integration or Forward Integration / Agricultural Cooperative is actual. Finally, the degree of vertical integration is between 0 and 1, i.e., dotted oval, in the governance structure Contract Farming.

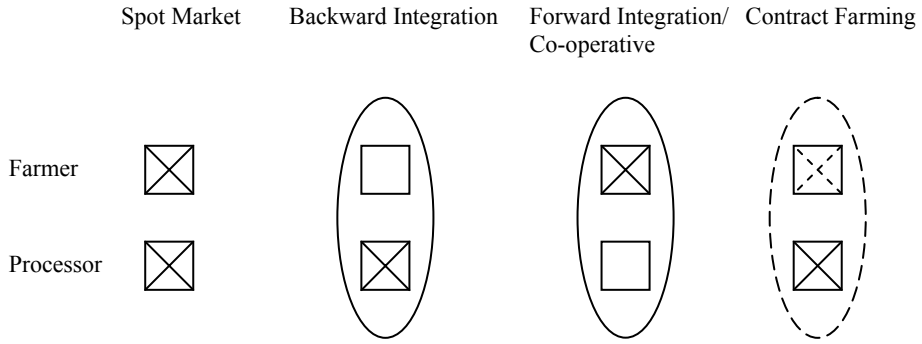


Figure 4.3 Four governance structures

Under the governance structure *Spot Market,* the two parties are independent, and prices coordinate the activities of the involved parties. Under the governance structure *Backward Integrated*, upstream assets are owned by the downstream party. Ownership of the assets implies that the access to the productive assets (and consequentially the returns of the assets) is controlled by the downstream owner. Decision rights reside with downstream players, and authority acts as the major coordination mechanism. Upstream farmers work as employees. Investor-owned agribusinesses are the representative of such a governance structure. Under the governance structure *Forward Integration*, individual farmers own upstream production assets as well as downstream processing assets. Most agricultural cooperatives are representative of such a governance structure. Under the governance structure *Contract Farming*, upstream farmers remain independent in the sense that they work with their own productive assets such as land, growing facilities, etc. It means that farmers are autonomous to decide on how to use their assets and how to deal with the resulting products. However, this autonomy is limited by the contract with the downstream party via ex ante specified and/or ex post restriction on the scope of authority. Ownership may not change, but decision rights across fixed firm boundaries may be moved using contracts (Baker, Gibbons and Murphy, 2005). This character is captured by the dotted oval.

### 4.2.3 Research Question

Contract farming is characterized by some decision rights being moved across fixed firm boundaries (which is captured by the dotted cross in figure 4.3). Both features are related to the extent and form of decision rights allocated across the involved parties. Contract farming captures various arrangements because of the extent of decision rights specified ex ante and the allocation pattern of decision rights varies.

To understand the reason for the various arrangements under contract farming, we have to address the following question: *What determines the form and extent of decision rights allocation in contract farming?* This question can be divided into two sub-questions. Firstly, many decisions/issues are specified in contracts ex ante. The more issues are specified in a contract, less space is left for parties to decide later on and behavioural uncertainty is decreased. Completeness of a contract is increased by including more specifications and reducing discretion for parties. Thus, by focusing on the specifications ex ante in a contract, we will address first question: *What determines the completeness of a contract?* By answering this sub-question, we will understand why some contracts are simple while other contracts are relatively complicated when dealing with similar agricultural products.

Secondly, when contracts are not complete, decision rights should be allocated. There are two major parties involved in agricultural contracts: upstream farmer growers and downstream processors. The allocation of decision rights will be addressed by the question: W*hen are decision rights allocated to downstream agricultural firms?* By answering this sub-question, we will understand why some contracts deliberately limit the contracted farmers' decisions/choices while other contracts grant farmers with extensive discretion.

To summarize, our main research question is *What determines the form and extent of decision rights allocation between farmer growers and downstream processors in contract farming?* By examining empirically the determinants of the completeness of a contract and the allocation of decision rights in the vegetable and fruit sector, our theoretical objective is to contribute to the literature which tackles the endogeneity of the degree of 'completeness'. Our practical objective is to better understand the practice of contract farming and thus provide support to managers to effectively manage the relations between producers and processors.

## 4.3 Contract Farming Hypotheses

This section start with formulating the hypotheses regarding completeness/incompleteness of contracts (4.3.1). Then the hypotheses predicting the allocation of decision rights to agricultural firms instead of farmers are elaborated (4.3.2). Finally, the conceptual model summarizes the hypotheses (4.3.3).

### 4.3.1 Extent of Contractual Incompleteness Hypotheses

Battigalli and Maggi (2002) model contractual incompleteness as arising endogenously from the costs of writing contracts, i.e., the costs of describing the environment and the parties' behaviour. A contract is viewed as specifying obligations for the agent. Different from the prior studies emphasizing mainly missing clauses, they argue that the optimal contract is characterized both by discretion and by rigidity: *discretion*, meaning that the contract does not specify the parties' behaviour with sufficient detail; and *rigidity*, meaning that the parties' obligations are not sufficiently contingent on the external state. In their terminology, the clauses of a contract can be ranked in three groups: contingent clauses, describing both future contingencies and parties' actions, incur the highest writing cost, and are used to regulate the most important tasks; rigid clauses, only describing parties' actions (like instructions given by a superior to other agents), incur relatively lower writing cost, and are used to regulate less important tasks; discretion

clauses (i.e. missing contingencies), leaving the discretion to parties, incur no writing cost, and are used to regulate the least important tasks. The optimum degree of discretion and rigidity is determined by the trade-off between the writing costs and the potential surplus.

Battigalli and Maggi (2002) examine how changes in the importance of writing costs relative to the potential gross surplus (gross of the writing costs) affect the optimal degree of rigidity and discretion of a contract. Denote the importance of writing costs (c) relative to the potential gross surplus (A) as y=c/A. The degree of discretion (captured by missing clauses in the model) is increasing in c/A and the amount of contingent clauses is decreasing in c/A. The intuition is simple. A smaller c/A implies that writing costs are decreasing or potential gross surplus is increasing, incorporating more clauses, and therefore less discretion becomes more attractive because it entails tailoring actions more to specific situations. Notice that an extremely small c/A, e.g, c/A=0, calls on contingent complete contract, that is, all states and the corresponding course of actions in each state will be specified in a contract. On the contrary, an extremely large c/A entails leaving all discretion to agents. The degree of rigidity (captured by the number of rigid clauses in the multi-task principle-agent model) is increasing in c/A for low values of c/A and decreasing in c/A for high values of c/A. Figure 4.4 depicts these relationships.

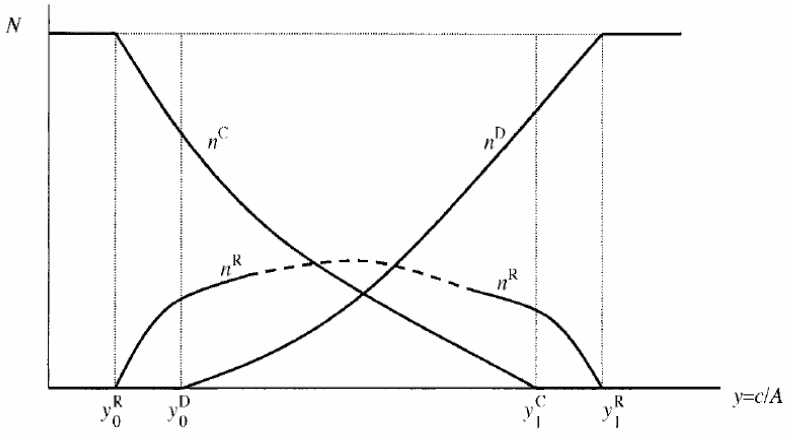


Figure 4.4 Impact of change in y on the optimum contract (Battigalli and Maggi, 2002, p.808)

A number of testable hypotheses regarding contractual incompleteness can be formulated. Let's focus on A (i.e., the potential gross surplus (gross of the writing costs)). If the potential gross contracting surplus is very small, no contract can be agreed upon since the contracting costs may be too high to be worth formulating a contract. If A increases, the optimum degree of discretion is expected to decrease, while the optimum

degree of rigidity and the possibility of observing contingent clauses are both expected to increase. If the potential gross contracting surplus is very large, the optimum contract specifies for each contingency an action because the writing cost can be neglected, i.e., complete (contingent) contracts emerge. There will be no scope for discretion. In addition to these two extreme situations, there are other situations where it is more interesting to predict and compare the completeness of contracts. When the potential gross contracting surplus is small, an optimum contract is expected to specify some (rigid) clauses while leaving substantial scope to agents' discretion. Thus, the more potential gross surplus a contract may generate, the less discretion is left to the agents, and more issues are specified in a contract. Consequentially, the completeness of a contract is positively influenced by the potential gross surplus of a contract.

The potential gross surplus of a contract can be represented by the value of contracting. Two cases can be distinguished regarding a change in the value of contracting. Firstly, if firms deal with high *quality* products, procuring material by contracting may have advantages over procurement from spot markets. In spot markets, both quantity and quality of products may not be stable enough for firms' marketing or processing. To buying the required materials, firms have to spend lots of resources to search, screen, and bargain with suppliers. Contracting may save transaction costs for firms by locating suppliers ex ante and by guaranteeing quality of supplying ex ante and/or ex post.

*Hypothesis 1: Completeness of a contract increases when the firm deals with higher quality products.*

The second case concerns firms having a well recognized *reputation*. Reputation is intangible capital which facilitates firms' business in many ways. It usually takes considerable investment to build up a reputation. However, it is fragile. Contracting can reduce the chances of destroying reputation by procuring unsatisfactory materials.

*Hypothesis 2: Completeness of a contract increases when the firm has a more well-recognized reputation.*

Uncertainty is identified in Battigalli and Maggi (2002) as another factor determining the extent of incompleteness of a contract. They claim that rigidity is decreasing as uncertainty increases, while contingent contracting and discretion are increasing as uncertainty increase. The argument is as follows (Battigalli and Maggi, 2002, p.809): '*when uncertainty is higher the efficiency cost of ignoring low-probability events and writing rigid clauses is higher, hence the number of rigid clauses is lower. Moreover,*

*when uncertainty is higher, both contingent clauses and missing clauses increase in number'*. It is depicted by figure 4.5 (Battigalli and Maggi, 2002, p.809). The two dots indicate the critical levels of the incremental benefit from matching events with actions. They separate D (i.e. discretion) from $R_n$ (i.e., Rigid clauses in contracts), and $R_n$ from $C_n$ (i.e., Contingent clauses). As uncertainty increase, an optimum contract will leave more scope for parties' discretion, and reduce rigid/specified tasks/activities which are not dependent on contingencies.

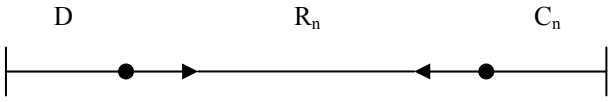


Figure 4.5 Effect of increase in uncertainty on the optimum contract (Battigalli and Maggi, 2002, p.809)

Applying this prediction to agricultural contracts, we have the following hypothesis:

*Hypothesis 3: In a more uncertain environment, the completeness of a contract will decrease.*

### 4.3.2 Decision Rights Allocation Hypotheses

The property rights model, i.e. GHM (Grossman and Hart (1986), Hart and Moore (1990)), addresses governance structure choice in the setting of incomplete contracting. They define the ownership of assets as the holder of residual decision rights: the rights to make any decision regarding the use of an asset that is not explicitly attenuated by law or assigned to other parties by contract. Integration involves benefits as well as costs, and the assignment of decision rights, hence ownership, should be allocated to the party who can create most value to a specific relation, because it affects ex ante investment incentives via the allocation of bargaining power ex post.

Aghion and Tirole (1994) apply and develop the property rights model to the relationships between small research firms and larger financial firms. According to them, two factors determine how decision rights are allocated: firstly, and consistent with the GHM model, the extent to which *underinvestment* by either or both of the parties jeopardized the success of the project; secondly, the relative *bargaining power* of the two parties. Bargaining power is constrained by the limited ability of many small high-

technology firms to obtain outside financing. When research firms are short of financing, even the marginal impact of its research effort on the value of final output is greater than the marginal impact of the financing partners' financial investment, the property rights may not be allocated to research firms.

The underinvestment problem is a relevant issue for contract farming. Both farmers and processors have to make specific investments to make a transaction successful. Farmers need to deliver products with specified quality, and processors need to process and sell out the products at satisfactory prices. For farmers, they may need purchasing special productive assets, such as a greenhouse or an irrigation facility; and, they may need to spend time and effort on learning a new production technology. For processors, they may need to buy storing facility and/or special transportation; they may also need to train their employees to efficiently collect marketing information, and/or establish or maintain marketing channels, developing niche markets. For each party, breaching contracts is costly due to the sunk costs which can not be recovered by finding alternative buying/selling alternatives. Decision rights should be allocated carefully to induce two parties' investment incentives. Thus, we expect decision rights in agricultural contracts to be allocated and balanced in such a way that both parties' specific investments can be protected as much as possible. The two hypotheses are therefore:

*Hypothesis 4: More decision rights will be allocated to the firm, if the level of firms' specific investment increases.*

*Hypothesis 5: Less decision rights will be allocated to the firm, if the level of farmers' specific investment increases.*

In agri-food transactions, bargaining power is also an important issue. Processors' bargaining power generated from financial means are larger compared with individual small farmers. However, this bargaining power may be strengthened or weakened by processors' competition status. If the processor has monopsony-oligopsony power, that is, there are no or just a few competitve buyers (including markets) within a certain geographical area, then farmers have less choice to sell their products. To gain access to marketing channels, farmers may give up their autonomy in making decisions for market access via contracts. Monopsony-oligopsony power thus can be transformed into bargaining power of processor, and further induce more authority allocated to processors. Thus, we have

*Hypothesis 6: More decision rights are allocated to firms, if firms have more monopsony-oligopsony power.*

The GHM model predicts that the allocation of *ex post* decision rights is determined by the desire to improve the *ex ante* specific investment. However, the allocation of decision rights in the contracts may be determined by a different mechanism. Arrunda, Garicano and Vazquez (2001) examine the allocation of rights and monetary incentives in 23 automobile franchise contracts. The empirical findings show that all contracts substantially limit the decision rights of franchisees, and grant extensive implementation and enforcement powers to manufactures. The degree of the contractual asymmetry is explained by the incidence of moral hazards. They point out both vertical externalities (Klein and Murphy, 1988) and horizontal externalities (Telser, 1960) exist in the dealer manufacturer relationship. Manufacturers also have potential moral hazards problem, which is constrained by brand names. It is suggested that a trade-off between the risk of ex post opportunism on the two sides (i.e., both franchisor automobile manufacturers and franchisee dealers) drives the allocation pattern of decision rights. When the cost of dealer moral hazard is higher and the risk of manufacturer opportunism is lower, the manufacturers hold more rights to determine the performance required from their dealers and to use mechanisms such as monitoring, termination, and monetary incentives to ensure that such performance is provided. As Baker, Gibbons and Murphy remark (2005, p.13), 'They test the informal theory that it is the need to achieve efficient ex post adaptation that drives variation in the contractual allocation of decision rights across different dealership networks. They find that when dealer's ex post actions can damage the network more, manufacturers are allocated more control and monitoring rights over dealer's actions: 'Manufacturers of higher-quality cars and those with larger networks are allocated…more discretion over the operation of their networks.' Thus, AGV's findings suggest that the ex post decision rights are not allocated to improve ex ante incentives to invest in the relationship, but rather to improve the ex post decision-making itself.'

The above informal theory may also explain the allocation of decision rights in agricultural contracts. Similar to franchising, agricultural contracts also entail externalities at the producers' side. As agricultural products become more and more specialized, many contractors require high quality products by providing specific quality and safety attribute standards. However, quality attributes of agricultural commodities has inherently a high degree of heterogeneity (Ligon, 2002; Carriquirey 2003). This variability stems mainly from the randomness of the production environment and/or the heterogeneity of the practices employed by farmers.

A farmer grower may, without being detected within the supply chains, provide a low-quality product to the processor/retailer who processes or sells the brand product. By shirking, a farmer saves his efforts in providing a specified quality attribute. Shirking may have two negative effects. Firstly, the low-quality product attribute may be detected by final consumers, which eventually reduces their value perceptions on the brand. Thus, the costs of shirking are carried by the brand-owner, i.e. processor or retailer. Secondly, when bad behavior can not be detected, high quality producers will have to share the loss from decreased value of the commodity or the brand with the processor/retailer. Anticipating this, producers will under-invest in quality-enhancing techniques. This has been identified in the contract literature (for example, Hennessy (1996)). Thus, because of two negative effects of shirking behaviour, the more important quality attributes and the combined brand are to the processor or the retailer, the higher the costs of the vertical externality.

As in franchising, ex post opportunism from processors in farmer-processor relationships is possible too. The centralized contract, that is the processor is in charge of most decisions, can result in opportunistic behavior by the processor (Bogetoft and Olesen, 2002). Centralized contracts usually shift the authority to make most of the decisions away from producers to the processor. For example, many broiler contracts require a big initial investment on chick housing, and/or specifies guidance format to grow chickens. Assume producers have made specific investment to deliver specified products. The processor may reject the delivery by downgrading quality attributes or ask for a discount on agreed-upon prices, when the market situation is not good for selling. Since it is hard to verify if the ex post renegotiation claims is based on a real situation or on simply opportunism, producers may have to give up all or the greater part of his share of quasi-rents since his investment is sunk into this specific relation. To anticipate this, producers may hesitate to make efficient relationship specific investments, even though his investment is valuable to create greater value for the whole chain. Thus, in agricultural contracts, hold-up problems faced by producers will influence producers' decisions on accepting centralized contracts or decentralized contracts.

In line with Arrunda, Garicano and Vazquez (2001), we expect that decision rights allocation would be determined by the extent of the opportunism risks of the two sides in a specific supply chain. When high quality of contracted products is important for the processor, the costs of opportunism risks from growers are greater. In this case, more decision rights will be allocated to processors. When processors have a good reputation, the risks of hold-ups will be reduced, the willingness of accepting authority from processors will be increased. Thus, we expect the following two hypotheses to hold:

*Hypothesis 7: More decision rights are assigned to the firm, when the firm deals with higher quality products.*

*Hypothesis 8: More decision rights are assigned to the firm, when the reputation of the processor is better recognized.*

### 4.3.3 Conceptual Model

We distinguish two endogenous variables and 6 endogenous variables, based on writing cost theory (i.e, Battigalli and Maggi's model), property rights theory, ex post efficient decision-making theory (i.e., Arrunda, Garicano and Vazquez's model). Figure 4.6 presents the conceptual model and the eight hypotheses.

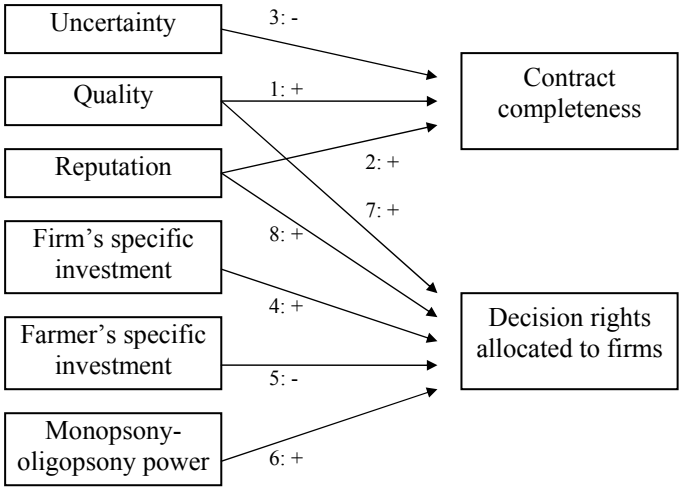


Figure 4.6 Conceptual model

## 4.4 Research Design

This section starts with motivating multiple case studies as the research strategy (4.4.1). Then, how to select cases is explained (4.4.2), and data collection methods are presented (4.4.3). Next, the measurement issue is illustrated (4.4.4). Finally, we discuss reliability and validity and formulate the tactics to address these two criteria (4.4.5).

### 4.4.1 Research Strategy

Verschuren and Doorewaard (1999, p.3) classify seven types of research, i.e., theory-developing research, theory-testing research, problem-finding research, diagnostic research, design-oriented research, intervening-oriented research and evaluation research. Since we develop several hypotheses from various theories regarding contractual completeness and decision rights allocation and are to test them for their validity, our research is characterized by *theory-testing research*. Different research strategies, such as experiment, survey, case study, can be selected for such tests. Which strategy is the preferred one depends on the type of research questions and research focus (Yin, 2003), and/or the specification of hypotheses (Dul and Hak, 2007).

According to Yin (2003), case study research is appropriate to research how-type and why-type research questions on contemporary events without control of behavioral events. Our main research question is "*what determines the form and extent of decision rights allocation in contract farmin*g?'. At a first glance, it is a what-type question which calls on either explorative survey/experiment/case study (if it is exploratory) or survey and archival strategies (if it is actually a form of a 'how many/much' line of inquiry). However, it is actually more 'explanatory', since we are trying to explain, based on several theories, what factors lead to a complex contract and what factors shape the allocation of a set of decision rights between parties. In other words, it is actually a 'why'-type question. In addition, our object of research is the *contracting relationship* between primary farmers (upstream growers) and agri-businesses (downstream processors, including all kinds of marketing and/or processing firms), which is a contemporary phenomena and difficult to be manipulate. In sum, case study research is suggested to be the most appropriate strategy to test our hypotheses.

Dul and Hak (2007) argue that, despite common belief, the case study is a useful strategy for theory-testing, and it is the preferred strategy for testing certain types of propositions. The specification of the proposition of a theory (i.e., a hypothesis) falls into two broad groups: *deterministic propositions* (e.g, if more A then more B) and *probabilistic propositions* (e.g., if more A then it is likely there is more B). There are three types of deterministic propositions, i.e., deterministic sufficient, deterministic necessary, and deterministic proportional, and two types of probabilistic propositions, i.e., probabilistic proportional co-variational relationships and probabilistic proportional causal relationship. The expression of deterministic proportional proposition is like 'If A is higher, then B is higher'. All the eight hypotheses in our research follow this formulation pattern and thus can be classified as *deterministic proportional relationships.* For example, hypothesis 1 claims that '*completeness of a contract increases when the firm deals with*

*higher quality products*'**.** It can be re-formulated as 'if the product transacted by a firm has a higher quality, then the extent of completeness of a contact is higher'. For a deterministic proportional relationship, Dul and Hak suggest that experiment is the preferred strategy, case study is second-best, while survey is not possible. It is not feasible to choose an experiment in our research project, because it entails manipulated changes of the 6 independent variables, however, it is not possible to manipulate the independent variables such as reputation and specific investments. The case study is thus chosen as the second-best strategy.

The case study can be further classified as single case study and multiple case study. We adopt multiple case study as our research strategy. Yin (2003) suggests choosing the multiple-case design instead of one single-case design when you have the choice (and resources). Eisenhardt (1989) indicates that with fewer than four cases it will be difficult to generate theory with much complexity. Herriott and Firestone (1983) argue that the evidence from multiple cases is often considered more compelling, and thus the conclusions are considered to be more robust. In addition, we would like to achieve both depth and breath in analyzing data; however, one single case does not provide enough breadth. All these arguments imply that the multiple case study strategy is the most appropriate one to be adopted in our research, that is, multiple instances (i.e. cases) will be chosen, and they are compared in order to test the hypotheses.

### 4.4.2 Selection of Cases

A case study is characterized by a small number of research units (i.e., cases), thus the selection of the cases to be studied is of vital importance in the technical design phase (Verschuren and Doorewaard, 1999). A survey usually requires random (or probabilistic) sampling, however, the sampling principle in the case study strategy follows the replication logic (Yin, 2003). Each case must be carefully selected so that it either predicts similar results or predicts contrasting results but for predictable reasons.

To explain the case selection for our research, we list the research question here again: *What determines the form and extent of decision rights allocation in contract farming*? It is informative to explore the above questions in different agricultural sectors, like the pork, poultry, vegetable industry, etc. However, it is out of our ability to consider all these sectors in one paper. To address the question carefully, we decide to focus on only the fruit and vegetable sector. There are two main reasons for choosing this particular agricultural sector.

Firstly, the extent of contract farming varies a lot in the fruit and vegetable sector (USDA, 2006). There are simple contracts as well as complicated contracts, and there are

highly restrictive contracts as well as quite autonomous contracts. Our preliminary observations on the fruit and vegetable sector in China confirm this. We visited four fruit and vegetable cooperatives in Eastern China two times in 2004 and in 2005. Various arrangements of vertical coordination and decision rights were observed. Thus, the fruit and vegetable sector provides the appropriate scenario for capturing the driving forces of our model. In contrast, concentration of decision rights by agricultural firms dominates in the pork industry and poultry industry.

Secondly, compared with livestock sectors such as poultry, pork and beef, fruits and vegetables have received less attention in the prior literature regarding decision rights. For example, Goodhue (2000) explains why processors control growers' inputs in the broiler industry, using an agency theory framework. In the setting of farmer heterogeneity, processors control inputs to reduce the information rents paid to agents. Reimer (2006) develops a property rights model that shows how in certain circumstances production contracts do not transfer sufficient control over the use of production assets to intermediaries. In sum, our focus on vegetables and fruits is motivated both by practical observations and theoretical considerations.

Once the fruit and vegetable sector is chosen, what we have to decide next is the number of cases. A 'case' in our research is *the contracting relationship* between primary farmers (upstream growers) and agri-business (downstream processors, including all kinds of marketing and/or processing firms). The unit of analysis is the contractual arrangement between two parties. We have selected 12 fruit and vegetable contracting relations between farmers and agricultural firms from the Shandong province in China. Shandong province is located in eastern coastal China, and is chosen because it is well known for vegetable and fruit production. Three districts or counties in the Shandong province are chosen: Shouguang city, Laiyang city and Dezhou district to increase local variety. Shouguang and Laiyang are both famous for vegetable and fruit production, while Dezhou is particularly famous for one type of fruit, i.e., Chinese date. Shouguang and Laiyang are more developed than Dezhou. In addition, Shouguang is more domestic-oriented while Laiyang is more export-oriented. Each case is chosen by considering both variability regarding contracting practices and the researchers' access capability to the case companies.

### 4.4.3 Data Collection Methods

Data used in our research are mainly primary data, generated by various labor-intensive methods. The major data collection method is face-to-face semi-structured interviews. It is useful to acquire written contracts, but written contracts can not be our major data source due to two reasons. Firstly, we expect it is difficult to gather commercial contracts because

of the confidentiality issue. Secondly, we also consider oral contracts. Thus, interviews are the right data extraction method for our purpose, and whenever possible, written contracts will be collected and analyzed too to increase data reliability.

Interviews are based on a carefully designed questionnaire. The questionnaire is developed from prior empirical studies and our major concepts. A major part of the questionnaire is designed to collect data on decision rights specification and allocation in contracts. Interviewees are the persons from agri-businesses who know the details and operations of contracts. Because agricultural contracts are mainly take-it-or-leave-it by nature and hence agri-businesses play a major role in designing contracts, we focus our interview object on agri-businesses. It is interesting to interview and get information from farmers too, but it is not feasible to extract data from farmers because of limited time and access.

The procedure of interviewing agricultural firms for contracting details is as follows. Firstly, we approach relevant local authorities in the three districts. These authorities either directly supervise/regulate the fruit and vegetable industry in their district, or are higher-level authorities co-ordinating supervising/regulating government agencies. The purpose for approaching these authorities is two-fold. On the one hand, these authorities have superior information regarding the relevant industry and the firms and farmers operating in the industry. On the other hand, in China, it is usually not feasible to approach a firm directly as a researcher to collect primary data. Many firms may reject your access simply because they are afraid that the local government may not like them to say something. The firms are more willing to cooperate with the researcher when the local officials introduce researchers to them and encourage them to cooperate. Secondly, we choose specific firms to interview by considering both the research framework and the access possibility provided by the local officials. Normally, we can choose from a list of firms suggested by the officials. Thirdly, we go to the chosen firms for face-to-face interviews. For each interview, it takes about two hours. It is not possible to always interview general managers. In some cases, we interview business managers. The information is normally written down in the questionnaire. We asked for recording interviews for each interviewed firm, however, this was rejected in most cases. Only 4 interviews are recorded on tape.

The individual interviews are supplemented by other methods to generate data, such as group interviews, on-site observations, factory and field visits, and a content analysis of textual materials. The triangulation of methods helps us to improve the validity of our data.

### 4.4.4 Major Concepts and Measurements

There are two independent variables in this research, i.e., *contract completeness* and *decision rights allocated to firms*. The measurement issue of these two independent variables and the six explanatory variables are addressed in this section.

*Contract completeness*

As we have argued, the more issues are specified and written into a contract, the more complete a contract is. Thus, *completeness of contracts* is measured by the number of clauses in a contract. A clause is one distinct legal stipulation/provision in a contract. In a written contract, each clause starts with a distinct number such as I1, or 1. We calculate the sum of clauses by adding up all clauses. In case of no written contract, we explain the definition of a clause and require the respondent/interviewee to state exactly the number of clauses in their oral/informal contracts.

*Decision rights allocated to firms*

Decision rights are a set of rights to direct activities or decide how to use assets. Across vegetable and fruit supply chains, many activities are involved in order to deliver products to final consumers. Figure 4.7 captures the important activities involved in the production and marketing process.[22] We distinguish input decision rights, in-process decision rights, after-process decision rights, monitoring decision rights and termination decision rights and some other decision rights. We add up the number of rights allocated to one party (i.e., firms in our analysis) as the index of authority allocated to one party. This method has been adopted in several empirical studies (Arrunada, Garicano, and Vazquez, 2002; Lerner and Merges, 1998). Elfenbein and Lerner (2003) adopt another method: they distinguish two sets of decision rights in the contractual relationship between a portal and its partner. For one set of decision rights that could be assigned to either party, a provision is coded as +1 if it favours portal, -1 if it favours the partner, and 0 if neutral. For the second set of decision rights that mainly limited the activities for the partner, they code +1 if such limitation rights are present and 0 if absent. Since our research is mainly focused on decision rights allocated to a firm, we decide to use the first method. Of course, simply adding up the number of decision rights has problems, because it treats each decision right

[22] Inputs include seeds, fertilizer, pesticides, and productive equipments such as green houses, watering equipments etc, and other physical materials. Before growing crops, farmers have to make plans: what to grow and how many to grow. Once decided on the type and quantity of crops, farmers will prepare site, plant, harvest and deliver the products. In the downstream marketing and processing stage, agricultural firms pack (including sorting, sizing, and packing), label, process, finally sell the products. Contracts combine two parties together by governing these activities.

with the same weight. To partly deal with this problem, we will further look into each sub-group.

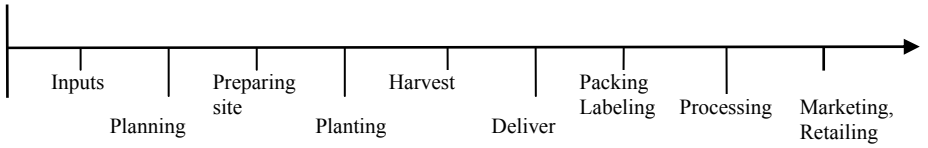


Figure 4.7 Activities/decisions involved in the production and marketing process (adapted from Allen and Lueck, 2003, p.184)

*Quality*

Quality is measured by the quality standards adopted by firms when procuring and marketing products. In China, there are three levels of national quality certification: NPF (Non-Pollution Food), GF (Green Food), OF (Organic Food). Vegetables with these national certifications are thought to have higher quality than non-certified vegetables. In addition, some vegetables are sold under international quality certifications. Some international quality certifications may be stricter than some national quality certifications. Thus, to measure the quality standards required by a firm, we let the interviewee first list the quality standards/certification they have. In case of international certification, they are required to compare this quality standard with GF standards. If a firm requires no national or international quality certification, the quality standard of vegetables of this firm is ranked as low; if a firm requires NPF and GF, its quality standards is ranked as medium; if a firm requires GF or international quality certification higher than GF, its quality standard is ranked as high. In sum, , three values regarding *quality* are identified: 'High' if a firm specifies/requires Organic Food Standards or any international quality standards which equals or is stricter than Organic Food, 'Medium' if a firm specifies/requires Green Food Standard or No Pollution Food Standards, and 'low' if the above two cases does not apply.

*Reputation*

Arrunada, Garicano, and Vazquez (2001) measure reputation by the length of the relationship between two contract parties. For our purpose, this measurement for reputation is not satisfactory, because contract farming is a new phenomenon in China and thus contracting experience may not vary enough among different firm-farmer supply chains. We use two kinds of measurements. The first measurement is *brand name capital*. If a firm has invested substantially in its brand and accumulated brand name capital, the firm is more likely to develop and sustain reputation. Questions are therefore formulated regarding the firm's branding strategy and expenses. Based on the overall answers, brand

name capital is ranked as one of three levels with decreasing order: national-recognized, local-recognized, and no-brand. These three levels of brand name capital represent high/medium/low reputation correspondingly.

A second measurement is *official honor/award*. In China, governments still play an important role in coordinating and/or supervising enterprises, although they do not intervene in the operations of enterprises any more in most cases. In recent years, rural development and agricultural industrialization are a policy focus for both central and local governments. The governments have both the incentives and the ability to screen good or bad agricultural firms. The well-performing firms are honored or awarded by the government to encourage their further development. Such honor/awards normally consider the size of a firm, the farmers a firm is dealing with, share of the market, community contributions, employment, etc. Thus, the honors awarded to one specific firm can be treated as a way to reflect how well the firm establishes its reputation in the local society. For example, among many possible official honors or awards, however, honor of 'dragon-head agribusiness firm'[23] is of particular importance and informative in agricultural sectors in indicating a firm's performance. We distinguish four values regarding the measurement: 'national honors/awards' if a firm receives some honors/awards from the central governments, 'provincial honors/awards' if a firm receives some honors/awards from provincial governments, 'local' honors/awards if a firm receives some honors/awards from local governments, and 'no official honors/awards' if a firm receives no honors/awards from any government. These four levels of official honors/awards represent the level of reputation in decreasing order.

*Uncertainty*

Uncertainty is a complex concept. Behavioral uncertainty is an important focus in transaction cost economics and supply chain management (see for example, Kwon and Suh, 2004). For our purpose, we mainly focus on uncertainty of the environment. In an uncertain environment, firms have difficulties to predict supply and demand and the price may fluctuate a lot. We use the difficulty level of predicting the market (price and supply, demand) to measure uncertainty. The following question is asked to measure uncertainty, "for the vegetable you mainly deal with, is it difficult to predict demand, supply, price? " The interviewee is required to choose among 5 levels: 1 not difficult at all; 2 not very difficult; 3 difficult; 4 very difficult; 5 extremely difficult. Uncertainty is scaled from 1 to 5 in ascending order, i.e., 1 is the lowest level of uncertainty while 5 is the highest level of uncertainty. These five scales can be transformed into three levels of uncertainty: 1 and 2 for 'low' uncertainty; 3 for 'medium' uncertainty, and 4 and 5 for 'high' uncertainty.

*Firm's specific investment*

Firm's specific investment is measured by both specific physical investment and human capital investments. We ask 5 questions to measure the overall level of specific investment: the first two questions require the interviewee to evaluate the physical investment in procuring, processing and marketing products and potential loss in case of changing or closing current business. The third and fourth questions ask the interviewee to evaluate the training practice to employees on procuring, processing and marketing and potential loss in case of changing or closing current business. The fifth question asks the interviewee to evaluate the investment on quality control. All answers are scaled from 1 to 5 in ascending order: 1 refers to no specific investment and 5 the highest level of specific investment. By summarizing the five answers, we obtain a measure of the level of firm's specific investment.

*Farmers' specific investment*

Farmers' specific investment is measured by two aspects: physical specific investment and human capital investment. Since we interview the firms instead of farmer growers in our research, it is difficult and not feasible to find contracted growers to answer the two questions. Alternatively, we ask the interviewees to evaluate farmer's specific investment. Better measurements can be acquired when the interviewees are both familiar with farmers' operations and judge the level of investment fairly. During the interviews, we verified that the interviewees are familiar with farmers' activities. However, the validity of the measurement may be influenced by the interviewee' arbitrary judgment. It implies that we have to be especially cautious when drawing any conclusion by using this measurement.

*Monopsony-oligopsony power*

The interviewee is required to evaluate the number of potential competitor firms which may contract with growers. If within the same period, many competitor firms may contract with growers, any individual firm is less powerful when bargaining with farmers. Thus, the monopsony-oligopsony power can be measured by potential competitor contractors available for growers. The more potential rival firms exist, the less monopsony-oligopsony power the firm has. We distinguish three possibilities regarding the degree of a firm's monopsony-oligopsony power. If in a given area, farmers can only sign contracts with one firm, then the firm is perceived to have 'high' monopsony-oligopsony power; if farmers can sign contracts with more than one but less than 5 firms,

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[23] It is called 'Long-tou-qi-ye' in Chinese.

then the firm is perceived to have 'medium' monopsony-oligopsony power; if farmers can sign contracts with more than 5 potential firms, then firms are perceived to have 'low' monopsony-oligopsony power.

### 4.4.5 Validity and Reliability

The quality of case study research can be evaluated by tests of reliability and validity, and several tactics can be used to establish or increase reliability and validity. Yin (2003) summarizes the four design tests as construct validity, internal validity, external validity and reliability.

Construct validity concerns the measurement issue of major concepts, that is, do the measurements really approach what it intends to measure (i.e., concepts)? To increase the construct validity, we use several tactics. Firstly, we review the high-quality empirical studies on a similar topic to see how they measure similar concepts. If their way of measuring can be applied to our research, we replicate their approaches. For example, measuring decision rights allocated to firms, specific investment by firms/farmers, monopsony-oligopsony power, are approached in this way. Secondly, for some measures such as the measurement for reputation and quality, we ask both peer researchers and professionals/experts to check the accurateness since we develop them by ourselves. Thirdly, we pilot-test the semi-structured questionnaire by asking several people: a Chinese researcher specialized in agricultural institutions and organizations; a Chinese researcher specialized in finance and being quite familiar with rural societies; a senior local officer who was once responsible for both industry and agriculture development in a local district; two local officers who are currently working in agricultural supervision and regulation agencies; a manager in an agricultural firm. The final English version of the questionnaire is included in the appendix 4-1, the final Chinese version in the appendix 4-2. The fourth tactic to guarantee validity is to use multiple sources of evidence. We use individual interviews, group interviews, on-site observations, casual talks with farmers and textual materials to generate evidence. In addition to these data collection tactics, we also telephoned one key interviewee to generally illustrate our findings in the stage of composing reports.

Internal validity concerns whether a causal relationship is really established from cases. Carefully treating data when analyzing them help to increase internal validity. Explanation-building and addressing rival explanations are adopted in our research as the tactics.

External validity concerns to what extent the study findings can be generalized. Case study methodology is often criticized for its low external validity. However,

following replication logic in multiple-case studies helps to increase external validity. In addition, this concern requires to treat the findings carefully: when a specific hypothesis is rejected, a new direction of testing hypothesis or potential of formulating a new hypothesis has to be incorporated; when a specific hypothesis is supported, it is worth pointing out the domain of generalization.

Reliability demonstrates that the operation of a study can be repeated with the same results. We develop a case study database to establish reliability. All the interviewee's talks and answers are written down by us as much as possible during the interviews. When allowed, we record the whole interview. Both the textual documents and tapes are kept for reference.

## 4.5 Empirical Findings

This section starts with introducing the general information about the interviewed firms in the cases (4.5.1). Next, contractual arrangements regarding price terms, quantity terms and decision rights are analyzed (4.5.2). Finally, the hypotheses are tested and empirical findings are summarized (4.5.3).

### 4.5.1 General Information on Case Firms

We interview eighteen firms for generating information on fruit and vegetable contracting. Seven firms deals with Chinese date farmers in the Dezhou district, Shandong province. Only two firms provided useful information and therefore are accepted as our object of analysis, because the remaining five do not use contracting with farmers when procuring Chinese dates.[24] Five firms deals with vegetable farmers in Shouguang city. Four firms are involved in vegetable contract farming and accepted for further analysis, while one is abandoned for further study because the interviewee did not cooperate on several important issues (such as details of a contract) during the interview. We interview 4 firms involved in vegetable farming in Dezhou district and 2 firms with vegetable contact farming in Laiyang city. These six firms are included into the sample. In sum, we have 12 cases, 10 of which are for vegetable contract farming and 2 for fruit contract farming.

[24] When checking the information regarding firms' characteristics, we find that the size of the firm is not necessarily the reason for choosing spot market procurement. For the two firms using contract farming, one firm's fixed capital is 1 million Yuan while the other's fixed capital is 0.22 billion Yuan. For the five firms using spot market procurement, the largest one's fixed capital is 18 million Yuan, the smallest firm's fixed capital 0.56 million Yuan, and the average 7.58 million Yuan. Since this paper is not focusing on the choice between contract faming and spot markets, we will not analyze the material further for it.

Table 4.1 summarizes the establishment, location, size and profitability of the firms,[25] and table 4.2 summarizes the involved vegetable or fruit business of each firm.

Table 4.1 General information regarding the 12 cases

| Characteristic / Firms in cases | Establishment | Location | ownership | No. of fixed employee | Fixed capital (*million Yuan)* | 2005 Sales (*million Yuan)* | Gross profitability |
|---|---|---|---|---|---|---|---|
| Firm 1 | 1986* | Laiyang | Shareholding | 21,000 | | 26,020 | -- |
| Firm 2 | 1994 | Laiyang | Private joint venture | 1,800 | | 1,200 | -- |
| Firm 3 | 1992 | Shouguang | Shareholding | 200 | | 28 | -- |
| Firm 4 | 2002 | Shouguang | Private | 180 | | 18 | -- |
| Firm 5 | 2001 | Shouguang | Limited liability | 1800 | 83.1 | 42.2 | 20% |
| Firm 6 | 1994 | Shouguang | Shareholding | 50 | 4 | | 20% |
| Firm 7 | 1994 | Dezhou | Limited liability | 40 | 3.2 | 14 | 22.9% |
| Firm 8 | 2003 | Dezhou | private | 248 | 6 | 1,500 | 20% |
| Firm 9 | 2000 | Dezhou | private | 120 | 20 | 27 | 18.3% |
| Firm 10 | 2000 | Dezhou | shareholding | 42 | 22 | 60 | 9.4% |
| Firm 11 | 1998 | Dezhou | private | 35 | 1 | 1.85 | 20.5% |
| Firm 12 | 1999 | Dezhou | shareholding | 1300 | 2,200 | 3,400 | -- |

Table 4.2 Product information regarding the 12 cases

| Characteristic / Firms in cases | Percentage of vegetable business | Percentage of fruit business | Percentage of export in vegetable/fruit business | Major vegetable/fruit |
|---|---|---|---|---|
| Firm 1 | 20% in all exports | -- | 60% | spinach, broccoli, capsicum, burdock, green soy bean, snow pea |
| Firm 2 | Main business | -- | 100% | spinach, broccoli, capsicum, green soy bean, snow pea |
| Firm 3 | 99% | -- | 100% | garlic, carrot, capsicum, ginger |
| Firm 4 | 100% | -- | 0% | seasonal vegetables such as tomato, cucumber, eggplant |
| Firm 5 | 40% | -- | 100% | |
| Firm 6 | 50% | -- | 0% | French shepherd's-purse |
| Firm 7 | 30% | -- | 0% | capsicum |
| Firm 8 | 70% | -- | 2% | Cabbage, capsicum, carrot, garlic |
| Firm 9 | 50% | -- | 100% | capsicum |
| Firm 10 | 100% | -- | 100% | Leek, green Chinese onion, capsicum |
| Firm 11 | -- | 90% | 0% | Chinese date |
| Firm 12 | -- | 40% | 10% | Chinese date |

[25] The real names and contact details of the interviewed firms and the title of the interviewees are listed in appendix 4-3.

Firm 1 was formerly established in Laiyang city, Shandong province as a brick and tile manufacturing factory in 1975. In 1986, it was re-established and shifted its business first to fresh vegetable and fruit, and later to processed vegetable and fruit. In 1989, it was re-organized by introducing the share-holding institution. In 1993, it developed into a large enterprise group which has diversified in agricultural sectors. Currently, it has 21,000 permanent employees. In 2005, its sales turnover reached 26,020 million Yuan. Vegetable business accounts for 20% of its export. It deals with both fresh vegetables and processed vegetables such as seasoned vegetables and frozen vegetables. Main vegetables are spinach, broccoli, capsicum, burdock, green soy bean, snow pea, etc. 60% of the vegetables are exported to abroad and 40% are sold in domestic markets. Japan is the most important export destination taking 90% of its export, and the EU and USA and Singapore consume the remaining 10%.

Firm 2 was established in 1994 in Laiyan city, Shandong province as a private joint venture enterprise. It grows very fast. Currently it has 1,800 permanent employees. In 2005, its sales turnover reached 1,200 million Yuan. Its main business involves fresh and processed vegetables, which sums up to almost 60 different products. All products are sold abroad. Similar to firm 1, Japan is its most important client taking 90% of its export while the EU and the USA take the remaining 10%.

Firm 3 was established in 1992 in Shouguang city, Shandong province as a shareholding company. Currently it has 200 permanent employees. In 2005, its sales turnover reached 28 million Yuan. Vegetable business accounts for 99% of its businesses. Main vegetables are garlic, carrot, capsicum, ginger. All products are sold abroad, and Japan is also its most important export destination.

Firm 4 was established in Shouguang city, Shandong province in 2002 as a private company. Currently, it has 180 permanent employees. In 2005, its sales turnover was 18 million Yuan. Its main business involves only fresh vegetables, and all products are sold in domestic markets. Main vegetables are seasonal vegetables such as tomato, cucumber, eggplant, etc. Up to 2005, it has obtained Green Food certificates for 13 kinds of vegetables.

Firm 5 was established in Shouguang city, Shandong province in 2001 as a limited liability company. Currently it has 1800 permanent employees, and its fixed capital is 83.1 million Yuan. In 2005, its sales turnover reached 42 million Yuan. Vegetables account for 40% of its business. All vegetables are sold abroad. Main vegetables are cauliflowers, sword beans, okras.

Firm 6 was established in Shouguang city, Shandong province in 1994 as a share-holding company. Currently it has 50 permanent employees, and its fixed capital is 4

million. Vegetable accounts for 50% of its business. All vegetables are sold in domestic markets. The main vegetable is French shepherd's purse.

Firm 7 was established in Dezhou district, Shandong province in 1994 as a limited liability company. Currently it has 40 permanent employees, and its fixed capital is 3.2 million. In 2005, its sales turnover reached 14 million Yuan. Vegetable accounts for 30% of its business. All vegetables are sold in domestic markets. The main vegetable is capsicums.

Firm 8 was established in Dezhou district, Shandong province in 2003 as a company. Currently it has 248 permanent employees, and its fixed capital is 6 million. In 2005, its sales turnover reached 1500 million Yuan. Vegetable accounts for 70% of its business. Most vegetables are sold abroad. The main vegetables are cabbage, capsicums, carrot, and garlic.

Firm 9 was established in Dezhou district, Shandong province in 2000 as a private company. Currently it has 120 permanent employees, and its fixed capital is 20 million. In 2005, its sales turnover reached 27 million Yuan. Vegetable accounts for 50% of its business. All vegetables are sold abroad. The main vegetable is capsicums.

Firm 10 was established in Dezhou district, Shandong province in 2000 as a shareholding company. Currently it has 42 permanent employees, and its fixed capital is 22 million. In 2005, its sales turnover reached 60 million Yuan. Vegetables account for 100% of its business. All vegetables are sold abroad. Main vegetables are leeks, green Chinese onions, capsicums.

Firm 11 was established in Dezhou district, Shandong province in 1998 as a private company. Currently it has 35 permanent employees, and its fixed capital is 1 million. In 2005, its sales turnover reached 1.85 million Yuan. Chinese date accounts for 90% of its business, and is all sold in domestic markets.

Firm 12 was established in Dezhou district, Shandong province in 1999 as a shareholding company. Currently it has 1300 permanent employees, and its fixed capital is 2200 million. In 2005, its sales turnover reached 3400 million Yuan. Chinese date accounts for 40% of its business, and is mainly sold in domestic markets.

In short, firm 1 to 10 are involved in vegetable contracting, while firm 11 and firm 12 are in fruit contracting. None of the firms are state-owned firms. Firm 1 is the oldest firm and established in 1986. Firm 8 is the youngest firm and established in 2003. The size of the firms varies a lot, measured in terms of permanent employees, fixed capital or sales turnovers. Regarding diversification/specialization, firms 2, 3, 4, 5, 8, 9, 10 mainly deal with vegetables and firm 11 mainly deals with Chinese date, while the remaining firms 1, 6, 7, 11 also deal with other products. Regarding marketing channels, firms 2, 3, 5,

9 and 10 export all vegetables to foreign markets, and firm 1 targets both foreign and domestic markets, while the remaining firms mainly or wholly target domestic markets.

### 4.5.2 Contractual Arrangements

This section illustrates contract arrangements in terms of price specifications, quantity specifications and decision rights allocation.

#### 4.5.2.1. Price term

Price terms vary across different contractual relations. In case 1 and 2, the price is determined by the firm by calculating the costs of planting vegetables in contracted land and transporting vegetables to the delivery sites. In case 3 and 4, both contracts specify the pricing as the spot market price at delivery. In practice, case 3 usually adds a premium (e.g. 0.05 Yuan in 2005) to current unit cash price for the contracted vegetable. Case 4 usually adopts the higher price among various spot market prices at delivery date. In case 7, the contract specifies a fixed price without bonus. In the remaining cases (i.e., case 5, 6, 8, 9, 10, 11 and12), the price clauses in the contracts are contingent: it first specifies a minimum price; then it stipulates that the firm will pay the minimum price when the spot market price at delivery is lower and will pay the spot market price otherwise.

In none of the cases, the price paid to farmers is obviously based on the price of final products sold at the downstream stage. However, in one case, farmer growers do share the benefits of downstream marketing by gaining returns from the firm. In Case 4, clause II.5 of the contract reads, "…… *every shed delivers 2,500 kilogram; when the current season's cooperation ends, the firm will allocate returns to growers according to the actual delivery minus 500 kilogram, and no returns are allocated to growers in case of less than 500 kilogram delivery. If the delivery is purchased at the unit price of above 1 Yuan per half kilogram, 0.2 Yuan will be paid to the grower for each delivered half kilogram; if the delivery is purchased at the unit price of below 1 Yuan per half kilogram, 0.1 Yuan will be paid to the grower for each delivered half kilogram. No returns are allocated for the delivery above 2,500 kilogram.* " This contractual arrangement guarantees the expected delivery in two ways. First, the higher quality of the delivery is, the more returns the grower will receive. Thus, the contracted quality is more likely to be reached. Secondly, no returns are allocated to growers when the delivery is either too low (less than 500 kilogram per shed) or too high (more than 2,500 kilogram per shed), thus the contracted quantity is more likely to be reached.

#### 4.5.2.2. Quantity terms

Sykuta and Parcell (2002) examine the quantity terms of identity-preserved soybean production contracts. They find all sample contracts are denominated in acres, although the price premiums are paid on the number of bushels of GMO-free soybeans delivered. They call these contracts *acreage contracts.*

In our study, four cases (i.e., case 1, 2, 5, 8) are dominated in acreage, while 6 cases (i.e., case 3, 4, 9, 10, 11, 12) are dominated in kilograms. The remaining two cases, i.e., case 6 and 7, do not specify the quantity in contracts. In Case 6, the firm has the rights to require the exact quantity of one contracted farmer delivery, while in case 7, the farmers make decisions by themselves.

According to Sykuta and Parcel, acreage contracts shift some of the production volume risk to the buyer (2002, p.341). Buyers deal with this in two ways. Firstly, compared with the buyers specifying kilogram requirement, the two buyers with acreage are much bigger in size. It reflects the larger processing and marketing capability, which may increase firms' flexibility for dealing with temporal surplus or deficiency. Secondly, both firms adopting acreage contracts closely supervise/monitor growers' production volume. In the contract from case 2, it reads (clause II6) "*when the party B finishes planting seeds, the grower must inform the party A, and party B must cooperate with party A to measure the actual seeding acreage, which will be adopted as the basis for delivery quantity*".[26] By providing seeds before seeding and measuring seeding acreage after seeding, the firm has a clear idea on potential delivery quantity and thus abnormal surplus or shortage of delivery will not happen.

The price and quantity terms in the contracts in the twelve cases are summarized in table 4.3.

[26] The incentive for party B (i.e., vegetable growers) informing party A (i.e., the firm) is that the final delivery quantity is calculated based on the seeding acreages. In addition, it is easy for the firm to find out the exact seeding acreage, because the firm will send employees to monitor growers' planting activities very often. According to our interviews, growers are willing to cooperate on reporting and measuring seeding acreage, since it is one of the first steps establishing trust between two parties.

Table 4.3 Price and quantity terms in contracts

| Basic Clauses Contract | Price Term | Quantity Term |
|---|---|---|
| Case 1 | Planting-transporting-cost based | Acreage |
| Case 2 | Planting-transporting-cost based | Acreage |
| Case 3 | Spot market price at delivery | Kilogram |
| Case 4 | Spot market price at delivery | Kilogram |
| Case 5 | Minimum protection price | Acreage |
| Case 6 | Minimum protection price | Not specified |
| Case 7 | Minimum protection price | Not specified |
| Case 8 | Minimum protection price | Acreage |
| Case 9 | Minimum protection price | Kilogram |
| Case 10 | Minimum protection price | Kilogram |
| Case 11 | Minimum protection price | Kilogram |
| Case 12 | Minimum protection price | Kilogram |

#### 4.5.2.3. Decision rights

The decision rights are listed in table 4.4. We will look into several sub-groups of decision rights. Firstly, the 12 cases show some decision rights variations regarding input. For the four potential input control activities, major firms have allocated two or three: 6 firms have the rights to control seed, fertilizer and pesticide, and 1 firm controls fertilizer and pesticide. Firm 8 and 11 allocates only one decision right, while firms 7 and 9 do not control inputs. No firm has decision rights regarding planting, irrigation and cropping facilities to be used by growers. One reason for major firms controlling fertilizer and pesticide may be related with the specific industry in this study, i.e., vegetable and fruit industry. The quality (e.g. safety attribute) of vegetables is highly dependent on what fertilizer/pesticide to use and how to use them. The manager in firm 1 tells us, "*when and how to use pesticide is very important to control quality. We send technicians to inspect the fields two times a week. It is required that our quality guarantee staffs must be on-site when growers spread pesticide. Our quality guarantee staffs will supervise what pesticides to use and the compounding of pesticides. The use of pesticides before harvesting is especially important for us. We call the ten days from pesticide spreading to harvesting 'Pesticide Security Management Period'. During these ten days, the fields will be supervised 24-hour around*.''

Table 4.4 Decision rights allocated to agricultural firms

| Case<br>Decision rights | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price of delivery | × | × | | | | | × | | | | | |
| Quantity of delivery | | | | | | | × | | | | | |
| Quality specification | × | × | × | × | × | × | × | × | × | × | × | × |
| Input control | *3* | *3* | *3* | *2* | *3* | *3* | *1* | *0* | *0* | *3* | *1* | *3* |
| *Specified/provided seeds* | × | × | × | | × | × | | × | | × | | × |
| *Specified/provided fertilizer* | × | × | × | × | × | × | | | | × | | × |
| *Specified/provided pesticide* | × | × | × | × | × | × | | | | × | × | × |
| *Specified/provided planting, irrigation, cropping equipments* | | | | | | | | | | | | |
| In-process control | *5* | *5* | *2* | *1* | *5* | *3* | *1* | *0* | *1* | *5* | *1* | *5* |
| *Planting plan* | × | × | | | | | | | | | | |
| *Plowing* | | | | | × | × | | × | × | × | | |
| *Seeding* | | × | | | × | | | | | × | | |
| *Cultivating* | × | × | × | × | × | | | | | | | × |
| *Use of fertilizer* | × | | | | | | | | | × | | × |
| *Use of pesticide* | × | × | | | | | | | | × | × | × |
| *Harvesting* | × | × | × | | × | × | | | | | | × |
| After-process control | *5* | *5* | *6* | *4* | *6* | *5* | *4* | *5* | *3* | *4* | *4* | *3* |
| *Packing before delivery* | × | × | × | | × | | | | | | | |
| *Storing before delivery* | | | × | | × | × | × | | | | | |
| *Delivery time/place* | × | × | × | × | × | × | × | × | | | | |
| *Quality measuring* | × | × | × | × | × | × | × | × | × | × | × | × |
| *Sorting, sizing, grading, packing for weighing and labeling* | × | × | × | × | × | × | × | × | × | × | × | × |
| *labeling* | × | × | × | × | × | × | × | × | × | × | × | × |
| Monitoring rights | *3* | *3* | *2* | *2* | *2* | *2* | *2* | *2* | *2* | *2* | *2* | *2* |
| *Fulfillment of delivery* | × | × | × | × | × | × | × | × | × | × | × | × |
| *Direct inspection of growers* | × | × | × | × | × | × | × | × | × | × | × | × |
| *Grower' duty to provide field records* | × | × | | | | | | | | | | |
| Termination rights | × | × | | × | | | × | | × | | | |
| Decision Rights by firms: Total | 19 | 19 | 14 | 11 | 17 | 14 | 10 | 11 | 8 | 20 | 9 | 14 |

Secondly, the 12 cases demonstrate variation regarding in-process decision rights. For the 7 potential control activities, five firms allocate 5 decision rights, and 1 firm allocates 3. 5 firms have only one or two decision rights, while for 1 firm (i.e. case 7) no decision rights are allocated at all. It is worth mentioning the decision rights regarding cultivating and harvesting here. In the majority of the cases, cultivating and/or harvesting

is controlled by firms somehow. Growers are required to grow according to the firms' technical guidance and the field management requirement or guidebooks. Growers are still taking care of the daily cultivating operations, however, these operations must be aligned with the firm's requirements. Most firms send their technicians to supervise and guide the growing activities.

Thirdly, the 12 cases have many similarities in allocating after-process decision rights. For the 6 potential control activities, 12 firms are allocated more than 3 decision rights. All 12 firms have rights to measure quality, to sort, size and grade, and to label. In all 12 cases except two (i.e., cases 9 and 12) delivery time and/or place is decided by firms. Three points should be mentioned here. Firstly, three firms (cases 1, 2 and 4) clearly state that they make calls to growers when they need products, the products are delivered immediately after harvesting. Several firms claim that they have rights to decide delivery time and place, although the way of informing growers are not told. Secondly, firms have rights to tell a farmer how to store before delivery. For example, firm 3 is mainly processing and exporting processed garlic, which is less perishable than fresh vegetables such as spinach. It may be the reason why growers store the harvest for some time before delivery. Thirdly, no growers have rights to measure the quality of their delivery. This right is allocated completely to firms. In all 12 cases, no third-party is involved.

Fourthly, regarding monitoring rights, the fulfillment of delivery and the rights of direct field visits are allocated to firms in all 12 cases, while two firms (cases 1 and 2) additionally ask growers to record their field operations.

Fifthly, regarding termination rights, in five cases firms are allocated the rights to terminate contracts by judging if growers breach contractual terms, while in the remaining 7 cases clauses specify when to terminate contracts legally.

Sixthly, regarding quality specification rights, firms have the right to specify the exact quality requirement.

Seventhly, regarding the decisions on price and quantity, in the majority of the cases they are *ex ante* specified in contracts, thus firms or farmers are not allowed to decide by themselves. However, in case 7 the firm has rights to decide the quantity, while in case 6 the farmers decide how much to deliver. In the cases 1 and 2, the firms have rights to decide the price.

### 4.5.3 Testing Hypotheses

This section starts with illustrating how the questions and answers in the interviews are transferred to the measurement of different variables (section 4.5.3.1), which will be used further to test hypotheses. Table 4.5 summarizes the measurements of the eight variables in

the twelve cases. Then, the following predicted relations are tested based on the data: the relations between quality, contract completeness and decision rights allocated to firms (section 4.5.3.2); the relations between reputation, contract completeness and decision rights allocated to firms (section 4.5.3.3); the relations between uncertainty, contract completeness (section 4.5.3.4); the relations between firm's specific investment and decision rights allocated to firms (section 4.5.3.5); the relations between farmer's specific investment and decision rights allocated to firms (section 4.5.3.6); the relations between monopsony-oligopsony power and decision rights allocated to firms (section 4.5.3.7). Finally, section 4.5.3.8 summarizes the findings.

### 4.5.3.1. The Measurements of the Variables

To test the hypotheses, the (qualitative) answers to the questions regarding each variable have to be transformed to comparable measures (see section 4.4.4 for detailed tactics). Table 4.5 lists the results.

Table 4.5 Independent variables and dependent variables (to be continued)

| Case / Variable | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 |
|---|---|---|---|---|---|---|
| **Dependent Variables** | | | | | | |
| contract completeness | N.A. | 20 clauses | N.A. | 8 clauses | 34 clauses | N.A |
| decision rights allocated to firms | High (19) | High (19) | Medium (14) | Medium (11) | High (17) | Medium (14) |
| **Independent Variables** | | | | | | |
| quality | High | High | Medium | Medium | High | Medium |
| reputation | | | | | | |
| -brand name capital | National recognized | Local recognized | No brand | Local recognized | Local recognized | Local recognized |
| -official honor/award | national | provincial | local | local | provincial | No honor/ award |
| uncertainty | Medium | Medium | Medium | Low | High | Medium |
| firm's specific investment | High | High | High | Low | High | Medium |
| farmer's specific investment | Low | Low | Low | Low | Medium | Low |
| monopsony-oligopsony power | Medium | Medium | Low | High | High | High |

Table 4.5 Independent variables and dependent variables (continued)

| Case<br>Variable | Case 7 | Case 8 | Case 9 | Case 10 | Case 11 | Case 12 |
|---|---|---|---|---|---|---|
| **Dependent Variables** | | | | | | |
| contract completeness | N.A. | 7 clause | N.A. | 8 clauses | Oral | N.A |
| decision rights allocated to firms | Medium (10) | Medium (11) | Medium (8) | High (20) | Medium (9) | Medium (14) |
| **Independent Variables** | | | | | | |
| quality | Medium | Medium | Low | High | Medium | Medium |
| reputation | | | | | | |
| -brand name capital | Local recognized | Local recognized | No brand | No brand | No brand | Local recognized |
| -official honor/award | local | provincial | local | provincial | No honor/ award | provincial |
| uncertainty | Medium | Medium | High | Medium | Low | Medium |
| firm's specific investment | Low | Medium | Low | Medium | Low | Low |
| farmer's specific investment | Low | Low | Low | Low | Low | Low |
| monopsony-oligopsony power | Medium | High | Medium | High | Medium | Medium |

It is worth formulating several remarks regarding table 4.5. Firstly, not all cases provide the information regarding completeness of a contract, since some firms did not show us the real written contracts. Only cases 2, 4, 5, 8 and 10 show the actual clauses to us. Case 11 is the only case using an oral contract, which is thought to be less complex and complete than written ones. Thus, we can test the hypotheses regarding completeness of contracts in 6 cases.

Secondly, regarding *decision rights allocated to firms*, we first calculated the number of decision rights assigned to a firm (the result is listed in the last row in table 4.4). Then, the cardinal number of decision rights allocated to a firm is further transformed to an ordinal ratio to facilitate the testing (see row 3 in table 4.5). In each case, the firm's actual decision rights are divided by 23 (i.e., the total number of possible decision rights allocated either to firms or to farmers in our research). If the ratio is smaller than 0.34, then the firm is perceived as allocating a 'low' proportion of all decision rights (i.e., less decision rights are allocated to firms); if it is between 0.34 and 0.67, then the firm is perceived as allocating a 'medium' proportion of all examined decision rights; if it is larger than 0.67, then the firm is perceived as being allocated 'high' proportion of all decision rights. It is obvious that 'high'-marked firms have more decision rights compared with 'medium'-marked firms, and the same with 'medium'-marked firms and 'low'-marked firms. [27]

[27] Another way to transforming this cardinal number to ordinal number is to first calculate the average value of all ratios. In our case, it is 7.23/12=0.6. Then, the firm with a ratio larger than 0.6

Thirdly, regarding firms' specific investment, quantitative measures from five questions are first added up, and then the sum is divided by 5 to obtain the equally weighted total measure for this variable. To facilitate testing, this numerical measure is further transformed to an ordinal one. If it is smaller than 3, then the firm's specific investment level is perceived to be 'low'; if it falls between 3 and 4, then the firm's specific investment level is perceived to be 'medium'; If it is larger than 4, then the firm's specific investment level is perceived to be 'high'. The same rule applies to farmers' specific investment.

#### 4.5.3.2. Quality, Contract Completeness and Decision Rights Allocated to Firms

The data shows that four cases require high quality products while seven cases require medium quality products. Regarding the high quality cases, case 1 specifies high quality standards based on Japanese strict regulation on pesticide residuals, case 2 specifies high quality standards based on ISO9002 and HACCP, case 10 is certified with IS09000 and HACCP, and case 5 requires strict Organic Food standards. The remaining cases, except case 9, specify relatively lower quality standards based on national quality standards Non-Pollution Food and Green Food. Notice that case 9 is the only one being thought of low-quality. The interviewee in this case claimed that the firm required the farmers to meet Non-pollution Food quality, however, after detailed discussion, we found that this firm's vegetables were not certified as NPF at all, and no detailed quality requirement equivalent to NPF was specified in the contracts. Thus, compared with the other cases, the quality requirement in case 9 is rather low.

Before we go further to test hypothesis 1, we illustrate the quality requirements with some example cases (i.e., cases 1, 2, 3 and 4). Both case 1 and 2 have a strict quality requirement for vegetables. In case 2, the clause I4 of the contract reads, '*Contractor A sets up specific quality standards for all procured vegetables (based on ISO 9002 and HACCP)*'. In case 1, the manager interviewed spent nearly 15 minutes to describe the importance of the high quality requirement and how the firm tries to guarantee the quality by contracting instead of by procuring from the market. In this case, 90% of the vegetables are exported to Japan. Japan has strict regulation on pesticide residuals, antibiotics and additives of exported fresh and processed vegetables, especially since 2002. To deal with Japan's rising demand for high quality, an office is set up in Japan to acquire the most recent information on legal requirements and regulation on food. The firm specifies strict

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can be perceived to have more decision rights than the firm with a ratio smaller than 0.6. In this way, there are only two values: high or low. We did do this calculation as a way to check the reliability of the main-text transforming tactic, and the result shows that the two methods do not differ much.

quality requirements when procuring vegetables. To measure and test quality, the firm has invested around 20 million Yuan in laboratories. It has bought 2 expensive pesticide residual testing machines, and is going to buy a new one, which costs 310,000 Yuan. Case 3 and Case 4 have a relatively lower quality requirement. In case 3, the firm also exports processed vegetables to Japan. It once had the HACCP certification. However, the manager told us they only require NPF standard when procuring vegetables. In case 4, the firm sells fresh vegetables in domestic markets. NPF and GF are required when procuring vegetables from contracted growers.

In the four high quality cases, i.e., case 1, 2, 5, and 10, the proportion of decision rights allocated to firms are marked as 'high', which means more decision rights are allocated to firms. As the quality standard requirement is decreased to a medium level in the cases 3, 4, 6, 7, 8, 11, and 12, the proportion of decision rights allocated to firms is also decreased to 'medium' and thus less decision rights are allocated to firms. As the quality standard requirement is further decreased to a low level in case 9, the proportion of decision rights to firms remains at the 'medium' level. However, further compared with the exact number of decision rights to firms in all medium-quality cases, the firm in case 9 has the least decision rights, i.e., 8 (see the last row in table 4). Therefore, the data shows that quality is positively related with the decision rights allocated to firms, thus hypothesis 7 is supported.

Since only 6 cases provide the information on the completeness of contracts, we could only check these 6 cases. The 6 cases vary in the firm's quality standards, which gives us a nice setting to test hypothesis 1. Quality is high in the cases 2, 5 and 10, while quality is medium in the case 4, 8 and 11. In the high-quality cases 2 and 5, the number of clauses are rather high, that is 20 and 34 respectively. However, in the third high-quality case 10, the number of clauses is fairly small, i.e., 8.[28] In the medium-quality cases 4, 8 and 11, the number of clauses is correspondingly 8, 7 and oral, which implies that the contracts are relatively less complete. Thus, as the quality increases from medium level to a high level, the clauses of a contract tend to increase and consequentially the completeness of a contract is increased. Therefore, the data shows that quality is positively influencing the completeness of contracts, and thus the hypothesis 1 is supported.

[28] We check the reasons why the number of clauses in high-quality case 10 is so small. We found in this case, the firm contracts with farmers via a cooperative. Cooperatives, as member-owned and member-managed governance structure, have advantage in coordinating its members, thus it is less necessary to specify detailed contracts. This may be the reason why the contractual terms are less complex compared with other firms.

#### 4.5.3.3. Reputation, Contract Completeness and Decision Rights Allocated to Firms

Two kinds of measurements are adopted to measure reputation: brand name capital and official honor/award. Firstly, let us look at the first measurement of reputation: *brand name capital*. The 12 cases exhibit large differences. The firm in case 1 has a national well-recognized brand. In 2005, the firm spent 1,000,000 Yuan in advertising. The firms in cases 2, 4, 5, 6, 7, 8 and 12 have well-recognized local brands, while the firm in the cases 3, 9, 10 and 11 have no registered brands at all.

The interviews indicate that firms may not be very interested in establishing brands. For example, in case 1, although the advertising fee is large compared with the other cases, the fee is quite small compared with its sale volume (i.e., 2.6 billion Yuan). The manager told us that the advertisement is mainly for selling vegetable and related products in domestic markets. If products are only sold abroad, managing and maintaining the relationships with old customers are more important than acquiring recognition in foreign markets. In other word, if not for domestic marketing, the firm will not spend too much in advertising. This consideration is also reflected in other cases. The general director also showed no interest in advertising the firm's brand in case 2. We were told that managers having a good relationship with large foreign customers are vital for the success of a firm, not any brand on itself. In case 3, the manager even told us directly his firm will not waste the money in registering a brand. Compared with these foreign-market-oriented firms, domestic-market-oriented firms hold different views regarding brands and advertisement. For example, in case 4 where the firm is mainly active in the domestic market, the two interviewees agree that branding is important. The firm spent 6,000 Yuan in advertising in 2005.

It is not clear if brand name capital positively influences the completeness of a contract. In the 6 cases providing the completeness information of contracts, 4 cases have local brands, while 2 have no registered brands. For the 4 cases with the locally recognized brand names, the number of clauses varies from 7 to 34, with the average of 17. For the 2 cases with no brands, case 10 has 8 clauses while case 11 uses an oral contract. When brand name capital is increased from a no-brand level to a recognized local brand level, the number of clauses in a contact may decrease (see case 8), or may increase (see cases 2, 4 and 5). Therefore, we can not say confidently that brand name capital positively influences the completeness of a contract.

We cannot draw a conclusion regarding the brand name capital and decision rights allocation either. In case 1, a national-recognized brand name is associated with a high proportion of decision rights allocated to the firm. When brand name capital decreases from a national-recognized level to a local-recognized level, the proportion of

decision rights allocated to firms either maintain a high level (see cases 2 and 5) or decrease to a medium level (see cases 4, 6, 7, 8 and 12). Till now, it seems that there may be a positive relationship between the two variables. However, as brand name capital further decreases (i.e., no registered brands), the proportion of decision rights allocated to firms still maintains a medium level (see cases 3, 9 and 11) or even increase to a high level (see case 10). Thus, the data does not show the predicted relationship.

Secondly, let us check the second measurement of reputation: *official honor/award.* The 12 cases are distinguished by considering four levels regarding official honors/awards. One case (i.e., case 1) has several national honors/awards, five cases have several provincial honors/awards, and four cases have several local honors/awards, while two cases have no official honor/award. In detail, the firm in case 1 is the most well recognized, because it is awarded 'national dragon-head enterprise' and meanwhile acquired several national awards such as '500 Leading China Manufacturing Enterprise', '100 Leading China Food Enterprise', etc. The firms 2, 5, 8, 10 and 12 acquire several honors or awards from provincial governments, such as 'provincial dragon-head enterprise'. The firms 3, 4, 7 and 9 are honored or awarded as 'local dragon-head enterprise' by local governments. In the cases 6 and 11, the two firms claim they have not acquired any honors/awards from local governments.

The relationship between official honor/award and the completeness of contracts is investigated now. In case 11 with no official honor/award, an oral contract is used, which represents the least complete contract. In case 4 with local honor/award, the number of clauses is 8. Till now, the prediction holds as we expect. However, when we look into the remaining 4 cases, which all have provincial honors/awards, the number of clauses remains the same (see case 10) or increase in three cases (see case 2 and 5), while it is decreased to 7 in one case (see case 8). Since one case offers an opposite relationship, we can not confidently draw a conclusion that here is a positive relationship between the two variables. Therefore, hypothesis 2 regarding a positive relationship between reputation, either measured by brand name capital or measured by official honor/award, and the completeness of contracts is not supported by the data.

The relationship between official honor/award and decision rights allocated to firms is investigated now. For the one case with national honors/awards, the proportion of decision rights allocated to firms is high. For the four cases with provincial honor/award, it is either high (see cases 2, 8 and 10) or medium (see case 12). For the four cases with local honors/awards, it is all medium, while for the 2 cases with no honor/award, it is medium. Thus, as the firm acquires a higher-ranked government honors/awards, which implies that the reputation is more established and recognized at a larger scale than the local environment, more decision rights are allocated to firms. Therefore, the data shows that

there is a positive relationship between reputation, measured by official honor/award, and decision rights allocated to firms. It means that hypothesis 8 regarding a positive relationship between reputation, measured by official honor/award, and decision rights allocated to firms is supported.

#### 4.5.3.4. Uncertainty and Contract Completeness

In general, two firms characterize the market by a high level of uncertainty, and eight firms think that the market is characterized by a medium level of uncertainty, while two firms perceive the uncertainty of the market to be at a low level. For the six cases with the information regarding the completeness of contracts, one firm ranks the market as highly uncertain, and three firms rank it as medium uncertain, while two firms rank it at a low level of uncertainty.

For the two cases with low uncertainty, case 11 uses an oral contract (i.e., the least complete), while case 4 has 8 clauses in its written contract. For the three cases with medium uncertainty, the number of clauses is increased to 8 in case 10, and 20 in case 2, while it is decreased to 7 in case 8. For the case with high uncertainty, the number of clauses is increased dramatically to 20. Thus, low uncertainty is associated with a less complete contract, while high uncertainty is associated with a more complete contract. However, the data regarding medium uncertainty does not show a clear pattern. Therefore, we think the hypothesis 3 is partly supported. More data or alternative measurement regarding uncertainty may be adopted to test the robustness of this hypothesis in future research.

#### 4.5.3.5. Decision Rights Allocated to Firms and Firm's Specific Investment

In the twelve cases, firms make specific investments regarding physical investment as well as human capital investment. In four cases, the firm perceives its specific investments to be at a high level, and three cases classify its specific investment at a medium level, while the firm in five cases classifies its specific investment as a low level.

For the five cases with low firm's specific investment, the proportion of decision rights allocated to firms is all ranked as 'medium'. As the firm's specific investment is increased from a low level to a medium level, the proportion of decision rights allocated to firms remains at a medium level (cases 6 and 8) or increase to a high level (case 10). As the firm's specific investment is further increased from a medium level to a high level, three cases shows that the proportion is increased to a high level too, and only one case remains at the same medium level. What we learn from the four cases is, therefore, as specific investment is increased, the decision rights allocated to firms are increased as well.

That is to say, the level of specific investment by firms is positively related with the decision rights allocated to firms.

#### 4.5.3.6. Decision Rights Allocated to Firms and Farmer's Specific Investment

In eleven cases, the farmer grower is thought to have a low level of specific investment, and only one case (case 5) perceives the farmer grower to be at a medium level of specific investment. For the cases with low farmer's specific investment, the proportion of decision rights allocated to firms is either high (in three cases) or medium (in seven cases). As the farmer's specific investment is increased to a higher level, the proportion of decision rights allocated to firms is increased to a higher level too (see case 5), which is contrary to our prediction. Thus, the hypothesis regarding a negative relationship between farmer's specific investment and decision rights allocated to firms is not supported. It means that farmer's specific investment is not the determining factor regarding the allocation of decision rights. The reason may be, although farmers made specific investment, this investment seems to be too limited to drive farmers in the direction of more decision rights.

#### 4.5.3.7. Decision Rights Allocated to Firms and Monopsony-Oligopsony Power

In all twelve cases, firms have some monopsony-oligopsony power. This is in accordance with the fact that farmer growers are weak in most transactions. In five cases, the firm is perceived to have a high level of monopsony-oligopsony power, and in six cases, the firm has a medium level of monopsony-oligopsony power, while only in one case (i.e., case 3) the firm has a low level of monopsony-oligopsony power.

It is interesting to point out that the size of a firm is not the reason determining the level of monopsony-oligopsony power. For example, firm 4 is rather small in terms of permanent employees or in terms of fixed capital investment, however, this firm is perceived to have a larger bargaining power. Two reasons may explain high monopsony power. One factor is the market in which the firm operates. Take case 4 as example again. This firm mainly deals with fresh vegetables in domestic markets. When asked about the competitiveness of the market in which the firm operates, we were told that the competition is not very intensive. The reason is that they develop a market niche by making use of the rapid rise of supermarkets. The firm signs contracts with supermarkets to supply them with high-quality fresh vegetables. Since most agricultural firms around this firm are less sensitive to the development of supermarkets, it establishes its success in marketing to supermarkets. The other factor is the size of growers from whom the firm procures vegetables. Larger growers may have more channels to market their products, and may attract more firms to do business with them. In contrast, small farmers have fewer

alternatives to contract with other firms because they are small in size and may lack a good reputation. For example, in case 1 where the largest firm with only medium monopsony-oligopsony power, the smallest contracted landing scale for one grower is 100 mu. However, the small firm in case 4 contracts with more than 200 farmers, and each farmer's contracting land is only around 2 or 3 mu.

For the case with low monopsony-oligopsony power, the proportion of decision rights allocated to firms is ranked as medium. As the monopsony-oligopsony power is increased to a medium level, the proportion of decision rights allocated to firms either remains at a medium level (in 4 cases) or increases to a high level (in 2 cases). As the proportion of decision rights allocated to firms is further increased to a high level, 2 cases show a high level of the proportion of decision rights allocated to firms and 2 cases show a medium level of the proportion of decision rights allocated to firms. Therefore, the hypothesis regarding a positive relationship between firm' monopsony-oligopsony power and allocated decision rights is partly supported.

#### 4.5.3.8. Summary

We summarize the empirical results in table 4.6. Among the 8 hypotheses, 4 are supported, 2 are partly supported, while 2 are not supported. Two main findings are as follows. Firstly, quality positively influences the completeness of a contract. Secondly, when the firm deals with a high quality product, has a well-recognized reputation, and has made substantial specific investments, more decision rights will be allocated to the firm when contracts are signed.

Table 4.6 Empirical results

| Hypothesis | Dependent Variable | Independent variable | Predicted sign | Empirical result |
|---|---|---|---|---|
| 1 | Contract completeness | Quality | + | Supported |
| 2 | Contract completeness | Reputation | + | Not supported |
| 3 | Contract completeness | Uncertainty | - | Partly supported |
| 4 | Decision rights allocated to firms | Firm's specific investment | + | Supported |
| 5 | Decision rights allocated to firms | Farmer's specific investment | - | Not supported |
| 6 | Decision rights allocated to firms | monopsony-oligopsony power | + | Partly supported |
| 7 | Decision rights allocated to firms | Quality | + | Supported |
| 8 | Decision rights allocated to firms | Reputation | + | Supported |

## 4.6 Conclusion and Future Research

We empirically examine the determinants of the completeness of a contract and the allocation of decision rights / decision rights in the context of fruit and vegetable contracting. Three main conclusions follow. Firstly, it is shown that the extent of completeness of a contract and the allocation pattern of decision rights vary substantially across different supply chains in China. This observation is in line with many other studies. Secondly, a contract is more complex when the firm designing the contract sells high quality products. In addition, market uncertainty may determine the completeness of a contract too, while reputation has no effect on the completeness of a contract. Thus, the predictions regarding uncertainty (measured by market uncertainty) and contracting value (measured by quality and reputation) is partly supported by our empirical findings.

Thirdly, under contract farming, many decision rights are shifted from farmers to firms. Quality, reputation and specific investments by firms positively influence the number of decision rights allocated to agri-business firms under contract farming, while monopsony-oligopsony power and specific investments by farmers have no effect on the allocation of decision rights.

There are several directions for future research. First, this research is limited by the size of the sample, which consists of only 12 contract farming networks. Collecting more data regarding new cases will help to test the robustness of our findings. Especially, regression analysis can be adopted and add additional value to the generalization issue if more than 50 cases are selected. Second, this research is focused on the fruit and vegetable sector. Other sectors will again help to test the robustness of our findings.

## Appendix 4-1 Questionnaire (English)

**Project Objective:**
This research explores contractual arrangements under contract farming in fruit and vegetable sectors in China. This research aims to contribute to the literature regarding contracting completeness and decision rights allocation, by examine detailed coordination and motivation arrangements between agri-business firms and upstream primary growers.

**Targeted object of this interview**
This questionnaire applies to agri-business firms which procure fruits and/or vegetables via written contracts or oral contracts. Senior managers are targeted interviewees. Your cooperation is very important for our research. Thank you in advance for your cooperation.

**Questions to be clarified:**
1) The name, Title of the interviewee and the contact telephone are used for spot tests and follow-up data verification. The pricy is guaranteed.
2) For some questions, the choice items have been designed; for the rest, the interviewee has to develop answers by himself.
3)This questionnaire is suitable for both vegetable contacting and fruit contracting.

Contact Person:
If you have any questions regarding this questionnaire or you have any suggestion, or you wish to receive final reports, please contact Drs. Yamei Hu. The telephone is 0031(10)4081966, and the email is yhu@rsm.nl 。

**A Background of the interviewee and the firm**
*We would like to know some background information on you and your firm.*

1. Name of the firm: _____
2. Established time of the firm: _____
3. Name and Title of the interviewee: _____
4. Contact telephone of the interviewee:_____
5. The ownership structure of the firms can be classified as:
   (1) State-owned firms
   (2) collective-owned firms
   (3) 100% owned by senior managers and their relatives
   (4) other types (please specify)_____
6. Permanent employees of the firm: _____
7. The fixed capital investment of the firm: _____Yuan
8. Total Sale of the firm in 2005: _____Yuan
9. Gross profit of the firm in 2005: _____Yuan
10. Net profit before tax of the firm in 2005: _____ Yuan
11. The proportion of vegetable business in all businesses: _____(%)

12. Main vegetables the firm deals with (please specify): _____
13. The vegetables are mainly sold to:
    (1) _____% of vegetables is sold in local markets;
    (2) _____% of vegetables is sold with your province;
    (3) _____% of vegetables is sold outside your province;
    (4) _____% of vegetables is sold in foreign markets.

**B. Procurement**

*We would like to know where do you procure your vegetables and how do you buy your products.*

14. how many vegetables did your firm processes or sales last year?
(1) _____(in terms of Yuan); or, (2) _____ (in terms of kilogram)
15. Where do your firm buy vegetables? (*Please choose the relevant buying channels)*

- farmers_____
- agricultural company_____
- farmer cooperatives/ associations/other cooperative organizations_____
- firm's self-owned or self-rented production base_____
- Firm's contracted production base_____
- Agricultural wholesale markets_____
- Agricultural wet markets_____
- distribution center_____
- other, *please specify*_____

16. Regarding the vegetables procured by your firm:
__% from your firm's self-owned or self-rented production base (i.e., grown by your firm)
__% from Firm's contracted production base(i.e., procured via contacts by your firm)
__% from spot markets
17. Regarding the vegetables procured by your firm:
    (1) _____ % is used for processing;
    (2) _____% is used for selling fresh vegetables;
    (3) _____% is used for other purposes, please specify_____
18. Does you firm use contracts when **procuring** vegetables?
    (1) Yes, we use **Written** contracts;
    (2) Yes, we use **Oral** contracts;
    (3) No, we do use contracts
19. Does you firm use contracts when **selling** vegetables?
    (1) Yes, we use **Written** contracts;
    (2) Yes, we use **Oral** contracts;
    (3) No, we do use contracts
20. Regarding the farmers who provide vegetables to your firms, are there other firms to contract with them to grow and/or market vegetables?
    (1) There is no other firms which may contract with farmer for growing (or marketing) vegetables;

(2) There are no more than five firms which may contract with farmer for growing (or marketing) vegetables;
(3) There are no more than ten firms which may contract with farmer for growing (or marketing) vegetables;
(4) There are more than ten firms which may contract with farmer for growing (or marketing) vegetables;

C. Market information
*We would like to know the some properties regarding the market where your firm is in.*

21. The extent of competition of your firm's business can be classified as
(1) The competition is not intensive at all;
(2) The competition is to some extent intensive;
(3) The competition is intensive;
(4) The competition is very intensive;
(5) The competition is extremely intensive.
22. The main competitor firm of your firm is located in
(1) Local;
(2) The province where your firm is located;
(3) Outside of the province where your firm is located;
(4) Abroad.
23. Regarding the market where you firm is in, what kind of products the consumers tend to search for
(1) The consumers tend to search for high quality products;
(2) The consumers tend to search for low price products;
(3) The consumers tend to search for new products;
(4) Others, *please specify* _____
24. Regarding the market where you firm is in, how is the supplying condition?
(1) The product is over-supplying for several years;
(2) The product is short of supplying for several years;
(3) The product's supply is not stable;
(4) Others, *please specify* _____

D. Investment information
*We would like to know the investment on assets by your firm and by your upstream suppliers.*

25. In the last three years, your firm may have made physical investments in procuring, processing and marketing vegetables. Please choose the right level regarding this kind of investment:
(1) No investment at all;
(2) Very limited investments;
(3) Some investments;
(4) Large investments;
(5) Extremely large investment.
26. If your firm does not operate the current vegetable business, then the investments made in procuring, processing and marketing vegetables by your firm may occur loss. Your firm

may continue making use of these physical assets, or may transfer these physical assets to other firms. Please evaluate the extent of the loss, after considering all these possibilities:

(1) No loss at all;
(2) Very limited loss;
(3) Some loss;
(4) Large loss;
(5) Extremely large loss.

27. Does your firm train the employees to procure, process, market vegetables?

(1) No training at all;
(2) Only few training;
(3) Sometimes train the employees;
(4) From time to time train the employees;
(5) a large number of trainings.

28. If your firm does not operate the current vegetable business, then the knowledge as well as the skills for procuring, processing, and marketing may occur loss. Please evaluate the extent of such a loss:

(1) No loss at all;
(2) Very limited loss;
(3) Some loss;
(4) Large loss;
(5) Extremely large loss.

29. Did your firm invested in controlling quality of vegetables in last three years?

(1) No investment at all;
(2) Very limited investments;
(3) Some investments;
(4) Large investments;
(5) Extremely large investment.

30. The investment of your firm in procuring, processing, marketing and quality controlling is about: _____Yuan

31. The farmer who provides vegetables for your firm come from:

_____% from local society；
_____% from the province where your firm is located；
_____% from outside of the province where your firm is located.

32. The farmer may need to make physical investment in order to deliver qualified vegetables to your firm. Please evaluate the extent of such an investment by a farmer:

(1) No investment at all;
(2) Very limited investments;
(3) Some investments;
(4) Large investments;
(5) Extremely large investment.

33. The farmer may need to learn new technology or skills in order to deliver qualified vegetables to your firm. Please evaluate the extent of such an human capital investment by a farmer:

(1) No investment at all;
(2) Very limited investments;
(3) Some investments;

(4) Large investments;
(5) Extremely large investment.

**E Brand**

*We would like to know the branding strategies of your firm.*

34. Is your firm recognized as Dragon-head Enterprise?
(1) Yes, our firm is _____ (national-level; provincial-level; district-level; county-level)
(2) No, our firm is not a dragon-head enterprise.
35. In the last three years, your firm may acquire honors and/or awards from governments. Please classify:
How many honors and awards are from local government: _____
How many honors and awards are from provincial government: _____
How many honors and awards are from central government: _____
36. Please specify the most important honor/award for your firm: _____
37. Does your firm have brands?
(1) Yes, the brand is _____;
(2) No, we have no brand at this moment.
38. Has the brand of your firm been already registered?
(1) Yes, the brand has already been registered;
(2) No, the brand has **not** been registered yet.
39. What kind of honor/award does the brand of your firm get?
(1) There is no honor/award at this moment;
(2) Local-level famous (well-known) brand;
(3) Provincial-level famous (well-known) brand;
(4) National-level famous (well-known) brand;
(5) Other, *please specify* _____
40. The market value of your firm's brand is about _____ Yuan.
41. Your firm has invested _____ yuan in advertisement for this brand.
42. Has the vegetable which your firm deals with acquired any national or international quality certifications?
(1) No Pollution Food;
(2) Green Food;
(3) Organic Food;
(4) International quality certification, *please specify* _____
(5) Others, *please specify* _____
(4) National-level famous (well-known) brand

**F Procure or grow vegetables via contracts**

*We would like to know the contractual relationship between agri-business and farmers.*

43**. Does your firm procure (or grow) vegetables by contracts?
(1) Yes, we use contracts;
(2) No, we do not use contracts.

***If the interviewee answers 'No' to Question 43, then ask the interviewee Question 44 and 45. After answering to these two questions, the interview will be closed. Thanks for the participation!***

***If the interviewee answers 'Yes' to Question 43, then jump Question 44 and 45, and directly ask the interviewee Question 46.***

44. Has your firm never used contracts to procure vegetables?
    (1) Yes, We has never used contracts to procure vegetables.
    (2) No, We once used contracts to procure vegetables, but will not use contract any more for some reasons.
45. What are the reasons why your firm stopped using contracts?
    (1) Too many farmers used to breach contracts;
    (2) The cost of using contract is too high;
    (3) Our firm grows vegetables by ourselves.
    (4) Others, please specify: _____

***If your firm is now using contracts to procure or grow vegetables, then please answer the following questions. Thanks for your patience!***

46. The proportion of the vegetables procured by contracts:_____%
47. The sales of the vegetables procured by contracts: _____Yuan
48. The gross profit of the vegetables procured by contracts: _____Yuan
49. The net profit of the vegetables procured by contracts: _____Yuan
50. Regarding the vegetables procured by contracts,
    _____% are grown in the open field;
    _____% are grown in the shed-field.
    Others, please specify: _____
51. Does your firm sign contracts directly with farmers or via other organizations/agencies?
    (1) We sign contracts *directly* with farmers;
    (2) We sign contracts with farmer *via farmer cooperatives/ associations*.
    (3) We sign contracts with farmer *via village commission or town-level government agencies;*
    (4) Others, please specify _____
52. Since when did your firm begin signing contracts with farmers?_____
53. How many farmers do your firm sign with: _____
54. Regarding the farmers who sign contacts with your firm,
    The average scale for the contracted farmers is: _____
    The largest scale for the contracted farmers is: _____
    The smallest scale for the contracted farmers is: _____

55. Regarding the contract with the longest duration, how many years it lasts? _____
56. Where did your firm get the information on farmers before your firm signed contracts with them?
(1) We do not have any information regarding the farmers before we sign contracts;
(2) We get the information regarding the farmers from other similar enterprises;
(3) We get the information regarding the farmers from other farmers;
(4) We get the information regarding the farmers from business organizations;
(5) We get the information regarding the farmers from government;

(6) We get the information regarding the farmers from our own research;
(7) We get the information regarding the farmers from families, relatives and friends;
(8) Others, *please specify*: _____

57. To what extent does the current legal system provide guarantees for enforcing contracts.
(1) It does not play any role;
(2) It plays a very limited role;
(3) It plays a role;
(4) It plays a quite important role;
(5) It plays very important role.

58. Your firm may need to re-negotiate the contract with farmers after signing the contract. Please evaluate to what extent it is necessary to negotiate and adjust contractual terms:
(1) It is not necessary at all;
(2) To a very limited extent;
(3) To some extent;
(4) To a large extent;
(5) To a very large extent;

59. If your firm breaches a contract with a farmer, will other farmers knows about it?
(1) Yes, other farmer will know it;
(2) No, other farmers may not know it.

60. If a farmer breaches a contract with your firm, will other farmers knows about it?
(1) Yes, other farmer will know it;
(2) No, other farmers may not know it.

61. Please evaluate: is it complex for the transaction between your firm and farmers?
(1) Not complex at all;
(2) Very limited complex;
(3) Quite complex;
(4) Very complex;
(1) Extremely complex;

62. Regarding the vegetable procured by contracts, is the growing of this vegetable influenced by the national environment such as weather?
(1) Not at all;
(2) To a very limited extent;
(3) To some extent;
(4) To a large extent;
(5) To a very large extent.

63. Regarding the vegetable procured by contracts, the technology for growing this vegetable influenced can be classified as
(1) It does not have any development;
(2) It develops very slowly;
(3) It develops slowly;
(4) It develops fast;
(1) It develops very fast.

64. Regarding the vegetable procured by contracts, to what extend does your firm feel difficult to predict the market information such as supply, demand and price:
(1) Not at all;
(2) To a very limited extent;
(3) To some extent;

(4) To a large extent;
(5) To a very large extent.

**F Basic terms in contracts**

*We would like to know the terms regarding price, quantity and quality in your contracts.*

65. Does the contract specify a fixed quantity regarding the vegetable to be delivered?
(1) Yes, it specifies the quantity in terms of how many *mu;*
(2) Yes, it specifies the quantity in terms of how many kilogram;
(3) No, it does not; however, we have rights to require the farmer to deliver a assigned amount of vegetables;
(4) No, it does not; and, a farmer makes decision on how many to deliver by himself;
(5) Others, please specify: _____
66. Does the contract specify how to pay to farmers?
(1) Yes, it specifies a fixed unit price, regardless high or poor quality of the delivery*;*
(2) Yes, it specifies a fixed unit price, plus a quality bonus*;*
(3) Yes, it specifies a minimum protection price. If the spot market price is higher than this minimum protection price at delivery, the market price will be adopted; otherwise, our firm pays to farmers based on the protection price.
(4) Yes, it specifies that our firm will pay farmers based on the spot market price at delivery; and we have rights to decide the actual price later on;
(5) No, the contract does not say anything on price.
(6) Others, *please specify*: _____
67. Is the price paid by your firm to farmers is obviously dependent on the final price of marketed/sold products?
(1) Yes;
(2) No.
68. Does the contract specify that a part of payments will be paid to farmers before actual delivery?
(1) Yes, it says that a part of payment will be paid before delivery;
(2) No, it does not specify on it, and we will not pay farmers in advance;
(3) No, it does not specify on it, but we usually pay a part of payments to farmers;
69. If your firm pays a part of the payment to farmers in advance, then the proportion of the pre-paid to the overall payment is : _____%.
70. Does the contract specify that farmers have to submit a certain of money as credit when signing contracts?
(1) Yes, it requires farmers to submit _____ Yuan;
(2) No, it does not require it;
(3) Others, please specify: _____
71. Does the contract specify that your firm has to submit a certain of money as credit when signing contracts?
(1) Yes, it requires our firm to submit _____ Yuan;
(2) No, it does not require it;
(3) Others, please specify: _____
72. Does the contract specify what quality standard the vegetable delivered by a farmer should meet?
(1) Yes, it specifies Non Pollution Food quality standard;
(2) Yes, it specifies Green Food quality standard;

(3) Yes, it specifies Organic Food quality standard;
(4) Yes, it specifies a quality standard made by our firm;
(6) No, it does not specify quality standard.

73. If your firm makes your own quality standard, to which national quality standard does it equals?
(1) Non Pollution Food quality standard;
(2) Green Food quality standard;
(3) Organic Food quality standard

74. How many transactions between your firm and farmers is this contract applied to?
(1) Only one transaction;
(2) Several transactions;
(3) Many transactions.

75. The duration of the contract is:
(1) _____ days; (2) _____ months; (3) _____ years

76. If the current contract expires, will the contract automatically update between your firm and contracted farmers?
(1) Usually it automatically updates
(2) It will not automatically update, and our firm decide if to continue contracting with current contracted farmers;
(3) It will not automatically update, and we need to negotiate with the current contracted farmers to continue contracting.

**G Restrictive terms in contracts**

*We would like to know the clauses regarding quality control, standardization production.*

77. Does your firm specify regarding farmers' inputs? For a specific input, a contract may require what input to use, or may not say anything on it and let firms or farmers decide later on. Please choose the right option for each input.

| Actual situation<br><br>Input | (1) provided by us; | (2) The contract specify what kind of inputs (such as brand, type) farmers should use | (3) The contract does not specify, but we have rights to decide on what kind of inputs (such as brand, type) farmers should use; | (4) The contract does not specify, but farmers have rights to decide by themselves. |
|---|---|---|---|---|
| seeds | | | | |
| fertilizer | | | | |
| pesticides | | | | |
| Planting equipments | | | | |
| irrigation equipments | | | | |
| harvesting equipments | | | | |
| Other cropping equiqments | *(please specify)* | | | |

78. Does the contract specify regarding farmers' production activities? (e.g., planting time, methods, etc)

| Actual situation<br><br>planting activities | (1) we provide production guidance booklet | (2) The contract requires farmers to grow vegetables according to our requirements. | (3) The contract does not specify, but we send technicians to guide or help farmers | (4) The contract does not specify, and farmers made their own decisions |
|---|---|---|---|---|
| Planting plan | | | | |
| activities before planting (such as ploughing) | | | | |
| planting | | | | |
| use of pesticide | | | | |
| use of fertilizer | | | | |
| harvesting | | | | |

79. For the following activities, does the contract make any specifications?

| Actual situation<br><br>after-planting activities | (1) The contract specifies how to do it | (2) The contract does not specify, but we have rights to require farmer to do what we would like them to do | (3) The contract does not specify, and farmers have rights to made the decision | (4) The contract does not specify, and we have rights to made the decision |
|---|---|---|---|---|
| Packaging before delivery by farmers | | | | |
| storing before delivery by farmers | | | | |
| delivery time and place | | | | |
| sorting, grading, packaging for weighing and labeling | | | | |
| labeling | | | | |
| storing | | | | |
| processing | | | | |
| marketing | | | | |

80. Regarding the farmer who contracts with your firm, the land where this farmer grows vegetables belongs to:

(1) This farmer;

(2) Our firm;

(3) Others, *please specify*: _____

81. Does the contract specify under what condition the contract will be terminated?

(1) Yes, it clearly specifies the conditions;

(2) No, it does not specify the conditions; however, we have rights to make decision;

(3) No, it does not specify the conditions; however, farmers have rights to make decision.

82. Does the contract specify that your firm has rights to monitor production activities of contracted farmers?

(1) Yes;

(2) No, the contract does not specify, but we have rights to monitor farmers' production activities;

(3) No, the contract does not specify, and we do not have rights to monitor farmers' production activities.

83. Does your firm often monitor contracted farmers' production?

(1) Never;

(2) Seldom;

(3) A few times;

(4) Many times;

(5) Very often.

84. Does the contract specify regarding how to control quality?

(1) Yes;

(2) No.

**I Effect of contracts**

*We would like to know your evaluation on the quality and quantity of vegetables provided via contracts.*

85. Regarding the vegetable procured by contracts, the actual quality of the vegetable provided by the contracted farmers is reliable. Do you agree on it?

(1) Strongly disagree;

(2) To some extent disagree;

(3) Basically agree;

(4) To large extent agree;

(5) Strongly agree.

86. Regarding the vegetable procured by contracts, the actual quality of the vegetable provided by the contracted farmers is steady and consistent. Do you agree on it?

(1) Strongly disagree;

(2) To some extent disagree;

(3) Basically agree;

(4) To large extent agree;

(5) Strongly agree.

87. Regarding the vegetable procured by contracts, the actual quantity of the vegetable provided by the contracted farmers meets the expected level when signing contracts. Do you agree on it?

(1) Strongly disagree;

(2) To some extent disagree;

(3) Basically agree;

(4) To large extent agree;

(5) Strongly agree.

88. If a farmer fails to deliver the vegetable, i.e., his vegetables can not meet the requirement specified by contracts in terms of quality or quantity, how will your firm deal with this problem?

(1) We will never sign contracts with this farmer again;

(2) We will make decision after finding out the reason for breaching contracts by this farmer;

(3) Other, please specify: _____

**The is the end of the interview. Thank you very much for the information. If you could show us a copy of actual contracts or a blank contract sample, it will be especially helpful for our research. Thank again for your cooperation!**

# Appendix 4-2 Questionnaire (Chinese)

## 关于农业合同的问卷调查

问卷设计人： 胡雅梅博士(中国) Hendrikse 教授(荷兰)

**研究目的：**
本研究项目考察中国农业定单生产和销售的合同设计及治理结构问题。该研究的理论目的是对契约完整性研究做出贡献，实际目的是对协调农业企业与上游初级产品生产者之间的关系、探索农业一体化的多种方式做出贡献。

**问卷调查的对象：**
本问卷适用于采用**书面合同或者口头合同**方式从事蔬菜或者瓜果生产、销售、加工、贸易的农业企业(含各类农民合作组织)。中高级经理人是适当的答卷人。您的合作对于我们的研究非常重要，衷心感谢您的合作!

**需要澄清的问题：**
1) 答卷人姓名、职务与联系电话用于后期抽查、核实、补充部分数据。
2) 多数问题已经给出备选答案，您只需要选出正确的选项；少数问题没有给出备选答案，此时需要您写下自己的答案。
3) **该问卷既适用于蔬菜合同、也适用于水果合同**。如果您的企业主要经营水果，但是收到的问卷却只提到"蔬菜"、未提及"水果"，请把题干中所有的"蔬菜"用"水果"替代即可。

**联系人及联系方式：**
如果您对问卷中的问题或者问卷本身有问题或者建议，如果您想了解最终的研究报告，欢迎联系胡雅梅博士，0031 (10) 4081966 ， yhu@rsm.nl 。

### 一、答卷公司及答卷人的背景（*本部分了解贵公司及您的一些背景信息*）

1．公司名称：_____
2．公司建立时间：_____
3．答卷人姓名及职务：_____
4．答卷人联系电话：_____
5．公司的所有权结构属于：
– 国有企业
– 集体企业
– 100%由高级管理人员及其亲属所有的私营企业
– 其他类型私营企业（***请说明***）_____
6．公司固定员工的人数：_____人
7．公司固定资产投资的规模：_____元
8． 2005 年公司的总销售额：_____元
9． 2005 年公司的毛利润：_____元
10．2005 年公司的税前净利润：_____元
11．蔬菜业务占贵公司总业务量的比例（%）：_____
12．贵公司主要经营的蔬菜品种（***请说明***）：
_____
13．贵公司的蔬菜主要销售地区：
（1）蔬菜总量的_____%在本地销售（2）蔬菜总量的_____%在本省销售；
（3）蔬菜总量的_____%销往外省；（4）蔬菜总量的_____%销往国外；

### 二、蔬菜的采购（*本部分了解贵公司的蔬菜采购渠道及方式*）

14．去年贵公司销售或者加工了多少蔬菜？
(1)_____（按人民币计算）； (2)_____ （按重量计算）
15．贵公司在哪里购买蔬菜？*（请选出所有正确的选项）*
（1）农民
（2）农业公司
（3）农民合作社、农民协会及其他合作组织
（4）贵公司的自主生产基地
（5）贵公司的合同生产基地
（6）农产品批发市场
（7）零售农贸市场
（8）配送中心
（9）其他渠道（***请说明是何种渠道***）_____
16．贵公司所采购的蔬菜，
_____%来自于公司的自主基地（即：公司自己生产的蔬菜）
_____%来自于公司的合同基地（即公司通过合同购买的蔬菜）
_____%来自于市场
17．贵公司所采购的蔬菜：
（1）____%用于加工；
（2）____%用于销售新鲜蔬菜；
（3）____%用于其他用途（***请说明是何种用途）：***_____
18．贵公司采购蔬菜时是否使用合同？
（1）是的，我们采用**书面**合同；
（2）是的，我们采用**口头**合同；
（3）不是，我们不使用合同生产或者收购这种方式。
19．贵公司销售蔬菜时是否使用合同？
（1）是的，我们采用**书面**合同；
（2）是的，我们采用**口头**合同；
（3）不是，我们不使用合同这种方式。
20．就为贵公司提供蔬菜的农民而言，其他企业可能与他们进行定单生产或销售吗？
（1）没有一家其他企业可能与农民进行定单生产（或者销售）；
（2）可能与农民进行定单生产（或者销售）的其他企业不多于 5 个；
（3）可能与农民进行定单生产（或者销售）的其他企业不多于 10 个；
（4）可能与农民进行定单生产（或者销售）的其他企业多于 10 个。

**三、市场情况**(*本部分了解企业的市场情况*)

21．贵公司所经营业务的竞争程度属于：
（1）竞争一点都不激烈；
（2）竞争不怎么激烈；
（3）竞争激烈；
（4）竞争很激烈；
（5）竞争非常激烈。
22．贵公司最主要的竞争对手位于：
（1）当地； （2）本省； （3）省外； （4）国外
23、在贵公司所处的市场中，消费者喜欢什么样的产品？

（1）消费者倾向于寻找高质量产品；
（2）消费者倾向于寻找低价格产品；
（3）消费者倾向于不断寻找新产品；
（4）其他(***请说明***)_____

24．在贵公司所处的市场中，产品的供给情况稳定吗？
（1）产品的供给连续多年过剩；
（2）产品的供给连续多年不足；
（3）产品的供给不稳定；
（4）其他(***请说明***)_____

**四、投资情况**（*本部分了解贵公司及上游供应商的资产投资*）

25．在过去三年中贵公司可能在采购、加工、销售蔬菜上进行了投资，请选出正确的投资数量：
（1）没有任何投资
（2）少量投资
（3）较多投资
（4）大量投资
（5）巨额投资

26．如果公司不再经营现有的蔬菜业务，那么公司对采购、加工、销售蔬菜所进行的投资可能遭到损失。公司可能继续使用这些投资，也可能转让给其他企业。在考虑到这些情况之后，请说说贵公司的损失：
（1）完全没损失
（2）基本没损失
（3）一些损失
（4）损失很大
（5）巨大损失

27．为采购、加工和销售蔬菜，贵公司是否培训员工？
（1）没有培训
（2）偶尔进行培训
（3）有时进行培训
（4）定期培训
（5）非常多的培训

28．如果公司不再经营现有的蔬菜业务，那么公司对于采购、加工和销售的知识及技能会受到损失。请评价这种损失的大小：
（1）完全没损失
（2）基本没损失
（3）一些损失
（4）损失很大
（5）巨大损失

29．贵公司在过去三年中对控制蔬菜的质量进行过投资吗？
（1）没有任何投资
（2）少量投资
（3）较多投资
（4）大量投资
（5）巨额投资

30．贵公司对蔬菜采购、加工、销售、质量控制的**投资**为_____（元）
31．为贵公司提供蔬菜的农民来自于：
_____%来自于本县和本地区；
_____%来自于本省；
_____%来自于外省。
32．为向贵公司提交质量合格的蔬菜，农民可能需要进行投资。相对于农民的承担能力而言，您估计一下农民的这种投资的数量：
（1）没有任何投资
（2）少量投资
（3）较多投资
（4）大量投资
（5）巨额投资
33．为向贵公司提交质量合格的蔬菜，农民需要学习新的技能或者技术。请说说这种人力投资的大小：
（1）没有任何投资
（2）少量投资
（3）较多投资
（4）大量投资
（5）巨额投资

**五、品牌**(*本部分了解企业的品牌策略*)

34．贵公司是否是龙头企业？
（1）是，我们公司是_____（*国家级*、*省级*、*地区级*、*县(市)级*）龙头企业
（2）不是。
35．在近三年中，在政府给予贵公司的荣誉和奖励中，各级政府的荣誉和奖励分别是：
_____项荣誉和奖励来自于当地政府；
_____项荣誉和奖励来自于省政府；
_____项荣誉和奖励来自于中央政府。
36．请说说对贵公司来说最重要的荣誉和奖励是什么？_____
37．贵公司有自己的商标(牌子)吗？
（1）是的，该商标的名字是_____
（2）现在还没有自己的商标。
38．贵公司的商标(牌子)经过注册了吗？
（1）是的，我们已经注册过；
（2）不是的，我们现在还没有注册。
39．贵公司的商标或者牌子得过什么样的荣誉？
（1）现有还没有什么荣誉；
（2）当地著名(驰名)商标；
（3）省级著名(驰名)商标；
（4）国家级著名(驰名)商标
（5）其他 (***请举例***)_____
40．该商标的市场价值大约是_____元。
41．贵公司已经为这一品牌投入的广告费用大约是_____元。
42．贵公司所经营的蔬菜产品获得国家或者国际的质量认证了吗？
（1）无公害食品；

（2）绿色食品；
（3）有机食品；
（4）国际质量论证（*请说明*）_____
（5）其他（*请说明*）_____

**六、通过合同生产或者销售蔬菜**(*本部分了解企业与上游农民之间的合同关系*)

43**．贵公司采购(或者生产)蔬菜时是否使用合同？
（1）是的，我们使用合同
（2）不是，我们不使用合同

***如果答卷人对问题 43 回答"不是"，那么请接着回答问题 44 和 45。 回答完问题 44 和 45 之后，您已经完成与我们的合作。谢谢您的参与！***
***如果访谈人对问题 43 回答"是的"，那么请跳过问题 44 和 45，直接回答问题 46。***

44．贵公司是否从未通过合同方式采购蔬菜？
（1）是的，我们从未通过合同采购蔬菜；
（2）不是，我们曾经使用过合同，但是因为某些原因不再使用合同。
45．使贵公司停止使用合同的原因是什么？
（1）违约的农民太多；
（2）使用合同的成本太高；
（3）我们公司自己生产蔬菜；
（4）其他，(***请举例***)_____

***如果贵公司正在使用合同生产或销售蔬菜，那么请继续回答以下问题。感谢您的耐心！***

46．贵公司通过合同采购的蔬菜占总采购量的比例是：_____%
47．通过合同采购的蔬菜的销售额是_____元
48．通过合同采购的蔬菜的毛利润大约是_____元
49．通过合同采购的蔬菜的净利润大约是_____元
50．在通过合同收购的蔬菜中，
_____%属于大田菜，
_____%属于大棚菜，
其他（请说明）_____
51．贵公司是直接与农民订合同还是通过其他中介组织或者公司？
（1）直接与农民订合同；
（2）与农民合作社、农民协会等合作组织订合同；
（3）与村委或者镇政府机构订合同；
（4）其他（*请举例*）_____
52．公司从哪年开始与农民定合同？_____年
53．现在与贵公司订合同的农民总数是多少？_____户
54．就与贵公司订合同的农民而言，
农民种植的平均规模是_____亩
农民种植的最大规模是_____亩
农民种植的最小规模是_____亩
55．贵公司与农民之间最长的合同关系已经有几年了？_____年

56．贵公司在与农民定合同之前，是从哪里得到这些农民的信息？
（1） 在定合同之前我们没有任何关于这些农民的信息；
（2）从其他类似企业那里得到这些农民的信息；
（3）从其他农民那里得到这些农民的信息；
（4）从商业组织那里得到这些农民的信息；
（5）从政府那里得到这些农民的信息；
（6）自己的研究；
（7）家族成员或者朋友；
（8）其他，*(请举例)*_____
57．现有的法律体系可以为实施合同提供的保障程度是：
（1）没有任何实际作用　　（2）没什么实际作用　（3）有一些实际作用
（4）实际作用很大　　（5）实际作用非常大
58．订合同之后，公司与农户可能需要就合同的实施进行再协商。请您估计一下订合同之后协商和调整条款内容的可能性：
（1）根本不用进行再调整和再协商；
（2）不太需要再调整和再协商；
（3）可能会再调整和再协商；
（4）再调整和再协商的可能性很大；
（5）再调整和再协商的可能性非常大。
59．如果公司对一个农户违约，其他农户会知道这件事吗？
（1）是的，其他农户会知道的
（2）不是，其他农户不一定知道
60．如果一个农户对公司违约，其他农户会很快知道这件事吗？
（1）是的，其他农户会知道的
（2）不是，其他农户不一定知道
61．请您评估一下：公司与农民之间的蔬菜交易复杂吗？
（1）根本不复杂
（2）不复杂
（3）有些复杂
（4）很复杂
（5）非常复杂
62．就通过合同收购的蔬菜而言，这种蔬菜的种植会受到天气等自然环境影响吗？
（1）完全不受影响
（2）影响很小
（3）有影响
（4）影响很大
（5）影响非常大
63．就通过合同收购的蔬菜而言，这种蔬菜的种植技术属于：
（1）技术根本没有任何发展
（2）技术发展很慢
（3）有一些技术发展
（4）技术发展很快
（5）技术发展非常快
64．就通过合同收购的蔬菜而言，贵公司预测市场上的供给、需求、价格等的困难程度属于：
（1）一点都不困难

（2）不怎么困难
（3）有些困难
（4）困难很大
（5）困难非常大

**七、合同的基本条款（*本部分了解合同中的价格、数量、质量条款*）**

65．合同规定了农民应当提交某一固定数量的蔬菜吗？
（1）是的，合同规定农民应当提交多少亩蔬菜
（2）是的，合同规定农民应当提交多少公斤蔬菜
（3）不是，合同没有规定具体的收购数量，但是我们有权要求农民提交我们所指定的数量；
（4）不是，合同没有规定具体的收购数量，农民自己决定提交蔬菜的数量
（5）其他情况（*请说明*）_____
66．合同规定了如何向农民支付价款吗？
（1）是，合同规定了一个固定单价，无论提交产品的质量好坏，价格不变；
（2）是的，合同规定了一个固定单价再加上质量奖金；
（3）是的，合同规定一个最低保护价，在市场价格高于此保护价时按市场价格收购；否则按最低保护价收购。
（4）是的，合同规定按市场价格收购，我们有权以后决定具体的价格；
（5）不是，合同根本没有规定价格；
（6）其他情况（*请说明*）_____
67．贵公司向农民支付的价款是否明显取决于贵公司销售的最终产品的价格？
（1）是的
（2）不是
68．合同规定了一部分价款可以在收购农民的产品前支付吗？
（1）是的，合同规定一部分价款可以在收购之前支付；
（2）不是，合同没有规定，我们也不会提前支付价款；
（3）不是，合同没有规定，但是我们通常会提前支付一部分价款给农民。
69．如果贵公司提前支付一部分价款，那么这部分价款占总价款的比例是 _____%。
70．合同规定了农民在签合同时要交付定金吗？
（1）是的，合同要求农民交的定金是_____元
（2）不是，我们不要求农民交定金
（3）其它情况（*请说明*）_____
71．合同规定了公司在签合时要交付定金吗？
（1）是的，合同要求公司交的定金是_____元
（2）不是，合同不要求公司交定金
（3）其它情况（*请说明*）_____
72．合同规定了农民提交的蔬菜所应达到的质量标准了吗？
（1）是的，合同规定了无公害食品质量标准；
（2）是的，合同规定了绿色食品质量标准；
（3）是的，合同规定有机食品质量标准；
（4）是的，合同规定公司自己制定的质量标准；
（5）不是，合同根本没有规定具体的质量标准。
73．如果贵公司是针对下游客户要求而制定的私人质量标准，这种质量标准基本达到国家规定的哪一级质量标准？
（1）无公害食品；　　（2）绿色食品；　　（3）有机食品

74．这份合同适用于贵公司与农民之间的几次交易？

（1）合同只适用于我们与农民之间的一次交易；

（2）合同适用于我们与农民之间的几次交易；

（3）合同适用于我们与农民之间的多次交易。

75．这份合同的有效期是：

（1）_____天；　　（2）_____月；　　（3）_____年

76．如果合同到期，现有的合同能够自动更新吗？

（1）通常合同会自动更新；

（2）合同不会自动更新，我们决定是否与现有农民继续签约；

（3）合同不会自动更新，我们需要与农民重新协商签订新的合同。

**八、合同的限制性条款**(*本部分了解合同关于质量控制、标准化生产等条款*)

77．贵公司如何规定农民的投入品？对于一种投入品来说，合同可能写明应当用什么类型的投入品，也可能不做任何规定，由公司或者农民自己决定。请就各种投入品，选出相对应的实际情况。

| 实际情况<br><br>各类<br>投入品 | (1) 由我们提供 | (2) 合同规定了农民应当使用什么样的投入品 | (3)合同没有任何规定，但是我们有权决定农民应当使用什么样的投入品 | (4) 合同没有任何规定，由农民自己决定 |
|---|---|---|---|---|
| 种子<br>化肥<br>农药<br>耕地设备<br>浇水设备<br>收割设备<br><br>其他种植设备 | *(请注明哪类设备)* | | | |

78．合同规定农民如何进行生产了吗？(比如种植时间、方法等)

| 实际情况<br><br>各类<br>生产活动 | (1) 我们提供生产指导手册 | (2) 合同规定按照我们的要求进行种植 | (3)合同没有任何规定，但是我们派出技术员进行指导 | (4) 合同没有任何规定，由农民自己决定 |
|---|---|---|---|---|
| 种植计划<br>种植前的活动（如耕地等）<br>种植<br>农药喷洒与使用<br>化肥使用<br>收割 | | | | |

79．对下列活动，合同是否做出规定？

| 实际情况<br><br>各类<br>产后活动 | (1)合同规定了如何做 | (2) 合同没有任何规定，但是我们有权要求农民如何做 | (3)合同没有任何规定，农民自己决定如何做 | (4)合同没有任何规定，但是我们有权决定自己如何做 |
|---|---|---|---|---|
| 农民交货前的包装<br>农民交货前的存储<br>交货时间和地点 | | | | |

| | |
|---|---|
| 产品分类、分级、为称重和贴标签进行包装<br>贴标签<br>存储<br>加工<br>销售 | |

80．就与公司订合同的农民而言，农民种植蔬菜所用的土地属于：
（1）农民自己
（2）公司
（3）其他（*请说明*）_____
81． 合同是否规定终止条款？
（1）是的，合同明确规定在什么情况下合同可以终止；
（2）不是，合同没有规定在什么情况下合同可以终止，但是我们有权对此做决定；
（3）不是，合同没有规定在什么情况下合同可以终止，但是农民有权对此做决定。
82．合同是否规定贵公司有权视察（监督）签约农民的生产活动？
（1）是的；
（2）不是，合同没有规定，但是我们有权视察（监督）菜农的生产活动
（3）不是，合同没有规定， 我们无权视察（监督）菜农的生产活动
83．贵公司直接视察菜农生产的次数多不多？
（1）根本没有
（2）很少
（3）有一些
（4）很多
（5）非常多
84．合同是否对如何控制质量做出规定？
（1）是的　　（2）不是

**九、合同的效果**

85．就通过合同采购的蔬菜而言，农民提供的蔬菜的实际质量是可信赖的。您同意吗？
（1）强烈**不**同意
（2）不太同意
（3）基本同意
（4）很同意
（5）非常同意
86．就通过合同采购的蔬菜而言，农民提供的蔬菜的实际质量是稳定的、连贯一致的。您同意吗？
（1）强烈**不**同意
（2）不太同意
（3）基本同意
（4）很同意
（5）非常同意
87．就通过合同采购的蔬菜而言，农民提交的蔬菜的实际数量达到了订合同时的预期**数量**水平。您同意吗？
（1）强烈**不**同意
（2）不太同意

（3）基本同意
（4）很同意
（5）非常同意

88．如果农民不能交货时，在质量或者数量上不能完全达到合同的要求，那么贵公司是怎么做的？

（1）下一次绝不会与这个农民定合同
（2）在进一步了解农民违约的原因后，再做决定
（3）其它（请说明）_____

***问卷调查到此全部结束，非常感谢您提供的信息！如果您能附上一份空白合同样本或者实际合同的复印件，对我们的研究有重要的意义。谢谢您的合作！***

## Appendix 4-3 List of the interviewed firms

| | Name | Location | Contact telephone | Interviewee |
|---|---|---|---|---|
| Firm 1 | Shandong Long-da Enterprise Group | Laiyang | 0086 (535) 7717036 | Manager |
| Firm 2 | Laiyang Long run Food Limited Company | Laiyang | 0086 (535) 726118 | General Manager |
| Firm 3 | Shandong Shouguang Da-seng Food Limited Liability Company | Shouguang | 0086 (533) 5102654 | Export&Import Manager, office manager |
| Firm 4 | Shouguang Tian-yuan Fruit and Vegetable Production Limited company | Shouguang | 0086 133 56791737 | Business manager, Manager assistant |
| Firm 5 | Shouguang Tian-cheng Food Limited Company | Shouguang | 0086 (536) 5196296 | Deputy General manager |
| Firm 6 | Beijing Fu-kang-duo Technology Limited Companey | Shouguang | 0086 136 15365045 | Manager |
| Firm 7 | Shandong Pang-da Seasoned Food Limited Company | Dezhou | 0086 (534) 6602032 | Manager, General Accountant |
| Firm 8 | Shandong Fei-da Group Limited Company | Dezhou | 0086 (534) 6601321 | Director of General office |
| Firm 9 | Wucheng Ying-chao Economic and Trade Limited Company | Dezhou | 0086 (534) 2175482 | Manager |
| Firm 10 | Ningjing Rui-feng Food Limited Liability Company | Dezhou | 0086 (534) 5234865 | Manager |
| Firm 11 | Shandong Laoling Cheng-xin Food Processng Factory | Dezhou | 0086 (534) 6682222 | Manager/Factory director |
| Firm 12 | Minimum protection price | Dezhou | 0086 (534) 3751562 | Manager |

# 5 Summary and Conclusions

Many forms of governance of agricultural products co-exist in agricultural sectors, such as spot markets, cooperatives, investor-owned agribusiness, and contract farming. Various stakeholders such as primary growers, processors, wholesalers, retailers, consumers and other parties are involved into the process as well as the structure of governing agricultural products. How to align the interests of these stakeholders and how to maintain or increase the efficiency of governance forms regarding agricultural products are becoming increasingly significant.

This thesis studies cooperatives and contract farming as two types of governance forms regarding agricultural products. Agricultural cooperatives emerged as early as in the 19th century. They played an important role in organizing and coordinating agricultural production and transactions in many agricultural industries. Cooperatives may continue to play an important role in providing agricultural producers with access to markets and an efficient vehicle for capturing value-added. Contract farming has been adopted, as an important vertical coordination form, both in developed and developing economies since the 1960s.

We treat cooperatives and contract farming as two particular governance structures for vertically coordinating various agricultural production stages. A governance structure consists of both decision rights and income rights. The allocation of decision rights tells who has rights to guide or direct activities, i.e., how authority is allocated among various stakeholders. The allocation of income rights specifies how benefits and costs are allocated among different stakeholders. Governance structures matter when contracts are incomplete.

The major research objective of this thesis is to add knowledge to co-existing governance structures in agricultural sectors. As there are various arrangements regarding governing agricultural products, it is important to understand deeply how each governance structure is characterized and works. Theoretically, we aim to add new knowledge regarding cooperatives by highlighting the role and added value of board of directors in screening investment projects. Empirically, we aim to explore the interaction of governance structure and other attributes of cooperatives, and delineate the allocation pattern of decision rights under contract farming as well as explore the driving forces for such arrangements.

The contribution of this thesis is as follows. Firstly, it extends the exogenous screening model of Hendrikse (1998) by building an endogenous double screening model

of selecting efficient governance structures (Chapter 2). This enriches the research on cooperative theory by highlighting the role and added-value of the board of directors in cooperatives. Secondly, it describes the historical development of farmer cooperatives in China, it presents the data on the membership of a sample of 66 farmer cooperatives in the Zhejiang province, it provides a detailed case study of a fruit cooperative in the Zhejiang province, and it studies the coherence of this organization by using the approach of a system of attributes (chapter 3). This enriches the empirical research on cooperatives by adding empirical observations regarding how cooperatives are organized and work efficiently in transitional economies. Thirdly, it provides the data on fruit and vegetable contracts in China and studies the driving forces for decision rights shift among various stakeholders (chapter 4). This enriches the empirical research on incomplete contracts.

The more detailed summary of the individual chapters are presented in the following, in order to see how each research question is answered and how the research objective is reached. For convenience, we list the research questions here again:

- Q1: What are the differences between cooperatives and investor-owned firms regarding the structure of the decision making process?
- Q2: How does the difference influence the efficiency of various governance structures?
- Q3: How are the new farmer specialized cooperatives in China organized?
- Q4: What determines the form and extent of decision rights allocation between farmer growers and downstream processors in contract farming?

Chapter 2 provides answers to the first and second research questions. Both cooperatives and investor-owned firms are viable organizational forms in many agricultural sectors (Nilsson, 1997; Hendrikse, 1998; Carriquiry and Babcock, 2004). Various studies show that cooperatives and investor-owned firms behave differently (Van der Krogt, 2005; Hendrikse and Van Oijen, 2004; Chaddad and Cook; 2004). Compared with investor-owned firms, cooperatives have disadvantages as well as advantages. We explore a potential advantage deriving from a difference in the decision making structure in Chapter 2. It is well known that there are differences regarding the board of directors (Vitaliano, 1983). Board monitoring is a public good, but more active participation by members in board monitoring is expected in cooperatives due to the substantial financial stake in the cooperative by the members (Hendrikse and Veerman, 2001). Bebchuk and Fried (2003) address the relationship between shareholders and the board of directors in stock-listed enterprises. They argue that there is substantial scope for managerial power due to actual incentives of directors being geared towards the interests of the CEO rather than the interests of the owners. USDA (2002, p11) states that “In an investor-owned firm,

the chief executive officer (CEO) often has a large, if not dominant voice, in selecting the board of directors…In a cooperative, the CEO usually has significantly less influence over who sits on the board…As a result, directors often do not feel beholden to the manager for their position and have the independence, if they choose to exercise it, to question management decisions and reject its recommendations." These arguments motivate us to characterize *a cooperative by a dual screening decision process*, whereas an investor-owned firm consists of a single screening decision process. The organization of the screening process matters, because it affects the errors made by individuals within the organization, and how those errors are aggregated at the organizational as well as industry level.

A four-stage game theoretic model is developed to capture the influence of the difference in the structure of the internal decision making process of these two governance on the efficient organizational choices and industrial structures. The first stage consists of the choice of architecture, that is, Investor-Owned Firm or Co-operative. Screening levels are chosen in the second stage of the game. Third, nature chooses the type of project. Finally, project acceptance decisions are made by the organization.

It is shown that an investor-owned firm is prone to accept more investment projects than a cooperative because a cooperative requires approval of the society of members as well as the management of the cooperative. However, lower screening levels are chosen in a cooperative in order to compensate for its hierarchical decision-making structure. Screening levels are strategic substitutes because a lower screening level by the rival enterprise makes it more likely that the market has to be shared when a project is good. The payoff maximizing response is to increase the screening level at local bureaus. Cooperatives are predicted in markets with attractive portfolio compositions because the cooperative is good at rejecting bad projects. Similarly, investor-owned firms thrive in markets with bad portfolio compositions because they select good projects more frequently than cooperatives. This finding is a reversal of the exogenous screening case. Governance structure choice entails an externality because choosing an investor-owned firm as organizational form makes the market less attractive for the rival enterprise. The heterogeneity of behaviour of enterprises with the same governance structure as well as the coexistence of cooperatives and corporations is driven by the same trade-off. The advantage of being more frequently a monopolist compensates for accepting more bad projects.

In chapter 3 we have answered the third question: *How are the new farmer specialized cooperatives in China organized*? Different from chapter 2 which only focuses on the decision making structure of cooperatives, chapter 3 treats cooperatives as a more complex institutional arrangement by adopting the approach of a system of attributes. A

detailed case study regarding a watermelon marketing cooperative is presented to illustrate what attributes a cooperative has and how each attribute interacts with others.

The institutional environment has been explored before we study the details of cooperatives in a transitional economy, since the originations are embedded into the environment. It is shown that cooperatives are not a new phenomenon in China. However, new cooperative organizations have emerged since the 1980s. They are different from old cooperative forms. We distinguish two basic forms: farmer specialized associations and farmer specialized cooperatives. The farmer specialized cooperatives is our research focus in Chapter 3. It also shows that relations play an important role in Chinese rural society, thus the origin and development of farmer cooperatives in China have an informal institutional background based on relations.

Next, we present a sample of 66 cooperatives in the Zhejiang province to capture the ownership characteristics of cooperatives in general. It shows that most cooperatives are small; shareholding is pervasive among most cooperatives; the cooperatives are usually composed of a minority of core members (usually big shareholders) and a majority of common members (usually users or patrons); the cooperatives can be generally divided into two types: one is with a minority of members as its shareholders; the other is with a majority or all members as its shareholders. For most cooperatives, shareholding is quite concentrated; big shareholders play a dominant role in providing capital.

Then, we describe a specific farmer specialized cooperative in details: Ruo-heng watermelon cooperative. We identify three major groups of attributes in this organization: governance which consists of decision rights and income rights, quality control system, and strategy. Firstly, decision rights are not uniformly distributed among the members. Director members have real control on important issues such as pricing, financing, investment screening, etc. Meanwhile, sharing benefits/costs among members are not solely based on membership. Income rights are confined by share contributions. Secondly, the quality control system is tight in this cooperative. For example, there are ex-ante contracted quality standards, which are agreed upon by all members and which are stricter than the legal requirements regarding fruits. Further, many control tools, such as input controls, production standardization, and group production/inspection, are adopted to monitor and guide members through different stages of production. In addition, quality-based pricing is used to complement the control tools. Thirdly, it adopts a branding strategy. Fourthly, it shows that various attributes complement each other. Tight quality control system, skewed decision rights allocation, and branding strategy complement each other to make this cooperative function well.

What we observe from these three levels of data regarding cooperatives in China adds new insights to cooperative research. Firstly, cooperatives are complex organizations

which are embedded into their local institutional environment. The characteristics of the local institutional environment shape the functional forms of a cooperative. Cooperatives exhibit substantial heterogeneity, in terms of farmers being member and skewness in the distribution of control rights. A cooperative is co-governed by both core members and non core-members based on relations and abilities. Human asset specificity in terms of establishing and maintaining relations and access to markets seems to be more important than physical asset specificity in accounting for governance structure choice in the current institutional setting. Secondly, the complementarities among various attributes determine the success of a cooperative. Choosing values of various attributes in a coherent way is thus a big challenge for managers.

While chapter 2 and 3 have focused on cooperatives, in chapter 4 we mainly study another vertical coordination form, i.e. contract farming. Contract farming is mainly an agreement between a farmer and a firm, where the farmer produces a fresh or partially processed product and the firm has a commitment to buy it (Grosh, 1994). It is an intermediate economic institution between spot market and vertical integration. The main research question in this chapter is '*What determines the form and extent of decision rights allocation between farmer growers and downstream processors in contract farming*?'. We have answered this question by investigating 12 fruit and vegetable contracts to test several hypotheses regarding their allocation pattern and driving forces.

According to the literature on writing costs, incomplete contracting models and franchising, the completeness of a contract is determined by quality, reputation and uncertainty, while the quality, reputation, specific investment and monopsony-oligopsony power determine the extent of decision rights allocation between farmer growers and downstream processors. To test these hypotheses, we have made each variable operational. Then, each fruit and vegetable contracting case is checked to see how explanatory variables are linked with the dependent variables.

The extent of completeness of a contract and allocation pattern of decision rights varies substantially across different supply chains in China. Regarding completeness of a contract, both written contracts and simple oral contracts are observed in our sample. Most contracts specify price and quantity regarding delivery. How many decision rights are being allocated to firms, according to contracts, varies across different contracting networks. One important observation is that most firms have rights to guide or direct the activities of contracted farmers regarding inputs and/or in-process activities. This observation is consistent with other studies.

A contract will become more complex when the firm designing the contract sells high quality products. In addition, market uncertainty may determine the completeness of a contract too, while reputation will not determine the completeness of a contract. Thus, the

predictions regarding uncertainty (measured by market uncertainty) and contracting value (measured by quality and reputation) is partly supported by our empirical findings.

Under contract farming, many decision rights are shifted from farmers to firms. Quality, reputation and specific investments by firms positively influence the number of decision rights allocated to agri-business firms under contract farming, while monopsony-oligopsony power and specific investments by farmers do not play a role in allocating decision rights.

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# Samenvatting (Summary in Dutch)

Dit proefschrift analyseert besluitvormingsprocedures en de toewijzing van besluitvormingsrechten in twee beheersstructuren in de landbouw sector: cooperaties en contracten. De belangrijkste onderzoeksvragen hebben betrekking op de wijze waarop zeggenschap de keten verticaal coördineert in verscheidene beheersstructuren in een transitie economie (China), en onder welke omstandigheden een bepaalde beheersstructuur efficiënt is. Het theoretisch onderzoek richt zich op de rol van de Raad van Commissarissen in coöperaties, terwijl het empirische onderzoek gericht is op de organisatorische en strategische attributen van Chinese land- en tuinbouwcooperaties en de contractuele arrangementen in de Chinese fruit- en groente sector. In het theoretisch onderzoek is vastgesteld dat de Raad van Commissarissen waarde toevoegen in coöperaties vanwege het tweemaal beoordelen van investeringsvoorstellen. Het niveau van het beoordelingscriterium is gekarakteriseerd als een strategisch substituut. Het tweede resultaat is dat Chinese coöperaties worden bestuurd door zowel kernleden als niet kernleden, waarbij relaties en capaciteiten van de bestuurders een grote rol spelen. Specifiek menselijk kapitaal, in de vorm van het bewerkstelligen en onderhouden van relaties, en toegang tot markten blijkt een grotere rol te spelen dan specifiek fysiek kapitaal om de keuze van beheersstructuur te verklaren in de huidige Chinese institutionele omgeving. In de derde plaats, vele besluitvormingsrechten zijn van boeren naar verwerkers verschoven in contracten. Kwaliteit, reputatie en specifieke investeringen door ondernemingen bepalen het aantal besluitvormingsrechten dat wordt toegewezen aan ondernemingen, terwijl marktmacht en specifieke investeringen van boeren geen rol blijken te spelen in de toewijzing van besluitvormingsrechten.

# 中文摘要（Summary in Chinese）

在农业部门中，各种治理结构纵向协调着上游生产者和下游加工商之间的活动，例如现货市场、投资者所有制公司、合作社、契约农业、以及其它一些混合组织形式。一个非常有趣现象的是：这些治理结构并存在许多市场上，并且，它们与制度之间有着互动关系。各种治理结构是如何运转的？什么决定了各种不同的治理结构的效率及并存状态？制度背景的影响何在？这些问题值得我们进行深入地探讨，以期既为企业理论增加新的知识、又为经理人员提供有用的建议。

治理结构可以分为收益权与决策权。决策权的分配指出了谁有权利指导或者指挥活动，即：权威如何在各个利益相关者之间进行分配。收益权的分配指明了收益与成本如何在不同的利益相关者之间进行分配。本论文研究合作社与契约农业这两类治理结构中的决策制定程序与决策权分配问题。主要的研究问题是：在过渡经济（中国）制度背景下，权威在各类治理结构中如何协调上游活动与下游活动，在什么条件下某一特定的治理结构是有效的？本论文既包括理论研究又包括实证研究，理论研究聚焦于农业合作社的董事会所起的作用，实证研究则聚焦于中国农民专业合作社的组织属性与策略属性、以及中国果蔬行业的契约安排。

本论文共分五章。第一章概述研究目的与研究问题。第二章引入了一个博弈模型以探讨内生的项目筛选规则如何影响有效的组织选择与产业结构。第三章首先描述了中国的制度背景，接着从“属性系统”这一理论视角出发，剖析了新一代农民专业合作社在此特定制度背景下如何组织其活动。第四章基于 12 个果蔬契约网络的案例分析，解释了决策权分配模式的决定因素和农业契约完全性程度的决定因素。第五章对全文进行总结。

本论文的主要结论如下。第一，由于合作社的二重筛选特征，董事会在筛选投资项目时为合作社创造了价值。筛选水平是策略替代。第二，中国的农民专业合作社由核心社员与非核心社员共同基于关系与能力进行治理。在决定现有制度背景下的治理结构选择上，以建立与维持关系、以及拥有市场进入渠道为表现形式的人力资产专用性比实物资产专用性更为重要。第三，农业契约的完全性程度和决策权的分配模式在不同的农产品供应链中有着显著的差异。质量和市场不确定性影响着农业契约的完全性。在契约农业中，许多决策权从农民手中转移到企业手中。质量、声誉、企业的专用投资影响着分配给企业的决策权数量，而垄断力与农民的专用投资并不决定决策权的分配。

# Curriculum Vitae

Yamei Hu was born in Dezhou, China on 24 January, 1976. She studied Economic and Trade English from 1993 to 1995 at Yantai University. After two years' working experience in a foreign trade company, she went to study Economics as a postgraduate student in Shandong University in 1997. In 2000, she received her MA in Economics from Shandong University with a thesis on von Hayek's economic thoughts. She went on to study Economics in Renmin University of China. In 2003, she defended her PhD thesis on the deregulation of China's financial markets and received her PhD in Economics.

In July 2003, Yamei joined the Ph.D. program in the Department of Organization and Personnel Management at Erasmus University Rotterdam. Her research interests cover the theory of the firm, governance structures, industrial organization, institutional changes in developing countries, and transition economics. For her PhD thesis, she focused on the governance of agricultural products and conducted both theoretical and empirical research. The research of this thesis has been presented at International Society of New Institutional Economics, Economics and Management of NETworks, International Association of Agricultural Economists, European Association of Agricultural Economies, EURESCO seminar in Chania, University of Missouri, and Wageningen University. Parts of the thesis are published already.

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## Essays on the Governance of Agricultural Products
### Cooperatives and Contract Farming

This thesis studies decision making procedures and decision rights allocation of two governance structures in agricultural sectors: cooperatives and contract farming. The main research questions are how authority coordinates upstream and downstream activities within various governance structures in a transitional institutional setting (China), and under what conditions one particular governance structure is efficient. The theoretical research focuses on the role of the board of directors in agricultural cooperatives, while the empirical research focuses on the organizational and strategic attributes of Chinese farmer specialized cooperatives and the contracting arrangements in the Chinese fruit and vegetable industry. It is found that, firstly, the board of directors adds value to cooperatives because of its dual screening characteristic. The screening levels are strategic substitutes. Secondly, the Chinese farmer specialized cooperatives are co-governed by both core members and non core-members based on relations and abilities. Human asset specificity in terms of establishing and maintaining relations and access to markets seems to be more important than physical asset specificity in accounting for governance structure choice in the current institutional setting. Thirdly, under contract farming, many decision rights are shifted from farmers to firms. Quality, reputation and specific investments by firms positively influence the number of decision rights allocated to agri-business firms, while monopsony-oligopsony power and specific investments by farmers do not play a role in allocating decision rights.

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