

# Influence of guanxi, trust and farmer-specific factors on participation in emerging vegetable markets in China

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## Abstract

The fast development of market outlets (e.g., supermarkets, processing industries, international markets) in China provides rich opportunities for small-scale farmers to upgrade quality and increase income. However, the high level of transaction costs incurred in small-volume-based vegetable transactions hinders farmers from participating in these emerging markets. This article explores how personal relationships (called *guanxi* in China) and trust between farmers and their buyers influence transaction costs in vegetable transactions, and thereby also farmers' participation in emerging markets. We interviewed 167 vegetable farmers in Jiangsu Province, which provided data for empirical testing using two-stage probit analysis with endogenous variables. The findings suggest that *guanxi* and trust effectively reduce transaction costs in vegetable marketing in China, which may help and encourage farmers to better participate in emerging markets. The results also reveal that farmers' age, education, marketing experience, distance to the market, production scale and land quality influence transaction costs. The article ends with policy implications with respect to efficiently reducing transaction costs in vegetable supply chains in order to create a better environment for small-scale farmers in emerging markets in China.

*Additional keywords:* buyer–seller relationships, smallholders, supermarkets, transaction costs

## Introduction

The sheer size of China's economy, its rapid growth and its increasing integration into the global economy make China a crucial player in the world market for agricultural products (Van Tongeren & Huang, 2004). Today, China is one of the largest vegetable producers in the world. In 2004, it supplied more than 550 million tons of vegetables,

accounting for one-third of the world's production (Anon., 2004). Although the contribution of agriculture to farmers' total income decreased drastically from 60% in 1984 to 33% in 2002, vegetables are still an important source of income – especially cash income – for farmers in China. In 2000, about 16% of farmers' per capita net income came from vegetable production. Vegetable production and related activities (e.g., processing and marketing) employed about 160 million rural labourers (Liu *et al.*, 2004).

Vegetable markets in China have changed dramatically during the last two decades. Various new forms of vegetable outlets are now also emerging. Supermarkets in China are a rapidly growing segment (Reardon *et al.*, 2003; Hu *et al.*, 2004) that aims to source and deliver high-quality and safe vegetables to modern consumers in urban as well as rural areas. In China, the present market share of supermarkets is estimated at approximately 30% in urban areas and the growth rate is still some 30% per year (Anon., 2006). Vegetable processing for international markets is also developing quickly (Lu, 2007), even though the requirements for quality, quantity, safety, consistency, and delivery frequency are higher in these markets. Increasingly, they require tracking and tracing of food safety throughout the supply chains. As a result of these trends, building co-ordinated or integrated vegetable supply chains has become a priority task for the Chinese vegetable sector in order to increase farmers' income and improve food safety (Anon., 2006).

China's vegetable sector, however, faces several challenges. The fast growth of the production scale has led to an over-supply of low-quality vegetables. Quality and safety have become major constraints for further development of the Chinese vegetable sector (Lu, 2007). Vegetable producers, who mainly are small-scale farmers, face difficulties in implementing advanced technologies to produce high-quality vegetables due to technical, managerial and financial constraints (Hu & Xia, 2007). As a result, they are largely excluded from most modern high-value market outlets such as supermarkets, processing industries and international markets. The participation of smallholders in such markets requires that they have the capacity to comply with buyers' high quality requirements and are capable of closely co-operating with them (Anon., 2006).

There is a growing recognition that relationships play an important role in supply chain management (Leuthesser & Kohli, 1995; Narasimhan & Kim, 2002). Meanwhile, transaction cost economics (TCE) has become one of the most frequently used theoretical frameworks in studying such business relationships (Klein *et al.*, 1990; Hobbs & Young, 2001). Researchers regard trust as an important lubricant of a social system and widely treat it as an influencing factor in TCE-related constructs (Batt & Rexha, 1999; Vakis *et al.*, 2003; Ruben *et al.*, 2007b).

Vegetable producers in China are experiencing low productivity and inefficient marketing performance due to the high level of transaction costs in a transitional agricultural environment (Ruben *et al.*, 2007b). Scholars are now focusing on new ways to facilitate the entry of small-scale farmers in developing countries (such as China) into commercial agrifood chains (e.g., Vorley *et al.*, 2007). Earlier studies focused heavily on the application of better production and crop management practices (Anon., 1998), or on the introduction of improved incentives to enhance farmers' willingness to invest in more advanced production methods (Hueth *et al.*, 1999). Far less attention has been given to options to improve co-ordination and personal relationships (called *guanxi* in

China) or trust among farmers and between farmers and their buyers, as an alternative strategy to reduce transaction costs, upgrade quality, expand markets, and improve performance (Ruben *et al.*, 2007b). The purpose of this article is to investigate the effect of personal guanxi and trust in reducing transaction costs in vegetable supply chains, and improving small-scale farmers' participation in emerging market outlets. We hope to provide insights into ways to enhance farmers' market position and increase their welfare in a modern market environment, and identify institutional and structural deficiencies that need to be addressed during policy making.

The remainder of this article is structured as follows. The next section develops the theoretical framework by reviewing the literature on guanxi, trust and transaction costs in supply chains. The research design is then described, followed by the empirical results. The discussions, conclusions, and some policy implications are presented in the last chapter.

## Theoretical perspective

### Transaction costs in supply chains

With transactions as the focus of analysis (as opposed to the actual goods), TCE recognizes that transactions do not occur in a frictionless economic vacuum. Transactions involve costs because they typically require farmers to search for buyers with whom to exchange, screen potential buyers to ascertain their trustworthiness, bargain with potential buyers to reach an agreement, transfer the product, and monitor the agreement to see whether its conditions are fulfilled and enforced. These costs increase with the frequency of the transactions, the specificity of the assets involved, and the uncertainty of the transactions (Williamson, 1979).

Transaction costs are often subdivided into search or information costs, negotiation costs and monitoring or enforcement costs (Hobbs, 1997; Rindfleisch & Heide, 1997). Four key concepts underlie TCE: (1) information asymmetry, (2) bounded rationality, (3) opportunism, and (4) asset specificity. In Williamson's (1979) pioneering work, the characteristics of a transaction were linked to the governance structures from 'classical contracting' (spot markets) at one end of the spectrum to unified governance (vertical integration) at the other. The level of transaction costs incurred in the transactions encourages agents to build closer business relationships and look for low-risk governance to reduce the effects of transaction costs.

The presence of transaction costs implies that the efficiency of exchanges can become seriously constrained, and keeps many farmers from participating in certain agricultural markets (De Janvry *et al.*, 1991). The selection of market outlet is largely dependent on the level of transaction costs incurred in transactions (Hobbs, 1997; Bailey & Hunnicutt, 2002). In other words, the transaction costs associated with exchanges are barriers to market access for resource-poor smallholders (Ruijs *et al.*, 2004; Kyeyamwa, 2007).

Economists always try to measure transaction costs directly in agricultural markets (Sadoulet & De Janvry, 1995; Gabre-Madhin, 2001; Kyeyamwa, 2007). However, in

many cases the transaction costs are largely unobservable (Vakis *et al.*, 2003). Therefore, the direct measurement approaches are not able to quantify the comprehensive transaction costs in agricultural markets. In addition, Buckley & Chapman (1997) further argued that transaction costs issues cannot be understood separately from issues of perception (i.e., the perception and definition of reality of social actors). In this article we therefore try to measure transaction costs indirectly, i.e., based on farmers' perceptions.

### **Guanxi and transaction costs**

Guanxi is first and foremost about the cultivation of long-term personal relationships (Standifird & Marshall, 2000). In Chinese society, guanxi is ubiquitous and plays an important role in daily social and business life. Guanxi is transferable from one person to the other. For example, if person A wants to request person C something with whom A has no guanxi, A may seek out a member of his guanxi network, person B, who has guanxi with C. When B introduces A to C, a guanxi may be established between A and C (Tsang, 1998). The transferability of guanxi permits the development of individual guanxi and ultimately leads to a multilayer guanxi network (Standifird & Marshall, 2000). Guanxi networks provide supportive assurance in exchange behaviour, which makes it easier for farmers to acquire advanced technology and knowledge and to achieve superior market performance (Luo & Chen, 1997; Lu *et al.*, 2008).

The transaction cost advantage of guanxi-based exchange specifically lies in the way guanxi deals with governance problems associated with bounded rationality and opportunism (Standifird & Marshall, 2000). In a guanxi network, farmers know buyers well. They can easily access required information about product supply and demand. The transparency leaves less room for farmers and buyers to behave opportunistically. With the assurance of a guanxi network, the loss of exchange opportunities with one network participant can easily develop into banishment of that participant by the entire network. So the cost of opportunism is the potential loss of exchange opportunities with all members of the network.

Guanxi networks also provide a sophisticated means for screening potential partners (Standifird & Marshall, 2000). The flexible and socially-based nature of guanxi networks also permits members of a guanxi network to deal with contingencies arising after agreements are reached. Therefore, guanxi networks possess the capacity to reduce *ex ante* transaction costs associated with environmental uncertainties, such as communicating, negotiating and co-ordinating transactions (Davies *et al.*, 1995). Guanxi also reduces transaction costs associated with behavioural uncertainties that arise from bounded rationality. Transaction costs derived from screening and selecting partners can be reduced due to the latent strength of guanxi networks. The fast information flow within the guanxi network provides rapid (in)direct feedback on partners' performance, so *ex post* transaction costs are also reduced.

### **Trust and transaction costs**

Trust is considered to exist if one party believes that the other party is honest or benev-

olent (Doney & Cannon, 1997). It is the expectation that one party in the transaction will not behave opportunistically (Gulati, 1995). Based on experimental studies, Ostrom & Walker (2003) concluded that trust appears to be a core variable explaining the cooperation behaviour of people. Nooteboom (2002) further argued that trust is produced through personal interactions. Trust develops gradually, evolving in a slow process where there is risk and hence little trust in the beginning enabling individuals to develop their relations and engage in major transactions. Therefore, trust is a relationship-based concept, which is created, reinforced, or decreased by bilateral activities in a series of economic exchanges (Suh & Kwon, 2006). If trust exists in a business relationship, each counterpart will be convinced that they will not be victims of behaviour hazard such as adverse selection, moral risk, and hold-up. So trust functions are an important lubricant for relationships that bind parties and has an important future orientation.

Trust has been theorized to reduce opportunistic behaviour, and hence mitigates transaction costs in business practice. Whenever trust is present, farmers can lower their guard and economize on transaction costs. Trust minimizes search costs, and facilitates the enforcement of contracts. Therefore trust enables farmers to place and take orders with less risk and less conflict, provide exchange credit, and offer warranty – all features that are often dramatically absent from liberalized markets in developing countries (Fafchamps & Minten, 1998). Trust also makes it easier for farmers to renegotiate their contractual obligations when problems arise, thereby providing much-needed flexibility in dealing with external shocks. In addition, trust facilitates the circulation of reliable information about technology and market opportunities, as well as the blacklist of unreliable agents (Barr, 1998).

The economic value of trust also has to be considered when it is based on non-contractual mechanisms (Dyer, 1997). Non-contractual trust (such as goodwill) eliminates the need for formal contracts, which are costly to write, monitor, and enforce. For example, in conditions of high trust, farmers spend less time and resources on *ex ante* contracting because they trust that the pay-off will be divided fairly. So there is no need for future contingencies. Trusted parties spend less time and resources on monitoring to see if the other party is not shirking or is fulfilling the agreement. Therefore *ex post* transaction costs are also lower. Trust also enables participants in an exchange relationship to share important confidential information, which significantly reduces transaction costs, as discussed earlier. Trust also encourages farmers and buyers to make relationship-specific investments, which in turn enhances productivity in the exchange relationship without fear of opportunism (Dyer, 1997).

### **Farmer-specific factors and transaction costs**

A number of farmer-specific variables may also have an impact on the costs incurred by farmers in the process of exchange, like age, education level, market experience, and household size (Kyeyamwa, 2007; Ruben *et al.*, 2007b). Age can often be indicative of farmer's knowledge, reputation, and social networks (e.g., social capital), all of which reduce certain information, negotiation, and enforcement costs. A high education level is associated with lower costs of searching, reduced time of synthesizing and acting on the information, and improved skills of negotiation. Households with more members

and more market experience may have more information sources and knowledge about negotiating. Furthermore, the resources farmers own (e.g., farmland), and the distance to the market may also influence transaction costs. Farmers with more farmland generally have strong negotiation power and therefore are easier to select as preferred suppliers by buyers in emerging markets (Ruben *et al.*, 2007a). In addition, land quality and distance to the market are also effectively associated with transaction costs (Ruben *et al.*, 2007b).

## Research design

### Data

We collected data in Jiangsu Province, using semi-structured questionnaires. To optimize questionnaire items, valuable insights were obtained through a series of eight case studies (Lu *et al.*, 2006). The interviewees in these case studies were asked to give feedback on the questions and questionnaire layout. They provided useful suggestions for improving the accuracy and relevance of the measurements for each construct, which improved the content validity of the constructs. Forward and backward translation techniques were used to translate the English questionnaire into Chinese.

Samples were selected following a stratified random selection procedure. Based on the different economic levels in various geographic areas, we first divided Jiangsu Province into three areas: a less developed, an intermediate, and a developed area. We then randomly selected five counties: one from the less developed and one from the developed area, and three from the intermediate area, based on the total number of vegetable farmers in each area. Thereafter, one village was randomly selected from each county, resulting in five villages. The final step of the sampling procedure involved selecting the sample households from the selected villages. In each village we randomly selected 30–40 vegetable farm households, based on the total number of farmers in the village concerned. The actual data collection was based on personal interviews in the field in each selected village during 2004 and 2005. Excluding the farmers who were not commercialized and those with incomplete information, a total of 167 farmers interviewed finally formed the dataset for empirical analysis in this article.

### Measurement of latent variables

In this study, three variables were measured by a multiple-item-latent construct: guanxi, trust, and transaction costs. The other variables were binary (i.e., emerging market participation), categorical (i.e., education and land quality), or numeric (i.e., age, experience, household size, total farmland, and distance to the market). The latent constructs were operationalized by multiple-item measures on a five-point Likert scale (1 = not true at all; 5 = totally true). Transferring the concept of transaction costs to the operational domain remains elusive (Grover & Malhotra, 2003). In line with common practice (Hobbs, 1997; Grover & Malhotra, 2003; Escobal, 2005) we disentangled different components of transaction costs into information costs, negotiation costs and

enforcement costs. Below is a brief introduction to how each latent variable was measured. Detailed information on the measurement of the latent variables is listed in Table 1.

Guanxi refers to the extent to which vegetable farmers use guanxi networks to facilitate their transactions. In this study we focused on the supportive effects of farmers' guanxi networks on vegetable transactions. Two items were used to measure the construct of guanxi networks, including level of agreement with the statement "My guanxi networks support me in finding (new) buyers / gaining access to (new) markets".

Trust refers to the belief that the other partner is honest and sincere, and under no circumstances will do anything to damage the relationship. Previous transaction experience, reputation and trustworthiness of the partners are the major reflective perspectives for trust. Interpersonal trust was the focus in this study because the case studies showed that the vegetable transactions in the research area were largely based on interpersonal activities. Seven items were used to measure trust in this study.

Information costs refer to the perceived costs (may also be time) incurred to find market-related information, such as price, potential buyers or marketing trends. Public media, such as newspapers, TV and radio, and neighbours are important information sources for farmers. The farmers' neighbours are generally vegetable producers as well, so they are well aware of the real market situation. Under some circumstances farmers need to contact traders and other buyers to get market information. Two items were used to measure information costs in this study.

Negotiation costs refer to the perceived costs (may also be time) related to negotiating a transaction with buyers. Negotiation costs in this study were evaluated by two items: (1) the number of buyers, and (2) the number of rounds needed to negotiate before reaching a transaction agreement.

Enforcement costs refer to the perceived costs related to monitoring buyers' behaviour in order to make sure the agreement or the conditions of a contract are being fulfilled. To measure enforcement costs three items were used: (1) farmers' previous transaction experience, (2) the duration of their relationship with buyers, and (3) their reputation.

## Methods

The purification of the multiple-item constructs was carried out using SPSS. First, exploratory factor analysis was conducted in SPSS to determine the best multiple items for each construct. Thereafter Cronbach's alpha was calculated for each construct to show the construct's reliability. Table 1 lists all items for each latent construct used in this study. Cronbach's alpha for all constructs was greater than or close to 0.7, indicating a high level of construct reliability. Factor loadings for each item was greater than 0.7, showing that the items were closely related to their corresponding constructs (Hair *et al.*, 1998).

All transaction cost variables in this study were endogenous variables. So an instrumental variable approach could be applied. For instrumental variable regressions to work, each instrument must satisfy two conditions, i.e., instrumental relevance and instrumental exogeneity. If an instrument is relevant, then the variation in the instrument is related to the variation in the instrumented variable (e.g., transaction

Table 1. Measurement scales of the latent constructs used in the study.

Construct <sup>1</sup>	Cronbach's alpha	Item	Factor loading <sup>2</sup>
Guanxi	0.93	My guanxi networks support me to access (new) markets.	0.75
		My guanxi networks support me to find (new) buyers.	0.73
Trust	0.87	The buyers I trade with have a good reputation.	0.73
		I should not hesitate to make important selling decisions based on my buyers' suggestions.	0.72
		My current relationships with my buyers are satisfactory.	0.73
		I expect my buyers to be working with me for a long time.	0.76
		My buyers have been fair in their negotiations with me.	0.75
		Based on experience, I can rely on my buyers with complete confidence to keep their promises to me.	0.79
		The buyers are trustworthy.	0.85
Information	0.76	It costs me time and effort to acquire market information from public media.	0.87
		It costs me time and effort to acquire market information from my neighbours.	0.92
Negotiation	0.75	I negotiate with more than one buyer before making a transaction.	0.90
		I negotiate in more than one round with buyers before agreeing on a price.	0.90
Enforcement costs	0.69	I seek out the advice of my buyers regarding quality.	0.80
		I have known my buyers for a long time.	0.79
		If I cheat my buyers, I will lose my reputation immediately.	0.76

<sup>1</sup> All constructs were measured on a 5-point Likert scale (1 = not true at all; 5 = totally true).

<sup>2</sup> A factor loading is the Pearson correlation between the item and the construct.

costs). In addition, it must satisfy the exclusion restriction, i.e., the instrument must be uncorrelated with the outcome variable of choice (e.g., emerging market participation). Another consideration is that the dependent variable is binary and equal to 1 if the farmer participates in an emerging market, and 0 otherwise. Consequently, the ordinary least squares estimator is not preferable and non-linear limited dependent variable specifications must be adopted that could accommodate the treatment for the endogeneity of the transaction cost variables. Therefore, an instrumental variable two-stage probit model (IVProbit) was applied. The IVProbit procedure in Stata attempts to fit models with dichotomous dependent variables and endogenous regressors via maximum likelihood estimations of Amemiya's generalized least square estimator (Newey, 1987). However,



the test of instrument validity does not exist for limited dependent variable models so that we should interpret the results with caution.

The variables guanxi, trust, land quality, and distance to the market served as instrumental variables. As discussed earlier, all four effectively influence transaction costs in vegetable transactions. Regarding farmers' participation in emerging markets, land quality plays a limited role. Distance to the market is very important for timely delivery of products. The good-quality roads and transportation facilities in Jiangsu Province help farmers deliver products to all markets. Guanxi is present whether farmers use it or not; so it may have equal effects on all market outlets. Trust relationships with buyers in the emerging markets will be built up once farmers begin to actually participate in them, so it is not a factor during the farmers' market selection process. In summary, four variables: guanxi, trust, land quality, and distance to the market, satisfy the conditions of instrumental relevance and instrumental exogeneity.

## Empirical results

### Baseline description

Table 2 lists the means and standard deviations of the variables used in the analyses. Vegetable production in China is characterized by its long history, small scale, use of traditional techniques, and scattered activities (Liu *et al.*, 2004). Farmers in Jiangsu Province have on average more than 20 years of experience in vegetable production. Production scales in the research area are rather small (3.2 mu or 0.2 ha per farm household) and production activities are diversified. Vegetable farmers in Jiangsu Province are generally older (with an average age of 52) and have a limited education. They are also not very well organized, so they produce and market vegetables independently. As a result, farmers possess less power in the negotiation process than buyers and face a lot of constraints in selling vegetables to emerging market outlets. Farmers perceive a high level of transaction costs, especially information and negotiation costs in both production and marketing activities (Ruben *et al.*, 2007b). The average distance to the market is about 5.3 km, and farmers perceive that the quality of their land is good.

After a long period of development, Chinese vegetable markets became more competitive in recently decades (Ahmadi-Esfahani & Stanmore, 1997). The vegetable marketing system in Jiangsu Province is now made up of multiple outlets. Farmers traditionally sold vegetables to conventional market outlets, such as wet markets and wholesale markets. Recently, some have been putting a lot of effort into selling vegetables to emerging modern market outlets, such as supermarkets, processing industries and even international markets. Delivery conditions, trust relationships and quality demands differ widely amongst different market outlets, occasioning various types of transaction costs and offering farmers different implicit incentives for improving their production systems and quality management regimes (Ruben *et al.*, 2007b). However, conventional markets still dominate vegetable distribution in China, accounting for more than 90% of total vegetable production. The remaining 10% represents relatively high-quality vegetables that are sold to emerging market outlets (Lu, 2007).

Table 2. Descriptive statistics of the variables used in the analysis.

Variable	Mean	SD <sup>2</sup>
<i>Latent construct <sup>1</sup></i>		
Guanxi	3.61	0.62
Trust	4.07	0.54
Information costs	1.55	0.51
Negotiation costs	4.05	0.69
Enforcement costs	4.07	0.62
<i>Other</i>		
Emerging market participation (0 = no; 1 = yes)	0.14	0.35
Age of interviewee (years)	52.42	10.48
Education level of interviewee <sup>3</sup>	1.20	0.91
Experience of interviewee (years)	22.03	12.62
Household size (persons)	4.06	1.63
Total farmland area (mu <sup>4</sup> )	3.22	2.28
Distance to market (× 10 km)	0.53	1.08
Land quality <sup>5</sup>	4.06	0.59

<sup>1</sup> Means and standard deviations for the latent constructs were calculated based on unweighted average scores.

<sup>2</sup> SD = standard deviation.

<sup>3</sup> 0 = illiterate; 1 = primary school; 2 = middle school; 3 = high school; 4 = above high school.

<sup>4</sup> 1 mu = 1/15 ha.

<sup>5</sup> 1 = very low; 2 = low; 3 = average; 4 = high; 5 = very high.

### **Influence of guanxi, trust and farmer-specific factors on transaction costs**

The instruments used in this study are strong predictors of the effect of guanxi and trust on transaction costs in vegetable marketing chains (the first stage of IVProbit analysis, see Table 3). The results show that guanxi in vegetable supply chains significantly influences information costs and enforcement costs incurred in vegetable transactions. These results are consistent with our previous theoretical discussions. In a guanxi network, farmers can spend less time and effort in determining where and to whom to sell vegetables. So they incur relatively low information costs in selling vegetables. Guanxi networks safeguard transactions and reduce opportunistic behaviour during and after transactions. Hence, the enforcement costs are low for farmers with good guanxi networks.

An unexpected result, however, was the positive relationship found between guanxi networks and negotiation costs. This may be explained by the way in which negotiation costs were measured in this study. As discussed earlier, negotiation costs were usually measured by the number of buyers and the number of rounds needed to negotiate a

Table 3. Regression results of the variables that influence the transaction costs in vegetable chains. <sup>1</sup>

Variable	Information costs		Negotiation costs		Enforcement costs	
	Regression coefficient <sup>3</sup>	SE <sup>2</sup>	Regression coefficient	SE	Regression coefficient	SE
Guanxi	-0.14 **	0.07	0.59 ***	0.09	-0.16 **	0.08
Trust	-0.56 ***	0.06	-0.01	0.07	-0.26 ***	0.07
Age interviewee (years)	-0.01	0.01	-0.01 *	0.01	0.003	0.01
Education level interviewee <sup>4</sup>	-0.11*	0.07	0.10	0.06	0.16 *	0.09
Experience interviewee (years)	0.003	0.005	0.01*	0.01	-0.02 *	0.01
Household size (persons)	-0.02	0.03	-0.04	0.04	0.02	0.05
Total farmland area (mu)	-0.06 **	0.03	-0.003	0.03	-0.04	0.03
Distance to market (× 10 km)	0.04	0.04	-0.07 *	0.05	0.03	0.05
Land quality	-0.29 ***	0.10	-0.25 **	0.11	-0.05	0.11
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Constant	2.14 ***	0.68	1.42 **	0.61	0.19	0.72

<sup>1</sup> The results of the first-stage Instrumental Variables Endogenous Probit Model. The Davidon–Fletcher–Powell algorithm was used to maximize the likelihood function. For a detailed discussion on the algorithm methods in Stata see Gould *et al.* (2006).

<sup>2</sup> SE = standard error.

<sup>3</sup> Levels of statistical significance: \* =  $P < 0.10$ ; \*\* =  $P < 0.005$ ; \*\*\* =  $P < 0.01$ .

<sup>4</sup> 0 = illiterate; 1 = primary school; 2 = middle school; 3 = high school; 4 = above high school.

transaction. With well-developed personal relationships farmers have more opportunities to meet different buyers, which may encourage them to negotiate with more buyers in more rounds in order to obtain a good price. The positive effect of guanxi on negotiation costs may also be explained by the lock-in effects of the networks (Liu *et al.*, 2008). In studying the role of guanxi in labour markets in China, Zhang & Li (2003) and Huang (2008) found that guanxi networks may support nepotism or agency problems, and therefore discriminate against those who do not have access to guanxi networks. Vegetable farmers may face the same problem. They engage in a guanxi network that may hamper them accessing to other networks to get necessary information. So more efforts are needed for them to negotiate with buyers.

Trust decreases information and enforcement costs significantly. This indicates that farmers' previous transaction experience, their satisfactory relationships with buyers, and buyers with a high reputation and trustworthiness reduce time and efforts needed to acquire market information, and reduce the necessity to enforce the transactions. All these are consistent with the theoretical discussion. A recent study discovered that guanxi networks have moderating effects on the relationship between trust and relational risk in marketing channels (Liu *et al.*, 2008). This means that the effects of trust on the reduction of transaction costs in vegetable transactions may be reinforced in the presence of guanxi networks.

We did not find a statistically significant effect of trust on negotiation costs. This may be because of the low development level of farmer organizations in China. Individual personal networks are not able to efficiently improve farmers' negotiation power. Also because of their limited relationships with buyers, farmers face tough negotiations in all transactions no matter how well their *guanxi* networks function.

The results also show that several farmer-specific factors have a significant impact on transaction costs. Older farmers may have more knowledge about negotiating with buyers, and thus incur less negotiation costs. Farmers with a high level of education have more knowledge and capacity to acquire necessary market information, thus less information costs incurred. Well-educated farmers, however, may seek new buyers and even new markets, exploring new opportunities, which may significantly increase enforcement costs. Farmers with rich market experience may know more about their buyers; therefore less monitoring efforts are required. Meanwhile, experienced farmers may also have good personal (*guanxi*) networks that offer more opportunities to negotiate with more buyers and for good prices. Farmers' production scale reduces information costs significantly. Large-scale farmers are more attractive to buyers, so less time and efforts are needed for them to find buyers. Farmers who live far away from the markets incur less negotiation costs. This may be because farmers have to travel far and need much time to reach urban consumers in Jiangsu Province, which leaves them little time for negotiations as they have to go back to work in the field. We found that this was quite a common situation faced by most of the farmers in the research area at the time of the field interviews. In addition, good quality land reduces farmers' information and negotiation costs too. This may be because high-quality land generally produces better quality vegetables, which makes selling vegetables at the market easier.

However, we did not find a statistically significant impact of household size on the reduction of transaction costs in vegetable transactions in the research area. Further empirical investigation may be needed.

### **Influence of transaction costs and farmer-specific factors on farmers' participation in emerging markets**

The factors determining farmers' participation in emerging market outlets in Jiangsu Province are listed in Table 4 (the second-stage result of IVProbit analysis). The results show that information costs and negotiation costs in vegetable transactions significantly reduced the probability of farmers participating in emerging market outlets in Jiangsu Province. This implies that if farmers have problems in accessing necessary information or possess less power in the negotiation process, they will probably be excluded from most emerging market outlets, such as supermarkets, processing industries and international markets. In the modern marketing environments it is essential for farmers to build strong and reliable personal networks and trustworthy buyer–seller relationships in order to reduce information costs, thereby helping them to gain access to emerging markets. In addition, organized individual farmers may improve their power in the negotiation process and earn them a better position in transactions in emerging markets.

Surprisingly, a strong positive relationship between enforcement costs and farmers' participation in emerging markets was found in this study. This may be because the

product quality and safety requirements and delivery conditions are much higher in emerging markets than in conventional ones; therefore, more efforts are usually necessary to ensure the completion of the transactions in emerging markets. The recent occurrence of food quality and safety crises in China (for example: melamine in pet food and baby formula) increasingly asks for a better quality control system and more restricted regulation throughout the chain. A tracking and tracing system was implemented in the vegetable sector in Nanjing City in order to ensure vegetable quality and safety. All critical information on vegetable production, harvesting, delivery, and transactions was registered. If quality/safety issues occur in the late stages of the chain it is possible to trace the vegetables back to their origin and identify the source of the problems. In addition, a complete fast testing system both in the fields and in

Table 4. Regression results of variables that influence farmers' participation in emerging market outlets. <sup>1</sup>

Variable	Emerging market participation	
	Regression coefficient <sup>3</sup>	SE <sup>2</sup>
Information costs	-0.78 ***	0.22
Negotiation costs	-1.50 ***	0.14
Enforcement costs	0.21 *	0.12
Age of interviewee (years)	-0.02	0.01
Education level of interviewee <sup>4</sup>	-0.25	0.18
Experience of interviewee (years)	0.003	0.01
Household size (persons)	0.20 **	0.09
Total farmland area (mu)	-0.06	0.06
.....		
Constant	-0.90	0.80
.....		
<i>Statistics</i>		
No. of observations		167
Wald $\chi^2$ (8)		162.87
Log pseudolikelihood		-608.36
$P > \chi^2$		0.0000
Wald test of exogeneity	$\chi^2$ (3)	68.29
	$P > \chi^2$	0.0000

<sup>1</sup> Results of the second-stage Instrumental Variables Endogenous Probit Model. The Davidson–Fletcher–Powell algorithm was used to maximize the likelihood function. For a detailed discussion on the algorithm methods in Stata see Gould *et al.* (2006).

<sup>2</sup> SE = standard error.

<sup>3</sup> Levels of statistical significance: \* =  $P < 0.10$ ; \*\* =  $P < 0.05$ ; \*\*\* =  $P < 0.01$ .

<sup>4</sup> 0 = illiterate; 1 = primary school; 2 = middle school; 3 = high school; 4 = above high school.

retailing markets was set up. Under these circumstances, farmers face more challenges and need more efforts to ensure their production process and produced vegetables are consistent with the quality and safety requirements in emerging market outlets.

The results also indicate a positive relationship between household size and the probability of farmer's participation in emerging markets. Farm households with more members may build up more extended guanxi networks and therefore may easily obtain market information and thus can participate more easily in emerging markets. During the last decade, non-farm employment is developing quickly in China (Zhang & Li, 2003; Feng, 2008). Most of the farm households have family member(s) participating in non-farm employment. The engagement of household members in non-farm employment improves farmers' capacity to invest in advanced production technologies and better marketing facilities (Feng, 2008), which may contribute to the improvement of vegetable quality and safety. As a result, farmers may have better opportunities to participate in emerging market outlets.

## Discussion, conclusions, and policy implications

In this study we used a latent variable approach to measure main variables. The effectiveness of the latent variables, however, may have suffered from the possible shortcomings of the reliability and validity of the scales. Earlier studies claimed that the measurement scale for guanxi is still underdeveloped (Lee & Humphreys, 2007). A widely accepted and used scale is not available in the literature. The two items that were used to measure guanxi in this article may not be able to capture the comprehensive effect of guanxi in businesses. Furthermore, farmers' market experience may be related to their age and education, and thus may be a potentially endogenous problem. Although the Wald test showed that there was no statistically significant exogeneity problem in our model (see Table 4), further investigation with more samples from additional research areas may help to validate the results. Therefore we should interpret the results obtained from this study with caution.

This article explored the effects of guanxi, trust and farmer-specific factors on the reduction of transaction costs in vegetable supply chains, and thereby on smallholders' participation in emerging markets in China. The outcome of this study has practical relevance for vegetable farmers because it represents the conditions through which farmers can become better integrated into a modern market economy.

Our empirical results support the common belief that transaction costs are a significant constraint on market participation. Policies that try to improve farmers' welfare and market performance should particularly focus on the reduction of transaction costs as a feasible strategy (Ruben *et al.*, 2007b). In particular, attention should be given to measures that reduce transaction costs within major vegetable marketing chains in China. Our empirical analyses confirm that both information costs and negotiation costs significantly constrain vegetable farmers' participation in emerging markets in China. Information costs can be effectively reduced through well-developed personal guanxi networks and trustworthy buyer–seller relationships. In this respect, policies targeting on the improvement of farmers' trustworthiness and facilitating the building of trust between

farmers and their buyers may be very effective in promoting smallholders' participation.

Transaction costs can be reduced by improving market information release systems. The lack of price transparency and absence of personal trust can seriously hamper fluid transactions (Ruben *et al.*, 2007b). Since poor communication prevents efficient access to market information, accessible and effective communication networks in the rural areas need to be further developed. Currently, the wholesale and retail prices in major market places in the urban area of China are spread daily through internet and newspapers. However, most farmers are not able to instantly access such information. As a result, the current system can only help farmers to a limited extent. With the fast development of mobile networks in China, using mobile phone messages (SMS) to release market information may be an efficient and economic way to improve market transparency in China. During the fieldwork interviews we observed that most farmers had mobile phones for social and business communications. So it will be much easier and faster for farmers to acquire necessary information via SMS and to arrange production and marketing activities.

Transaction costs can also be reduced through more co-ordinated and collaborative relationships between farmers and their buyers. Although guanxi has been prevalent for thousands of years in China, and is deeply embedded in the mindset of the Chinese, the influence of guanxi in modern business is declining and ultimately may be taken over by the legal system (Guthrie, 1998). The economic transition in the Chinese vegetable markets increasingly requires adjustment in the sphere of market integration (Ruben *et al.*, 2007b). The potential to reduce transaction costs in agricultural markets through innovative institutional arrangements, such as horizontal co-ordination (e.g., farmers' organizations), vertical collaboration (e.g., contract farming or preferred suppliers), and chain optimization has been emphasized by researchers such as Verhaegen & Van Huylenbroeck (1999), Deshingkar *et al.* (2003), Reardon *et al.* (2003) and Ruben *et al.* (2007a). In China, developing farmers' organizations (e.g., farmers' co-operatives or professional associations) deserve serious attention as a device for reducing transaction costs (especially negotiation costs) (Hu *et al.*, 2004; Ruben *et al.*, 2007a). Further institutional reforms may therefore be needed to enhance market-driven conditions for improving small-scale farmers' marketing performance.

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## References

- Ahmadi-Esfahani, F.Z. & R.G. Stanmore, 1997. Demand for vegetables in a Chinese wholesale market. *Agribusiness: An International Journal* 13: 549–559.

- Anonymous, 1998. Improvement and stabilization of year-round vegetable supplies. In: AVRDC Report 1998. Asian Vegetable Research and Development Center, Shanhua, Taiwan, pp. 62–71.
- Anonymous, 2004. Yearbook of Agricultural Production and Trade. Food and Agriculture Organization of the United Nations (FAO), Rome, 351 pp.
- Anonymous, 2006. China's Compliance with Food Safety Requirements for Fruit and Vegetables: Promoting Food Safety, Competitiveness, and Poverty Reduction. World Bank, Washington, D.C., 197 pp.
- Bailey, D. & L. Hunnicutt, 2002. The role of transaction costs in market selection: market selection in commercial feeder cattle operations. Paper presented at the Annual Meeting of the American Agricultural Economics Association, 28–31 July 2002, Long Beach, California.
- Barr, A.M., 1998. Enterprise performance and the functional diversity of social capital. Working Paper Series No. 98/01. The Center for the Study of African Economics, University of Oxford, 21 pp.
- Batt, P.J. & N. Rexha, 1999. Building trust in agribusiness supply chains: a conceptual model of buyer–seller relationships in the seed potato industry in Asia. *Journal of International Food & Agribusiness Marketing* 11: 1–17.
- Buckley, P.J. & M. Chapman, 1997. The perception and measurement of transaction costs. *Cambridge Journal of Economics* 21: 127–145.
- Davies, H., T.K.P. Leung, S. T.K. Luk & Y. Wong, 1995. The benefits of “guanxi”: the value of relationships in developing the Chinese market. *Industrial Marketing Management* 24: 207–214.
- De Janvry, A., M. Fafchamps & E. Sadoulet, 1991. Peasant household behavior with missing markets: some paradoxes explained. *The Economic Journal* 110: 1400–1417.
- Deshingkar, P., U. Kulkarni, L. Rao & S. Rao, 2003. Changing food systems in India: resource sharing and marketing arrangements for vegetable production in Andhra Pradesh. *Development Policy Review* 21: 627–639.
- Doney, P.M. & J.P. Cannon, 1997. An examination of the nature of trust in buyer–seller relationships. *Journal of Marketing* 61: 35–51.
- Dyer, J.H., 1997. Effective interfirm collaboration: how firms minimize transaction costs and maximize transaction value. *Strategic Management Journal* 18: 535–556.
- Escobal, J.A., 2005. The role of public infrastructure in market development in rural Peru. PhD thesis Wageningen University, Wageningen, 256 pp.
- Fafchamps, M. & B. Minten, 1998. Relationships and Traders in Madagascar. Discussion Paper No. 24. International Food Policy Research Institute (IFPRI), Washington, D.C., 28 pp.
- Feng, S., 2008. Land rental, off-farm employment and technical efficiency of farm households in Jiangxi Province, China. *NJAS – Wageningen Journal of Life Sciences* 55: 363–378.
- Gabre-Madhin, E.Z., 2001. Market Institutions, Transaction Costs, and Social Capital in the Ethiopian Grain Market. Research Report No. 124. International Food Policy Research Institute (IFPRI), Washington, D.C., 108 pp.
- Gould, W., J. Pitblado & W. Sribney, 2006. Maximum Likelihood Estimation with Stata (3rd edition). Stata Press, College Station, Texas, 290 pp.
- Grover, V. & M.K. Malhotra, 2003. Transaction cost framework in operations and supply chain management research: theory and measurement. *Journal of Operations Management* 21: 457–473.
- Gulati, R., 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice alliances. *Academy of Management Journal* 38: 85–112.
- Guthrie, D., 1998. The declining significance of guanxi in China's economic transition. *The China Quarterly* 154: 254–282.



- Hair, J.F., R.E. Anderson, R.L. Tatham & W.C. Black, 1998. *Multivariate Data Analysis* (5th edition). Prentice-Hall, Englewood Cliffs, New Jersey, 768 pp.
- Hobbs, J.E., 1997. Measuring the importance of transaction costs in cattle marketing. *American Journal of Agricultural Economics* 79: 1083–1095.
- Hobbs, J.E. & L.M. Young, 2001. Vertical Linkages in Agri-food Supply Chains in Canada and the United States. Research and Analysis Directorate, Strategic Policy Branch, Agriculture and Agri-Food Canada, Ottawa, Ontario, 84 pp.
- Hu, D., T. Reardon, S. Rozelle, P. Timmer & H. Wang, 2004. The emergence of supermarkets with Chinese characteristics: challenges and opportunities for China's agricultural development. *Development Policy Review* 22: 557–586.
- Hu, D. & D. Xia, 2007. China: Case Studies of Carrefour's Quality Lines. International Institute for Environment and Development, London, 59 pp.
- Hueth, B., E. Ligon, S. Wolf & S. Wu, 1999. Incentive instruments in fruit and vegetable contracts: input control, monitoring, measuring and price risk. *Review of Agricultural Economics* 21: 374–389.
- Huang, X., 2008. Guanxi networks and job search in China's emerging labor market: a qualitative investigation. *Work Employment Society* 22: 467–484.
- Klein, S., G.L. Frazier & V.J. Roth, 1990. A transaction cost analysis model of channel integration in international markets. *Journal of Marketing* 27: 196–208.
- Kyeyamwa, H., 2007. Integration of Smallholders Cattle Farmers in the Livestock Market of Uganda. Faculty of Bioscience Engineering. Ghent University, Ghent, 215 pp.
- Lee, P.K.C. & P.K. Humphreys, 2007. The role of guanxi in supply management practices. *International Journal of Production Economics* 106: 450–467.
- Leuthesser, L. & A.K. Kohli, 1995. Relational behavior in business markets implications for relationship management. *Journal of Business Research* 34: 221–233.
- Liu, Y., J. Chen, X. Zhang & B. Kamphuis, 2004. Vegetable Industry in China: Developments in Policies, Production, Marketing and International Trade. Agricultural Economics Research Institute (LEI), The Hague, 81 pp.
- Liu, Y., Y. Li, L. Tao & Y. Wang, 2008. Relationship stability, trust and relational risk in marketing channels: evidence from China. *Industrial Marketing Management* 37 432–446.
- Lu, H., 2007. The Role of Guanxi in Buyer–Seller Relationships in China: a Survey of Vegetable Supply Chains in Jiangsu Province. Wageningen Academic Publishers, Wageningen, 239 pp.
- Lu, H., S. Feng, J.H. Trienekens & S.W.F. Omta, 2008. Performance in vegetable supply chains: the role of guanxi networks and buyer-seller relationships. *Agribusiness: An International Journal* 24: 253–274.
- Lu, H., J.H. Trienekens & S.W.F. Omta, 2006. Does guanxi matter for vegetable supply chains in China? A case study approach. In: J.S. Bijman, S.W.F. Omta, J.H. Trienekens, J. Wijnands & E. Wubben (Eds), *International Agri-food Chain and Networks: Management and Organization*. Wageningen Academic Publishers, Wageningen, pp. 31–47.
- Luo, Y. & M. Chen, 1997. Does guanxi influence firm performance? *Asia Pacific Journal of Management* 14: 1–16.
- Narasimhan, R. & S.W. Kim, 2002. Effect of supply chain integration on the relationship between diversification and performance: evidence from Japanese and Korean firms. *Journal of Operations Management* 20: 303–323.
- Newey, W.K., 1987. Efficient estimation of limited dependent variable models with endogenous explanatory variables. *Journal of Econometrics* 36: 231–250.

- Nooteboom, B., 2002. Trust: Forms, Foundations, Functions, Failures and Figures. Edward Elgar, Cheltenham, 231 pp.
- Ostrom, E. & J. Walker, 2003 (Eds). Trust and Reciprocity: Interdisciplinary Lessons from Experimental Research. Russell Sage Foundation, New York, 409 pp.
- Reardon, T., P. Timmer, C.B. Barrett & J. Brdegue, 2003. The rise of supermarkets in Africa, Asia, and Latin America. *American Journal of Agricultural Economics* 85: 1140–1146.
- Rindfleisch, A. & J.B. Heide, 1997. Transaction cost analysis: Past, present, and future applications. *Journal of Marketing* 61: 30–54.
- Ruben, R., D. Boselie & H. Lu, 2007a. Vegetable procurement by Asian supermarkets: a transaction cost approach. *Supply Chain Management: An International Journal* 12: 60–68.
- Ruben, R., H. Lu & E. Kuiper, 2007b. Marketing chains, transaction costs and resource management: efficiency and trust within tomato supply chains in Nanjing City. In: M. Spoor, N. Heerink & F. Qu (Eds), *Dragons with Clay Feet? Transition, Sustainable Land Use and Rural Environment in China and Vietnam*. Rowman & Littlefield, Lanham, Maryland, pp. 161–180.
- Ruijs, A., C. Schweigman & C. Lutz, 2004. The impact of transport- and transaction-cost reductions on food markets in developing countries: evidence for tempered expectations for Burkina Faso. *Agricultural Economics* 31: 219–228.
- Sadoulet, E. & A. De Janvry, 1995. Quantitative Development Policy Analysis. Johns Hopkins University Press, Baltimore, Maryland, 72 pp.
- Standifird, S.S. & R.S. Marshall, 2000. The transaction cost advantage of guanxi-based business practice. *Journal of World Business* 35: 21–42.
- Suh, T. & I.W.G. Kwon, 2006. Matter over mind: when specific asset investment affects calculative trust in supply chain partnership. *Industrial Marketing Management* 36: 191–201.
- Tsang, W.K., 1998. Can guanxi be a source of sustained competitive advantage for doing business in China? *The Academy of Management Executive* 12: 64–74.
- Vakis, R., E. Sadoulet & A. De Janvry, 2003. Measuring Transactions Costs from Observed Behavior: Market Choices in Peru. CUDARE Working Papers No. 962. Department of Agricultural & Resource Economics, University of California, Berkeley, California, 21 pp.
- Van Tongeren, F. & J. Huang, 2004. China's Food Economy in the Early 21st Century: Development of China's Food Economy and its Implication on Global Trade and on the EU. Report No. 6.04.04. Agricultural Economics Research Institute (LEI), The Hague, 321 pp.
- Verhaegen, I. & G. Van Huylenbroeck, 1999. A transaction cost analysis of a small innovative marketing channel for beef in Belgium. *Journal of International Food and Agribusiness Marketing* 10: 1–18.
- Vorley, B., A. Fearn & D. Ray (Eds), 2007. Regoverning Markets: a Place for Small Scale Producers in Modern Agrifood Chains? Gower Publishing, Hampshire, 248 pp.
- Williamson, O.E., 1979. Transaction cost economics: the governance of contractual relations. *The Journal of Law and Economics* 22: 233–261.
- Zhang, X. & G. Li, 2003. Does guanxi matter to nonfarm employment? *Journal of Comparative Economics* 31: 315–331.