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Article

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Why are social network transactions important? Evidence based on the concentration of key suppliers and customers in China

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ABSTRACT

Based on a new institutional economy framework, this study examines the formation and economic consequences of social networks (*guanxi*) from the perspective of key suppliers and customers in China. Results show that commercial activities which depend on networks are determined by the institutional environment. For example, companies that have lower accumulated social capital (less trust among people) and are subject to more government intervention depend more on social network transactions than on the market. In addition, this study shows that network transactions can provide benefits to firms, especially in weak institutional environments. Networks can reduce transaction costs by reducing information asymmetry, i.e., increased network dependence is associated with lower credit costs and lower advertising and sales costs. Networks can also reduce the effect of industry shocks, especially negative shocks, by creating a bonding mechanism. This study contributes to our understanding of social networks in emerging markets by providing evidence on network transactions with key suppliers and customers and their influence on firms' accounting behavior.

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1. Introduction

Previous studies have generally concluded that social networks play an important role in information sharing among connected parties (see a review paper by Allen and Babus (2008)). Nonetheless, there is little academic work examining the role that social networks play in emerging markets. Khanna and Thomas (2009) find that companies in Chile which have social ties have greater synchronicity due to information correlation. Bunkanwanich et al. (2008) find that family firms use marriages between different groups to form social networks and that the market reacts positively to the announcement of such marriages. Ball et al. (2003) argue that companies in East Asia conduct business activities using social networks (*guanxi*), which means the effect of financial accounting on capital markets is limited. However, without a direct measurement of social networks, we still know little about the role they play in accounting behavior. Using unique data on key suppliers and the concentration of customers in China, the aim of this study is to provide empirical evidence on how institutions in emerging

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markets influence the formation of social networks and how the characteristics of network transactions influence accounting behavior.

Following a new institutional framework proposed by Williamson (2000), the paper begins with a brief analysis of both informal (i.e., *religion and customs*) and formal (i.e., *the legal system, degree of property rights protection, market arrangements*) institutions in China and their effect on the governance structure of firms. We focus mainly on the influence of social network transactions, proxied by the concentration of key customers and suppliers. The specific analysis paths are presented in the diagram below.

	Degree 1	Degree 2	Degree 3	Conclusion
Question	Why are social networks transactions necessary?	How can social network transactions be retained?	What are the benefits of social network transactions?	
Theoretical analysis	Transaction behavior is endogenously determined by the institutional background	An optimal governance structure is matched with the external environment	An optimal governance structure can minimize transaction costs from ex-ante and ex-post perspectives	
Arguments addressed in this study	Social network transactions are determined by informal and formal institutions in China	Firms accomplish transactions with key customers and suppliers	Dependence on social network transactions can reduce transaction costs and industry shocks	Social networks are important and valued by firms
Hypothesis		Hypothesis 1	Hypothesis 2 and 3	

Based on a unique dataset of Chinese listed firms, we measure the concentration of key suppliers and customers as a measure of their dependence on social network transactions. Specifically, if a firm accomplishes its commercial activities with a limited number of key suppliers or customers, the firm will depend more on social network transactions. If the firm has a diverse range of suppliers or customers, it will depend less on social networks. Our sample consists of 7401 firm-level observations from 2001 to 2008. We find that firms are more likely to establish key customer or supplier connections in regions where the local economy is less market-oriented or has low social capital, as measured by the level of trust. We also find that the concentration of key customers and suppliers tends to reduce transaction costs, measured by the cost of sales/advertising and credit, especially in areas with weak institutions. We then find that the concentration of key customers and suppliers can reduce the effect of exogenous industry shocks, although, after distinguishing between positive and negative shocks, we find that the result is only significant for negative shocks. These results are robust to controlling for various firm characteristics.

This research contributes to the literature in several ways. First, we complement previous studies (La Porta et al., 2002; Zingales and Sapienza, 2004) by showing that institutional differences in the protection of property rights, the local government's propensity to expropriate from local firms and social capital accumulation have direct effects on firms' dependence on social networks. In addition, this research provides further insights into the findings of recent studies on the role of social networks in the finance and accounting fields. Anecdotal evidence suggests that as an informal mechanism, social networks can play a large part in how people conduct business in China, although empirical evidence is rarely provided. The current research mainly focuses on the role of information sharing among corporate officers (e.g., Cohen et al., 2008; Hwang and Kim, 2009). The findings in this paper provide further evidence on the potential benefits of social network transactions and the risk management process.

The rest of the paper is organized as follows. Section 2 reviews the literature and develops hypotheses. Section 3 introduces the methodology and data. Sections 4 and 5 report the empirical results and robustness checks, and Section 6 concludes.

2. Literature review and hypotheses

2.1. Institutional influences and endogenous determinants of social network transactions

The role of institutions is to reduce uncertainty by establishing a stable (but not necessarily efficient) structure for human interactions (Acemoglu et al., 2005). We can think of economic institutions as determining the economic rules of the game, such as the degree of property rights enforcement, the set of contracts that can be written and enforced, and the rules and regulations that determine the economic opportunities open to people. It is conventional to subdivide institutions into formal institutions, such as the legal system and property rights protection system, and informal institutions, such as customs and religion. In constructing a new institutional economy framework, Williamson (2000) explains the progressive relationships between institutions including formal and informal institutions, governance structures and economic performance. In

a micro-level analysis, Williamson (1979, 1985) points out that to minimize transaction costs, efficient economic organizations should adopt governance structures that match the external environment. The cross-country results of Acemoglu et al. (2005) suggest that institutions, including the protection of citizens' property rights from expropriation by the government, have a first-order effect on long-term economic development. As a transitional economy, China offers an ideal setting for testing the influence of different institutions (both formal and informal) on firm activity. Following Williamson's, 2000 framework, we analyze firms' dependence on social network transactions among different regions of China.

2.1.1. Social capital (informal institutions) and dependence on social networks

Social capital is defined as the advantages and opportunities that are available for people through their membership of particular communities (Putnam et al., 1993). The source of social capital lies with the people that a person is connected to, which is an important part of informal institutions, as measured by a trust index. Zingales and Sapienza (2004) document that social capital plays an important part in financial development. Zhou (2009) use survey data in China and find that the parents of students often pay a New Year call to teachers, which helps to build social ties and helps their children gain entrance to better high schools. Social capital affects the behavior of individuals because it enhances the level of social punishment in a society. High levels of social capital generate higher levels of trust towards others, which influences the way people do business and their dependence on social network transactions.

Klein et al. (1978) document post-contractual opportunistic behavior in the use of market systems, especially when a specific investment is made. To overcome this cost there are two forms of long-term contracts that can be used: (1) an explicit contractual guarantee that is legally enforced by the government and legal system; and (2) an implicit contractual guarantee that is enforced by the withdrawal of future business if opportunistic behavior occurs. Due to the weak legal protection in China, implicit contracts play an even more important part. Trust, as a composition of social capital, is a self-enforcing mechanism that reinforces implicit contracts. When one party engages in opportunistic behavior for a current gain, the loss of trust will result in a loss of value in future transactions. In regions with a weak level of trust among people, implicit contracts will not be fulfilled among the general public; instead, transactions will be limited to familiar groups, such as friends and families. Such groups (*quanzi* in Chinese) will construct social networks to fulfill implicit contracts. In the sociological literature on China's institutions, a great deal of attention is paid to trust. Weber (1920) argues that the low level of trust among Chinese people is an important reason why capitalism did not initially develop in China. Furthermore, Fei (1948) emphasizes that trust in Chinese people is based on family or blood connections, and that trust is like a pecking order in which people only have trust in people who belong to the same group. He documents that a lack of trust induces people to conduct business in limited groups to reduce opportunistic behavior, which creates social network transactions. We therefore make the following prediction, formally stated in the form of a hypothesis:

H1a. Dependence on social network transactions is negatively related to social capital accumulation (trust level).

2.1.2. Rent seeking incentives (formal institutions) and dependence on social networks

China has experienced remarkable economic growth in the process of moving from a centrally-planned to a market-oriented economy. Although the central government retains its control of political aspects, particularly the appointment of government personnel, economic decision-making rights have become greatly decentralized to local government, so that local parties have great influence over local businesses (Xu, forthcoming). On the one hand, government policies at both central and local levels still dominate the allocation of resources through licensing, which tend to promote various rent-seeking activities. For example, Cull and Xu (2005) find that local SOEs can obtain credit from local SOE banks due to natural government networks, whereas anecdotal evidence suggests that private firms have to raise capital through social network financing that depends on personal connections. On the other hand, local governments can take the role of a 'grabbing hand' (Shleifer and Vishny, 1994), either by imposing extra fees and fines on firms or by setting unfavorably high prices for resources supplied by local governments.

There are ways for firms, especially private firms, to reduce rent-seeking activities and protect their property rights. Chen et al. (2011) document that private firms build political connections to reduce local governments' rent-seeking activities. We argue that social network transactions can also play a part in stopping the 'grabbing hand' of local government. First, local governments often segment local markets so that firms cannot undertake outside transactions. Second, rent-seeking activities jeopardize product development; although an undeveloped market needs limited scientific knowledge, it will need more specific knowledge and network transactions are more suitable for the type of knowledge needed in this setting. Third, transactions that take place within a limited group will be kept at a distance from government, which can reduce rent-seeking opportunities. We therefore make the following prediction, formally stated in the form of a hypothesis:

H1b. Dependence on social network transactions is positively associated with the rent-seeking incentives of local government.

2.2. Economic consequences of social network transactions

Recent research provides supportive evidence for the information dissemination effect of social networks in corporate finance, as reviewed by Allen and Babus (2008). Cohen et al. (2008) find that fund managers hold more stock issued by firms in

which the senior officers share their educational ties. They also find that school ties give sell-side analysts an information advantage and their stock recommendations earn significantly higher returns than those who do not have such social ties. Similarly, Hochberg et al. (2007) find that social networks provide better investment performance in venture capital firms. There is also evidence to show that social networks are associated with less monitoring of managers among directors, which can be regarded as a weak corporate governance mechanism (Nguyen-Dang, 2005). Nevertheless, there is little evidence to show how social networks affect the commercial activities of firms, especially in emerging countries. This section will provide such evidence.

2.2.1. Social network transactions to reduce transaction costs

Williamson (1979) uses *uncertainty, frequency with which transactions occur* and whether *durable transaction-specific investments have incurred* to characterize the different dimensions of transaction costs. As documented in the previous section, social networks are used to arrange non-governmental contracts (or *implicit contracts*). There are two reasons why transaction costs will be reduced by this arrangement. First, the creation of a social network will build expectations for repeat-purchase transactions, which means the interaction will last longer, occur more frequently and will reduce information asymmetry. Second, social network transactions require both parties to make specific investments. As documented by Klein and Leffler (1981), a premium is offered to other parties to reduce opportunistic behavior *ex post*; in equilibrium, the premium will equal a discounted stream of rents on future sales entitled by specific investments. The premium can be offered in various ways, especially during transactions with customers and suppliers who share a social network. For instance, customers and suppliers will not demand advertisements that signal a product's quality because they have a private information channel. They will also demand less prepayment and will not require a high credit payment pattern. In regions with low social capital (where there is less trust to fulfill contracts), the fulfillment of transactions will depend more on implicit contracts, and social network transactions will become more important in reducing transaction costs.¹ Thus, we make the following prediction, formally stated in the form of a hypothesis:

H2. Firms with more social network transactions have lower transaction costs, especially in regions with low social capital.

2.2.2. Social network transactions to overcome external shocks

Contagion is used by Allen and Gale (2000) to explain the emergence of an economic crisis. Furfine (2003) and Degryse and Nguyen (2005) find that the failure of one bank can cause contagion and create an industry shock, which refers to an exogenous factor that affects the industry's level of profitability. Such shocks can cause the collapse of the whole banking industry. A report from the Guangdong Academy of Social Science (2009) states that the financial crisis in 2008 caused over 11,000 companies in Guangdong, particularly export companies, to report large losses in earnings. As argued in the previous section, social networks offer a premium in the fulfillment of implicit contracts; the premium may take many different forms and a reduction in the effects of industry shocks is one such form.

There are a number of incentives for the parties in a social network to reduce the effects of industry shocks. First, the parties have an incentive to protect specific investments, such as research and development costs. If the company makes a big loss, or even fails, as the result of an industry shock, the specific investment will not be recouped. Previous studies have found that a series of mechanisms can be used to protect specific investments, such as low leverage (Maksimovic and Titman, 1991; Kale and Shahrur, 2007), greater conservatism (Chen et al., 2008) and greater likelihood of cross-holding stock (Fee et al., 2006). In this section, we argue that reducing industry shocks also acts as a mechanism for protecting specific investments. Second, industry shocks can cause *contagion* in a firm's network counterparts, which will mean that the whole group fails together. Thus, to protect specific investments and prevent *contagion*, there are incentives for firms to reduce industry shocks for their partners.

There are many methods for reducing industry shocks in accounting behavior. Take the key customers and suppliers in a social network transaction as an example. When facing a negative industry shock, such as a widespread increase in production costs, the firm can alleviate the negative consequences by expediting accounts receivable and postponing accounts payable; when facing a positive industry shock, they may negotiate with key customers or suppliers to hide a proportion of their earnings, as in *cookie jar* accounting. The firm may also do the opposite; because the benefit of doing so is small, the incentive will be much less than when facing a negative shock. If there is a strong social network, all of these activities should take place in collaboration with key suppliers and customers² because they have the incentive to cooperate with each other. Thus, we make the following prediction, formally stated in the form of a hypothesis:

H3. The effect of industry shocks, particularly negative shocks, is reduced in firms with more social network transactions.

¹ Some may argue that a social network transaction is endogenously determined by the external environment. In equilibrium, after we control for endogenous factors, there should be no relation between transaction costs and social networks. Similar arguments are made by Lehn and Demsetz (1985) concerning the relationship between firm performance and ownership structure. However, we believe that this argument does not apply in our setting, because apart from transaction costs, there will also be production costs, which are influenced by social networks, both of which should be endogenously determined by the transaction mode. In our research design, after we control for endogenous arguments in 2SLS regressions, our results remain robust.

² Anecdotal evidence suggests that Huangguangyu uses key customer and supplier relations for short term financing for his retail enterprise building, especially when the firm faces severe financial constraints, which also supports our argument.

3. Research design

The regression models used to test the hypotheses are explained below. The measures for social network transactions, firm's transaction costs and industry shocks are introduced after each regression model.

To test hypotheses H1a and H1b, we employ the following models:

$$\begin{aligned} \text{Networktransaction}_{it} = & \alpha_0 + \beta_1 \text{Trustindex} + \beta_2 \text{Controller}_{it} \\ & + \beta_3 \text{ROA}_{it} + \beta_4 \text{Age}_{it} + \beta_5 \text{Shr1}_{it} + \beta_6 \text{Loss}_{it} \\ & + \beta_7 \text{Tobin'sQ}_{it} + \beta_8 \text{Related}_{it} + \beta_9 \text{Leverage}_{it} + \beta_{10} \text{Size}_{it} \\ & + \text{YearDummies} + \text{IndustryDummies} + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} \text{Networktransaction}_{it} = & \alpha_0 + \beta_1 \text{Marketindex} + \beta_2 \text{Controller}_{it} \\ & + \beta_3 \text{ROA}_{it} + \beta_4 \text{Age}_{it} + \beta_5 \text{Shr1}_{it} + \beta_6 \text{Loss}_{it} \\ & + \beta_7 \text{Tobin'sQ}_{it} + \beta_8 \text{Related}_{it} + \beta_9 \text{Leverage}_{it} + \beta_{10} \text{Size}_{it} \\ & + \text{YearDummies} + \text{IndustryDummies} + \varepsilon \end{aligned} \quad (2)$$

β_1 is the variable to be tested and we expect β_1 to be negative. The key variables are defined as follows. Social network transactions are proxied by the concentration of key suppliers and customers, with greater concentration implying more dependence on social networks. The CSRC introduced a mandatory disclosure requirement for the concentration of big 5 customers and suppliers in 2001. In the regression model, we separate the level of concentration into S-network transactions (*concentration of top 5 suppliers*) and C-network transactions (*concentration of top 5 customers*). The trust index (*proxy for social capital accumulation*) is derived from survey data from Zhang and Ke (2002) and the market-oriented index is derived from Fan et al. (2007), on which higher levels imply better institutions (greater accumulation of social capital or less incentive for government entrenchment).³ The following are included as control variables: *Controller* is the proxy for the property rights of the firm; *ROA* is the proxy for performance; *Age* is the number of years a firm has been listed; *Shr1* is the largest shareholder ownership of the firm; *Loss* indicates if the firm earns a loss; *Tobin's Q* measures growth opportunities; *Related* is a measure of related party transactions; and *Leverage* measures the firm's capital structure. A more detailed description is provided in Table 1.

To test Hypothesis 2, we employ the following model, similar to Liu et al. (2009):

$$\begin{aligned} \text{TransactionCost}_{it} = & \alpha_0 + \beta_1 \text{TrustIndex} + \beta_2 \text{Networktransaction}_{it} + \beta_3 \text{TrustIndex} * \text{Networktransaction}_{it} \\ & + \beta_4 \text{Controller}_{it} + \beta_5 \text{Shr1}_{it} + \beta_6 \text{Tobin'sQ}_{it} + \beta_7 \text{Size}_{it} + \beta_8 \text{Leverage}_{it} + \beta_9 \text{ROA}_{it} + \text{YearDummies} \\ & + \text{IndustryDummies} + \varepsilon \end{aligned} \quad (3)$$

β_2 and β_3 are the variables to be tested; according to Hypothesis 2, we expect β_2 to be significantly negative, and β_3 to be significantly positive.

Following Liu et al. (2009), we use the following variables for proxies: *Sales expense* (cost of sales and discounts as a proportion of total sales), *Trust cost-pijk* (notes payable as a proportion of credit sales) and *Trust cost-yf* (prepayments as a proportion of total assets). We also use principal components analysis to generate a new factor, which is the linear function of the three factors above. Details of the control variables can be found in Table 1. To reduce the endogenous determinants of social network transactions, we use the 2SLS method⁴ as a robustness check; the first stage is the model used to test hypothesis 1.

To test Hypothesis 3, we employ the following model, similar to Bertrand et al. (2002) and (Jian and Wong, 2010):

$$\begin{aligned} \text{Per}_{it} = & \alpha_0 + \beta_1 \text{Industryshock}_t + \beta_2 \text{Industryshock}_t * \text{Networktransaction}_{it} + \beta_3 \text{Size}_{it} + \beta_4 \text{Leverage}_{it} + \text{YearDummies} \\ & + \text{IndustryDummies} + \varepsilon \end{aligned} \quad (4)$$

β_2 is the variable to be tested; according to Hypothesis 3, we expect β_2 to be significantly negative.

Per is the operating profitability of the firm. Chen and Yuan (2004) document that listed firms can use a *below the line* method for earnings management; in this setting, social network transactions help the firm to reduce industry shocks mainly through normal commercial activities, thus operating profitability is more suitable than net profitability. We adopt industry codes according to the "Guide on Industry Classification for Listed Firms" set by the CSRC. For manufacturing industries, we include one character and two numerals; for other industries, after deleting financial industry, we include only the character. Thus, we have 21 sub-sectors in the whole sample. *Industry shock* is the industry median *per*, excluding the firm itself. Further details on the control variables can be found in Table 1.

³ Trust index is mainly by a survey for 15,000 entrepreneurs, in order to make the index normalization, we take logarithmic transformation, market oriented index is about five dimensions including market and government relation, development of product market, development of factor and material, development of market intermediaries, and legal environments.

⁴ Thanks to an anonymous referee for this constructive suggestion.

Table 1
Variable definitions.

Variables	Definitions
<i>S-network transaction (%)</i>	The proportion of total purchases accounted for by the five largest suppliers
<i>C-network transaction (%)</i>	The proportion of total sales accounted for by the five largest customers
<i>Sales expense (%)</i>	The cost of sales and discounts in the sales revenue
<i>Trust cost-pjzk (%)</i>	Notes payable/(notes payable + accounts payable), which reflects the proportion of credit transactions
<i>Trust cost-yf (%)</i>	Prepayments/total assets, which reflects the the amount paid in advance during a transaction
<i>Inventory (%)</i>	Inventory/total assets
<i>Per</i>	Operating profit/operating income
<i>Industry shock</i>	The industry median per excluding the firm itself, which is similar to Bertrand (2002).
<i>Market index</i>	Used in the market report, from Fan et al. (2007)
<i>Trust index</i>	Survey data from Zhang and Ke (2002)
<i>Size</i>	The natural logarithm of total assets
<i>Leverage</i>	Total liabilities/total assets
<i>Tobin's Q</i>	According to the CSMAR definition, we use flow per share price \times number of shares + net assets per share \times number of non-tradable shares + book value of liabilities)/book value per share
<i>Controller</i>	Dummy variable which equals one when the firm is not a stated-owned enterprise, and equals zero when the firm is an SOE.
<i>Shr1</i>	The proportion of the largest shareholder
<i>ROA</i>	According to the CSMAR definition, net profit/average total assets
<i>Age</i>	Listing years, from the time of listing to August 2010 as the baseline
<i>Loss</i>	Dummy variable which equals one when the firm earns a loss, and otherwise equals zero
<i>Related</i>	Related party transactions as a proportion of the total revenue

4. Empirical analysis

4.1. Distribution of the sample

Data on the concentration of key suppliers and customers is hand collected from annual reports from 2001 to 2008 and financial data is sourced from the CSMAR database. After deleting observations relating to the financial industry and those that have missing financial data needed for the regression model, there are 7800 observations which disclose information on their five biggest suppliers and 9069 observations which disclose information on their five biggest customers. We only include the data which discloses the level of both customer and supplier concentration. Our final sample has 7401 firm-year observations. The sample distribution by year is shown in Fig. 1.

From Fig. 1, we can see that there is a high concentration of key suppliers and customers. The average concentration of big 5 customers is higher than 30% per year and the concentration of big 5 suppliers is higher than 35%. From the time series trend, we can see that the concentration slowly decreases, which implies that dependence decreases with time. Fig. 2 also shows the concentration distribution among different regions across China. Taking the concentration of big 5 suppliers as an example, we can see that there are differences among provinces, with a much lower concentration in Zhejiang, Shandong and Beijing than in Yunnan, Xizhang and Hainan provinces. The concentration of customers shows a similar trend across regions.

4.2. Descriptive statistics

All variables are winsorized at 1% and 99% levels to reduce extreme values. Table 2 presents descriptive statistics. On average, big 5 suppliers are 39% of purchases and big 5 customers are 31% of sales. We also use principal components analysis for the basic transaction cost proxy to obtain the linear function⁵; the coefficients are 0.7177, 0.6977 and -0.4877 , which explains 41.28% of the variable.

Table 3 shows the Pearson correlation matrix. The table shows that *S-network transactions* and *C-network transactions* are significantly negatively correlated with *Market index* and *Trust index*, which supports the prediction of Hypothesis 1. *Trust cost-pjzk* is significantly negatively correlated with *C-network transaction*, and *Trust cost-yf* and *Sales expense* are significantly negatively correlated with *S-network transactions* and *C-network transactions*, which supports the prediction of Hypothesis 2. We find no statistical correlation between *Trust cost-pjzk* and *S-network transactions*.

4.3. Regression results

This section reports the main regression results. All the OLS regression models are adjusted according to White (1980) standard errors and include controls for industry and year effects. We also confirm that the VIF for each variable is less than 4, except for year and industry dummies, which suggests that there is no problem with multicollinearity.

⁵ This is for the first component. The figures for the second variable are 0.4850, 0.5142 and 0.7621 which can explain 31.48% of the variables. For a robustness check, we use the second component and our empirical results remain basically unchanged.

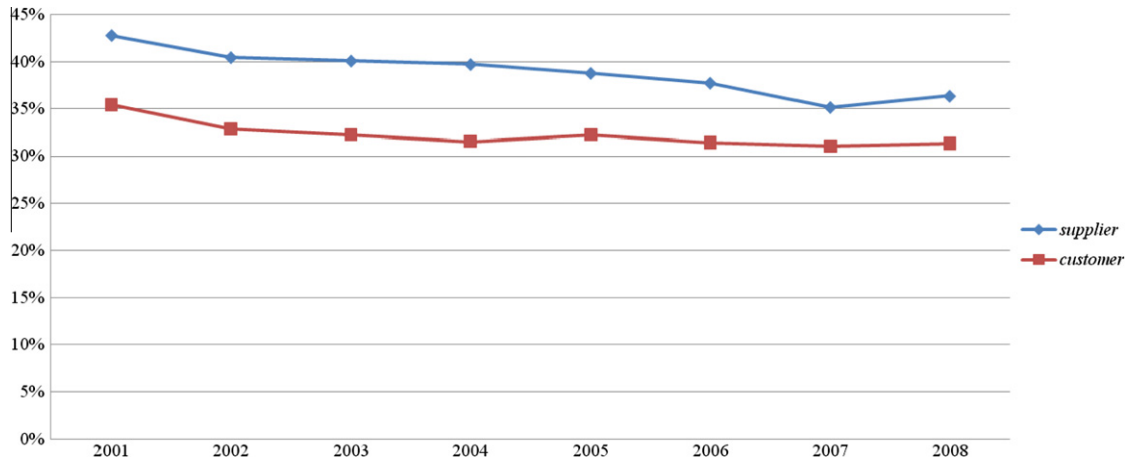
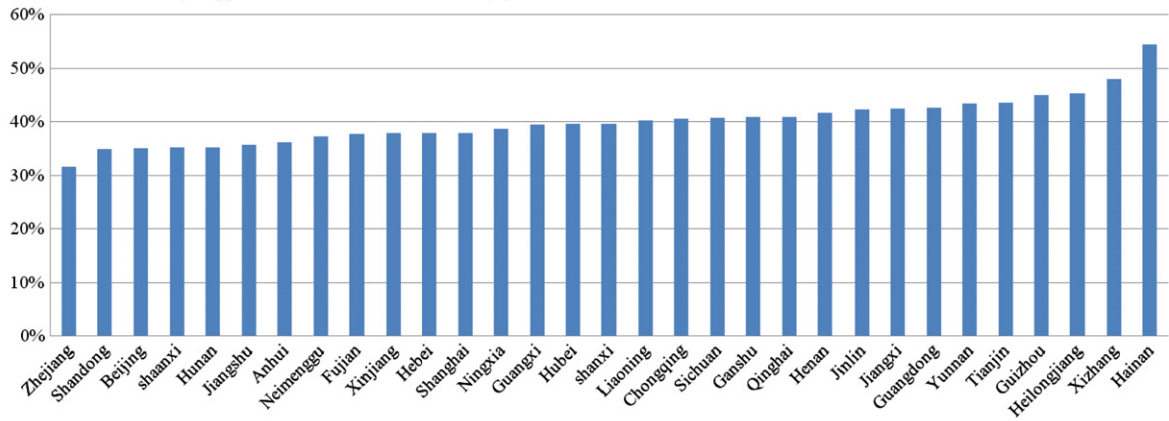


Fig. 1. Concentration of key suppliers and customers of Chinese listed firms by year.

2.1 Concentration of key suppliers of Chinese listed firms by province



2.2 Concentration of key customers of Chinese listed firms by province

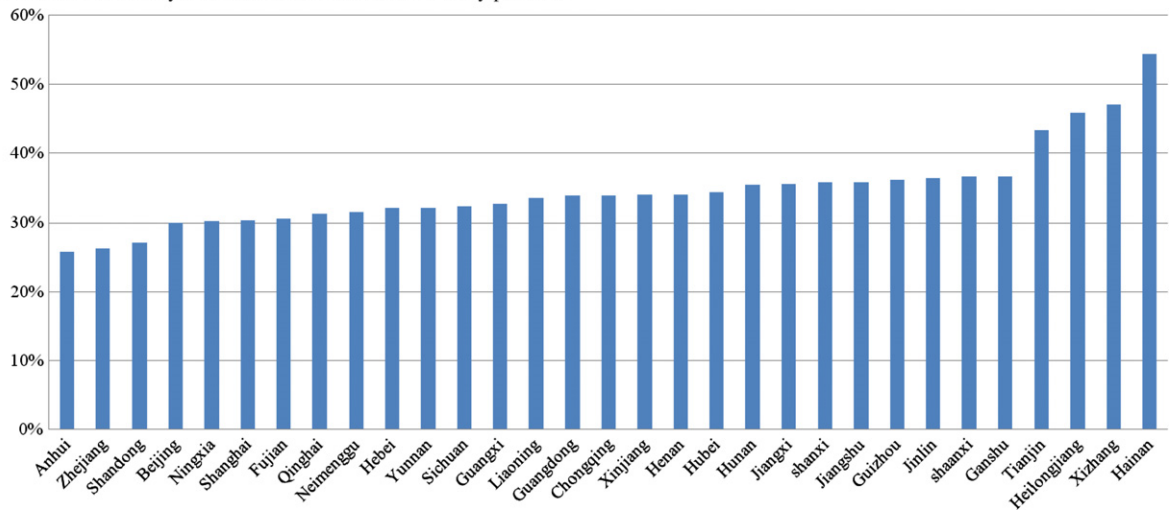


Fig. 2. (2.1) Concentration of key suppliers of Chinese listed firms by province. (2.2) Concentration of key customers of Chinese listed firms by province.

From Table 4, we find that when *S-network transactions* is the dependent variable, the coefficients of *Trust index* and *Market index*, -0.602 and -0.360 , respectively, are significantly negative, with *t*-statistics of -2.62 and -2.51 . Both are statisti-

Table 2
Descriptive statistics.

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
<i>S-network transactions</i>	7401	39.264	23.588	4.100	98.680
<i>C-network transactions</i>	7401	31.818	23.523	1.750	100.000
<i>Leverage</i>	7401	0.515	0.245	0.091	1.837
<i>Trust cost-pjzk</i>	7401	21.320	23.994	0.000	86.409
<i>Trust cost-yf</i>	7401	3.870	4.284	0.003	22.452
<i>Sales expense</i>	7401	6.016	6.922	0.000	40.426
<i>Market index</i>	7401	7.707	1.901	2.500	10.410
<i>Trust index</i>	7401	3.649	1.181	0.993	5.389
<i>Per</i>	7401	0.001	0.375	-2.754	0.477
<i>Industry shock</i>	7401	0.063	0.042	0.012	0.246
<i>Size</i>	7401	19.082	1.423	14.209	22.304
<i>Tobin's Q</i>	7401	1.385	0.592	0.811	4.365
<i>Controller</i>	7401	0.276	0.447	0.000	1.000
<i>Shr1</i>	7401	0.406	0.166	0.103	0.763
<i>ROA</i>	7401	0.040	0.084	-0.394	0.234
<i>Age</i>	7401	12.563	3.111	5.984	18.479
<i>Related</i>	7401	0.061	0.226	0.000	1.875
<i>Loss</i>	7401	0.079	0.269	0.000	1.000

Note. The sample firms are selected from the CSMAR financial statement database. There are 7401 A-share firm-years observations in non-financial industries with complete financial statement data necessary for analysis. A detailed definition of the variables can be found in Table 1.

Table 3
Correlation matrix.

	var1	var2	var3	var4	var5	var6	var7	var8
<i>S-network transactions</i>	1.000							
<i>C-network transactions</i>	0.383 0.000***	1.000						
<i>Market index</i>	-0.059 0.000***	-0.067 0.000***	1.000					
<i>Trust index</i>	-0.0666 0.000***	-0.0585 0.000***	0.902 0.000***	1.000				
<i>Trust cost-pjzk</i>	0.001 0.929	-0.080 0.000***	0.002 0.851	-0.030 0.000***	1.000			
<i>Trust cost-yf</i>	-0.025 0.034**	-0.079 0.000***	-0.073 0.000***	-0.070 0.000***	0.182 0.000***	1.000		
<i>Sales</i>	-0.124 0.000***	-0.224 0.000***	-0.063 0.000***	-0.059 0.006***	-0.091 0.000***	-0.073 0.000***	-0.019 0.104	1.000

Note. *** and ** indicate that coefficient estimates are significant at the 1%, 5% and 10% levels, respectively (two-tailed).

cally and economically significant, suggesting that when there is low social capital or high government intervention, firms will concentrate their suppliers and depend more on social network transactions. When *C-network transactions* is the dependent variable, the coefficient of *Trust index* is -0.151 , but not significant ($t = -0.66$); *Market index* is -0.290 with a t -statistic of -2.01 , which is statistically and economically significant. Overall, Hypothesis 1 is supported by the empirical results.

Table 5 presents the OLS regressions for Hypothesis 2. *Trust index* is significantly negative in each regression, which indicates that social capital can increase transaction costs. When the independent variable is *S-network transaction*, the coefficient for *Sales expense* as a dependent variable is significantly negative, as predicted, and all other coefficients and interaction variables are not significant, as predicted. When the independent variable is *C-network transaction*, the coefficients for *Trust cost-pjzk*, *Sales expense* and *Factor* as dependent variables are significantly negative as predicted; the interaction variables *Factor* and *Trust cost-pjzk* are significantly positive as predicted; the remaining coefficients and interaction variables are in the same direction as expected but are not significant, as predicted.

Table 6 presents the results for the 2SLS regressions. The results are stronger than for the OLS regressions. When the independent variable is *S-network transactions*, all variables are significant as predicted, except for the dependent variable *Sales expense*. When the independent variable is *C-network transactions*, all variables are significant as predicted, except for the dependent variable *Trust cost-yf*, and the interaction variable with *Sales expense* is in the opposite direction (the coefficient is -0.089 and statistically significant), as predicted. The empirical results in Tables 5 and 6 partially support our predictions.

Table 7 presents the results for Hypothesis 3. *Industry shock* is significantly positive (with coefficients of 0.350 and 0.402 , both significant), suggesting that industry shock can influence the financial performance of firms. The interaction variable *Industry shock * S-network transactions* and *Industry shock * C-network transactions* are both significantly negative (-0.004

Table 4
Test for Hypothesis 1.

Variables	Expectation	(1) S-network transactions		(2) C-network transactions	
		Coefficient	t-Statistics	Coefficient	t-Statistics
<i>(a) Test for Hypothesis 1a</i>					
Trust_index	–	–0.602	–2.62**	–0.151	–0.66
Controller		3.260	5.19***	2.315	3.78***
ROA		3.601	0.95	–0.418	–0.11
Age		0.254	2.83***	0.104	1.24
Shr1		7.501	4.30***	7.782	4.70***
Loss		6.031	4.76***	7.355	5.82***
Tobin's Q		–0.004	–15.78***	0.005	18.53***
Related		2.526	1.86**	4.970	3.31***
Leverage		–9.186	–6.21***	–7.951	–5.44***
Size		–2.788	–12.09***	–2.477	–10.80***
Constant		83.484	17.61***	73.093	15.77***
YEAR		Control		Control	
Industry		Control		Control	
N		7401		7401	
ADJUST-R ²		0.1689		0.1946	
F		89.38		381.35	
<i>(b) Test for Hypothesis 1b</i>					
Market_index	–	–0.360	–2.51**	–0.290	–2.01**
Controller		3.296	5.24***	2.368	3.86***
ROA		3.717	0.98	–0.245	–0.06
Age		0.259	2.88***	0.131	1.56
Shr1		7.298	4.19***	7.774	4.70***
Loss		6.048	4.77***	7.381	5.84***
Tobin's Q		–0.004	–15.68***	0.005	18.51***
Related		2.527	1.86*	4.843	3.22***
Leverage		–9.148	–6.19***	–7.912	–5.41***
Size		–2.793	–12.12***	–2.422	–10.53***
Constant		84.082	17.75***	73.206	15.84***
YEAR		Control		Control	
Industry		Control		Control	
N		7401		7401	
ADJUST-R ²		0.1688		0.195	
F		88.63		389.73	

Note. The *t*-statistics are computed by White (1980) standard errors. ***, ** and * indicate that coefficient estimates are significant at the 1%, 5% and 10% levels, respectively (two-tailed).

and –0.006), which suggests that when firms face an industry shock, social network transactions can reduce the shock to avoid risk.

Next, we separate shocks into positive and negative shocks, using the method described in Xue and Ye (2009). When the present year's performance is less than the previous year's, it is classified as negative shock, and otherwise as a positive shock.⁶ From Table 8(a) we can see that when the industry shock is positive, the interaction variables *Industry shock * S-network transactions* and *Industry shock * C-network transactions* are not significant (with *t*-values of –0.03 and 0.35). Table 8(b) shows that when the industry shock is negative, both interaction variables are significant; the coefficients are –0.006 with a *t*-value of –1.87 and –0.009 with a *t*-value of –2.78, respectively. We also compute *z*-statistics to compare the difference between the coefficients. The difference for *Industry shock * S-network transactions* is 2.28, which is marginally insignificant with a *p*-value of 0.1311. The difference for *Industry shock * S-network transactions* is 2.28, which is significant at the 5% level. Overall, the results support Hypothesis 3, which indicates that social network transactions can reduce industry shocks, especially negative shocks.

5. Robustness checks

Our results remain basically unchanged after conducting the robustness checks described below. We combine *S-network transactions* and *C-network transactions* to create a new variable and our empirical results remain unchanged. Following Zingales and Sapienza (2004), we use *voluntary blood donation* level across regions as a proxy for social capital accumulation instead of *Trust index*, and we also use ranking levels for *Trust index* and *Market index*, and our results remain constant.

Compared with other industries, customer and supplier concentration levels for manufacturing industries may be a better proxy for social network transactions, so we conduct an analysis on a sub-sample of manufacturing industry firms and our

⁶ We also separate the shock according to whether the value of the shock is positive or negative and our results remain unchanged.

Table 5
Test for Hypothesis 2.

Variables	Expectation	Trust cost-pjzk		Trust cost-Yf		Sales expense		FACTOR	
		Coefficient	t-Statistics	Coefficient	t-Statistics	Coefficient	t-Statistics	Coefficient	t-Statistics
<i>(a) The independent variable is S-network transactions</i>									
Trust index	–	–2.224	–5.34***	–0.358	–4.41***	–0.326	–2.74***	–1.687	–5.20***
S-network transactions	–	–0.004	–0.11	0.001	0.14	–0.024	–2.22**	0.009	0.31
S-network transactions * Trust index	+	0.013	1.33	–0.001	–0.51	0.001	0.19	0.008	1.10
Controllor		4.415	7.01***	0.836	7.04***	1.573	8.67***	0.068	1.34
Shr1		0.052	0.54	0.016	2.00**	–0.039	–0.77	–0.003	–12.20***
Tobin's Q		–0.002	–5.98***	–0.001	–9.68***	0.003	28.26***	3.521	22.26***
Size		4.701	23.11***	0.087	2.01**	–0.177	–2.86***	9.805	10.19***
Leverage		11.575	9.77***	1.583	6.75***	–0.808	–1.90*	2.984	6.15***
ROA		–5.132	–1.45	3.809	5.88***	–12.190	–8.62***	4.917	1.73
Constant		–76.457	–17.07***	1.989	2.13**	15.532	11.61***	–61.061	–17.60***
YEAR		Control		Control		Control		Control	
Industry		Control		Control		Control		Control	
N		7401		7401		7401		7401	
ADJUST-R ²		0.077		0.075		0.280		0.130	
F		18.41		17.84		123.53		43.27	
<i>(b) The independent variable is C-network transactions</i>									
Trust_index	–	–2.570	–6.88***	–0.409	–5.87***	–0.415	–3.73***	–1.927	–6.58***
C-network transactions	–	–0.119	–3.42***	–0.010	–1.52	–0.072	–7.96***	–0.057	–2.11**
C-network transactions * Trust index	+	0.026	2.84***	0.000	0.26	0.004	1.50	0.017	2.43**
Controllor		4.554	7.22***	0.841	7.10***	1.610	8.67***	3.069	6.30***
Shr1		0.023	0.26	0.014	1.81*	–0.053	–1.17	0.052	1.09
Tobin's Q		–0.002	–5.45***	–0.001	–9.05***	0.003	32.25***	–0.003	–12.36***
Size		4.493	22.55***	0.070	1.64*	–0.284	–4.77***	3.412	21.97***
Leverage		11.181	9.58***	1.559	6.67***	–0.942	–2.25**	9.571	10.03***
ROA		–5.196	–1.48	3.804	5.90***	–12.250	–8.78***	4.897	1.72*
CONSTANT		–68.981	–16.11***	2.662	2.98***	18.899	14.16***	–56.869	–17.02***
YEAR		Control		Control		Control		Control	
Industry		Control		Control		Control		Control	
N		7401		7401		7401		7401	
ADJUST-R ²		0.150		0.077		0.308		0.128	
F		37.05		18.41		123.63		43.56	

Note. The t-statistics are computed by White (1980) standard errors. ***, ** and * indicate that coefficient estimates are significant at the 1%, 5% and 10% levels, respectively (two-tailed).

results remain robust. To overcome the cluster effect of panel data, and to overcome the censored distribution problem of transaction cost variables, we use the Fama–Macbeth method and panel data method with fixed effects and our main results remain basically unchanged.

6. Conclusions

How do firms cooperate with one another? Though commercial contracts are important, contracts are incomplete and their implementation is not well protected in emerging countries (La Porta et al., 2002). Implicit contracts that depend on social networks may play a more important part than commercial contracts, particularly in emerging countries. Using the concentration of key suppliers and customers of firms listed in China as a measure of social networks, this study investigates the effect of social network transactions on firms' commercial activities.

Based on a new institutional economy framework, we provide empirical results on social network transactions and find that social network dependence is endogenously determined by the external institutional background. When regions have a low level of social capital accumulation and a high incentive for government entrenchment, firms will depend more on social network transactions. Empirically, we find that key suppliers and customers will concentrate in regions with weak institutions. Dependence on social networks can reduce transaction costs by reducing information asymmetry and uncertainty. We find such evidence in a proxy for credit costs and sales expense, especially in those regions with low social capital, and our results remain robust after we use the 2SLS method for endogeneity concerns. By reducing contagion effects and protecting specific investments, we find that dependence on social network transactions can reduce industry shocks; however, our results are mainly driven by a reduction in negative industry shocks.

This evidence enhances our knowledge of the channels through which social networks can influence corporate commercial transactions, which is particularly important for businesses in emerging countries. Our study also extends recent

Table 6

Using the 2SLS method to reduce endogenous concerns.

Variables	Expectation	Trust cost-pjzk		Trust cost-Yf		Sales expense		Factor	
		Coefficient	t-Statistics	Coefficient	t-Statistics	Coefficient	t-Statistics	Coefficient	t-Statistics
<i>(a) The independent variable is S-network transactions in a 2SLS regression</i>									
Trust index	–	–63.673	–4.56***	–4.083	–2.99***	–2.372	–1.42	–0.461	–4.53***
S-network transactions	–	–6.256	–4.40***	–0.378	–2.72***	–0.232	–1.37	–0.045	–4.38***
S-network transactions * Trust index	+	1.541	4.44***	0.092	2.70***	0.051	1.24	0.011	4.41***
Shr1		–0.816	–1.47	–0.037	–0.67	–0.068	–1.03	–0.006	–1.37
Tobin's Q		–0.009	–1.88*	–0.001	–2.64**	0.003	4.80***	0.000	–2.61**
Size		2.242	3.02***	–0.062	–0.85	–0.258	–2.92***	0.017	3.14***
Leverage		5.900	1.95*	1.239	4.19***	–0.997	–2.76***	0.069	3.15***
Controller		3.705	2.65***	0.793	5.80***	1.549	9.27***	0.019	1.90**
ROA		–1.891	–0.23	4.005	4.93***	–12.082	–12.16***	0.110	1.82*
Constant		219.679	3.23***	19.937	3.00***	25.392	3.13***	1.594	3.22***
YEAR		Control		Control		Control		Control	
Industry		Control		Control		Control		Control	
N		7401		7401		7401		7401	
ADJUST-R ²		0.111		0.071		0.232		0.130	
F		5.99		12.07		76.69		7.63	
<i>(b) The independent variable is C-network transactions in a 2SLS regression</i>									
Trust index	–	–35.272	–7.26***	–1.014	–1.88*	2.581	3.13***	–0.265	–7.22***
C-network transactions	–	–4.279	–6.95***	–0.087	–1.27	0.310	2.96***	–0.032	–6.93***
C-network transactions*Trust index	+	1.039	6.93***	0.019	1.15	–0.089	–3.50***	0.008	6.89***
Shr1		–1.157	–2.75***	–0.008	–0.17	0.055	0.77	–0.008	–2.63***
Tobin's Q		0.007	2.00**	–0.001	–1.46	0.003	4.31***	0.000	1.07
Size		3.121	7.53***	0.045	0.97	–0.158	–2.25***	0.023	7.28***
Leverage		7.915	3.80***	1.499	6.50***	–0.643	–1.82*	0.083	5.27***
Controller		4.320	4.20***	0.836	7.35***	1.631	9.35***	0.024	3.07***
ROA		–17.368	–2.72***	3.579	5.06***	–11.135	–10.27***	–0.005	–0.11
CONSTANT		94.291	3.73***	5.679	2.63***	3.941	0.92	0.739	3.87***
YEAR		Control		Control		Control		Control	
Industry		Control		Control		Control		Control	
N		7401		7401		7401		7401	
ADJUST-R ²		0.115		0.060		0.151		0.124	
F		11.2		17.2		75.29		13.33	

Note. The *t*-statistics are computed by White (1980) standard errors. ***, ** and * indicate that coefficient estimates are significant at the 1%, 5% and 10% levels, respectively (two-tailed).

Table 7

Test for Hypothesis 3.

Variables	Expectation	Per		Per	
		Coefficient	t-Statistics	Coefficient	t-Statistics
Industryshock	+	0.350	1.68*	0.402	1.81*
Industryshock * S-network transactions	–	–0.004	–1.85*		
Industryshock * C-network transactions	–			–0.006	–2.82***
Size		0.081	15.75***	0.081	15.84***
Leverage		–0.703	–18.09***	–0.705	–18.05***
CONSTANT		–1.332	–11.37***	–1.332	–11.61***
YEAR		Control		Control	
Industry		Control		Control	
N		7401		7401	
ADJUST-R ²		0.267		0.267	
F		21.150		21.940	

Note. The *t*-statistics are computed by White (1980) standard errors. ***, ** and * indicate that coefficient estimates are significant at the 1%, 5% and 10% levels, respectively (two-tailed).

research on the role of social networks. Whereas most extant studies focus on the information role that social networks provide, our study explores direct evidence on the formation of social networks and the economic consequences from the perspective of key suppliers and customers. However, due to the limited disclosure of social networks, especially the disclosure level of key managers, our results still lack detailed data on the identification of social networks, which may be a useful direction for future research.

Table 8

Separating shocks into positive and negative shocks.

Variables	Expectation	Per		Per	
		Coefficient	t-Statistics	Coefficient	t-Statistics
<i>(a) Positive industry shocks</i>					
Industryshock	+	-0.677	-1.10	-0.738	-1.31
Industryshock*S-network transactions	-			0.001	0.35
Industryshock*C-network transactions	-	0.000	-0.03		
Size		0.078	8.47***	0.079	8.36***
Leverage		-0.538	-8.22***	-0.538	-8.25***
CONSTANT					
YEAR		Control		Control	
Industry		Control		Control	
N		2203		2203	
ADJUST-R ²		0.275		0.275	
F		12.07		11.55	
<i>(b) Negative industry shocks</i>					
Industryshock	+	0.244	0.64	0.122	0.34
Industryshock * S-network transactions	-			-0.006	-1.87*
Industryshock * C-network transactions	-	-0.009	-2.78***		
Size		0.084	12.57***	0.085	12.69***
Leverage		-0.707	-14.34***	-0.706	-14.31***
CONSTANT					
YEAR		Control		Control	
Industry		Control		Control	
N		3942		3942	
ADJUST-R ²		0.284		0.284	
F		13.6		13.73	

Note. The *t*-statistics are computed by White (1980) standard errors. *** and * indicate that coefficient estimates are significant at the 1%, 5% and 10% levels, respectively (two-tailed).

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