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From individual social capital to collective social capital: empirical evidence from inter-firm financing trust network

Bao Wu[1,2]

Correspondence:
wubao@zjut.edu.cn
[1]China Institute for Small and Medium Enterprises, Zhejiang University of Technology, Hangzhou, Zhejiang, China
[2]College of Economics and Management, Zhejiang University of Technology, Hangzhou, Zhejiang, China

Abstract

The paper proposes two theoretical hypotheses about how collective social capital is constructed based on the operation of individual social capital in Chinese context: the logic of particularist *guanxi* operations and the logic of social prestige recognition. The two hypotheses are tested by an empirical study about inter-firm networking for financing supports It is found that the former logic, which is strengthened by *guanxi* proximity including kinship proximity, geographic proximity, and industrial proximity, would make the focal firm restrain its trust relationship within a particular small group, leading the firm to become part of a sectarian small-group trust network; and the latter logic, which is strengthened by classification homogeneity, would encourage the focal firm to trust unspecified business partners, leading firms to become part of a large-scale open trust network. The trust radius of the focal firm has a mediating effect on the relationship between individual social capital and the collective-level structure of inter-firm financing trust network, thus exerting important influence on the construction of collective social capital.

Keywords: Individual social capital, Collective social capital, Trust, Inter-firm network, Cross-level research

Introduction

The individual approach and the collective approach are two long-standing rivals in social capital research. And they are in an ongoing contest for research focus, theory development, and concept crystallization. Cross-level dialog between the two approaches is imperative to clarify the essence of social capital theory. Particularly, the inquiry about how collective social capital is constructed on the basis of the operation of individual social capital is at the core of this dialogue. This work is also of theoretical significance because it can reveal and test the interactional mechanism of individual social capital and collective social capital. It is particularly vital to discuss how collective social capital is developed on the basis of the operation of individual social capital in the context of Chinese society. First, Chinese society is a typical *guanxi* society in which *guanxi* at the individual level is the hinge of the operation of Chinese society (Fei 1985/1947). Individual social capital is thus abundant and active in Chinese society. Second, Chinese society is rich in Putnam's two foundations for collective social capital—social networks and reciprocal rule (Putnam 1993). Collective social capital, however, is still rare in Chinese society, manifested as a general lack of social trust

(Weber 1915; Fukuyama 1995), the domination of personal virtue over social ethics (Fei 1985/1947) and the predicament of public spiritedness (Li et al. 2012). Why has the abundant and active operation of individual social capital not promoted the construction of collective social capital?

The mainstream point of view attributes this stasis to the trust pattern of particularist that results from the influence of Confucianism on Chinese society, suggesting that Confucian ethics, based on kinship proximity, are characterized by independence, privacy, closure, and autocracy and also differ from modern public spiritedness in terms of its cultural implication. The basic structure of Chinese society—with its differential mode of association (差序格局)—is built on Confucian ethics, which is completely different from the Western organizational mode of association (Fei 1985/1947). Zhai (2009, p. 120) questions "how it is possible/impossible for the traditional guanxi to transform into modern social capital," which, in a sense, is a parallel academic exploration to understanding how individual social capital develops to collective social capital in the context of China. The development experiences of Hong Kong and Singapore have already demonstrated that collective social capital can be successfully established from a foundation of Confucian ethics. Therefore, what is the theoretical pathway by which collective social capital can be developed on the basis of individual social capital in China's modernization process?

This paper aims to explore the theoretical pathway from individual social capital to collective social capital in the context of inter-firm networking for financing support. Typically, owner of private firms seek financial supports from interpersonal relationships and personal social capital, which lead to the formation of local inter-firm financing trust networks with complex guarantee and shareholding relationships. These networks are formed on the basis of abundant personal social interactions among the business owners. At the micro level, the realization of the financing relationship chain, which reflects a strong inter-firm trust relationship, relies on the active operation of individual social capital (Wu et al. 2011). In this article, the author defines such inter-firm networks based on the interconnection of strong trust relationships in forms of financing ties such as loan guarantee, loan, shareholding as inter-firm network of financing trust, or simply financing trust network. At the meso level, such financing trust network is, to some extent, a kind of structure of trust relationship, whose structural characteristics, such as scale and density, directly represent the intensity and form of social trust in the specific context of inter-firm networking for financing support. Hence the financing trust network is an appropriate case to elaborate on the development of collective social capital.

This paper offers exploratory research about cross-level construction of collective social capital on the basis of operations of individual social capital in the context of Chinese society, aiming to contribute to the cross-level dialog between the approaches of individual social capital and collective social capital and to strengthen the discourse construction of the sociology of *guanxi*. As the extensive applications of social capital theory in many disciplines, it seems inevitable that the core conception of social capital is explained and used in different research fields. Different research approaches within social capital theory are inclined to keep independent development without dialog. The most serious challenge to the theoretical development of the theory of social capital is the conceptual contest between individual approach and collective approach (Payne et

al. 2011). Cross-level research on individual social capital and collective social capital has already become a hotly debated topic in the field of social capital theory. Meanwhile, the effort of exploring the theoretical pathway about interaction between collective social capital and individual social capital is also helpful to clarifying the operational mechanism of *guanxi* in the transformation of social structure in contemporary Chinese society. To build the sociology of *guanxi* with Chinese characteristics, it is important to explore the theoretical pathway of developing collective social capital on the basis of the operation of individual social capital.

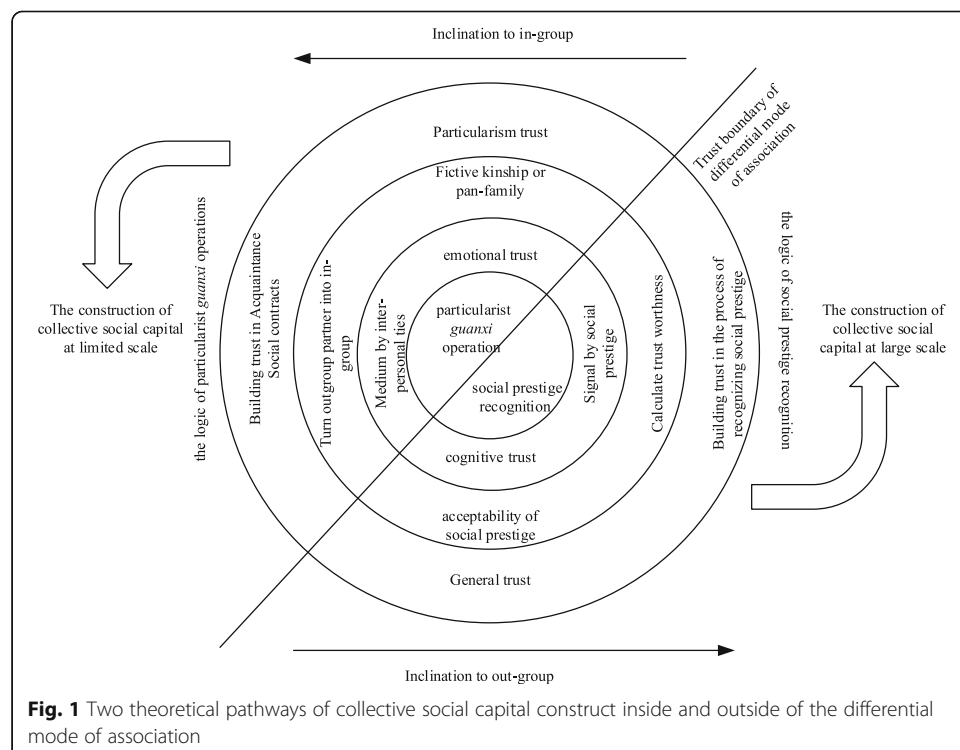## Theoretical analysis and research hypotheses

Two theoretical pathways from individual social capital to collective social capital

How does individual social capital foster collective social capital? Studies about the psychological process of social trust construction offer clues for answering this question, though the relevant literature of cross-level research on social capital is quite limited. Generally, there are two psychological processes at work in social trust construction. First, the trustor instrumentally deduces the capacity and reliability of the trustee from information about the trustee's behavior. Step by step, the trustor builds cognitive trust (认知信任) in the trustee. Second, the trustor builds emotional trust based on his/her empathy to the trustee or perception of the trustee's feelings and motives arising from emotional interactions and social contacts (McAllister 1995). The trust construction mode of Chinese people often depends on the ongoing experiences the trustor has with the trustee and personal characteristics, rather than based on institutional system (Whitley 1991). Inter-organizational trust is the derivative of interpersonal trust. Managers' interpersonal relationships fuel the inter-organizational dynamics (Park and Luo 2001). Chua's comparative Sino-American research (Chua et al. 2009) reveals that emotional trust and cognitive trust are interwoven in Chinese managers' network. Hu and Zhou (2013) suggest that there are primarily two mechanisms of trust construction under Confucian culture—the *guanxi* mechanism and the classification mechanism. The former incorporates the construction of emotional trust, while the latter is similar to the construction of cognitive trust. These two mechanisms have completely different preconditions, operational logics, realization processes, and social consequences, which belong to two differently operational logics of individual social capital. The choice of operational logic at the individual level ultimately determines the production of collective social capital. This paper argues that there are two theoretical pathways from individual social capital to collective social capital in the context of Chinese society: the logic of particularist *guanxi* operations and the logic of social prestige recognition.

"Extracting trust from acquaintance" is the fundamental logic of social trust construction in traditional Chinese society (Fei 1985/1947), which is indeed a construction approach of emotional trust in China. In this sense, social trust should radiate out from the center of "self" (己). The level of trust declines with the extension of psychological distance between the trustor and trustee (Hu and Zhou 2013). *Guanxi* bases, including geographic proximity/dialect, fictive kinship, actual kinship, work place, industrial proximity/social clubs, and friendship, are primary media of emotional trust (Kiong and Kee 1998). Otherwise, the construction of emotional trust requires a large amount of extra emotional input and cost from interpersonal relationship. Therefore, once the trust practice, based on the *guanxi*

operations, exceeds the scope of *guanxi* bases, it will encounter practical difficulties. Fictive kinship or pan-family thus becomes the common development mechanism of interpersonal trust. The particularist *guanxi* operations often require frequent face to face interactions, therefore trust is constructed on the basis of kinship proximity, geographic proximity, and industrial proximity. Inter-organizational emotional trust is also embedded in managers' emotional exchange network. Direct interpersonal relationship chains are key factors to building and maintaining inter-organizational emotional trust. Because of the high cost of emotional input and limited scale of *guanxi* operations, the logic of particularist *guanxi* operations confines the social trust relationship to a certain small group, implying a strong inclination toward in-group. Furthermore, the nature of particularist determines that personal relationships possess considerable privacy. The transferability of *guanxi* is so poor that the accumulation of personal trust does not have significant spillover effect on group trust (Fig. 1).

Although Chinese context emphasizes emotional trust more than the Western context does, the utilitarian and rational calculation is the fundamental operational logic in many social contexts, especially in business Generally speaking, cognitive trust is constructed on the instrumental assessment of trustee's capacity and quality based on contact experience and prestige. The trustor can build cognitive trust only when the trustee gives sufficient signals of reliability. Restricted by incomplete information within social interaction, the foundation of inter-organizational cognitive trust is more a comprehensive social assessment than an accurate calculation of capacity, quality, and reliability. In the context of Chinese society, social prestige signals the social status, social image, and personality of the potential trustee, serving as a critical medium of cognitive trust construction. What is more important is that the comprehensive social

Fig. 1 Two theoretical pathways of collective social capital construct inside and outside of the differential mode of association

assessment, as a kind of group assessment, can easily transfer through weak ties and go beyond the boundary of the in-group to reach a large number of out-group members. The relative uniformity of the standard used in social assessment also promotes the acceptability of social prestige in certain social groups or social networks constituted by strangers. Hence, the trust relation on social prestige recognition possesses a relatively strong spillover effect. The accumulation of personal trust can transform and build toward group trust at the large scale, which is helpful to producing collective social capital. The recognition of social prestige implies rational assessment of reliability and qualification matching of classification homogeneity, which are integrated into the social construction of cognitive trust.

Research hypotheses in the context of inter-firm networking for financing trust
Logic of particularist guanxi operations

Weber has pointed out that in China, all trust and commercial relations are obviously established on the basis of kinship or affinal personal relationships (Weber 1915). Social networks and particularistic trust, based on kinship and clan ties, significantly influence the entrepreneurs from private firms in the southeastern coastal area, especially in the aspect of financing supports (Chen 2007). The operations of *guanxi* imply a set of construction processes of emotional trust and emphasize sentiment (情) so as to consolidate emotional ties. Therefore, relationships based on kinship proximity, geographic proximity, and industrial proximity serve as the natural approach of *guanxi* operations. Most of financing supports by guarantee, loan, or shares are achieved based on inter-firm "home grown" (知根知底的) social contacts that require natural interpersonal ties, to guarantee interpersonal trust between business owners. When the business partner does not come from the traditional circle of kinship proximity, it is a routine manner to promote the existing weak tie between focal actor and its business partner to a strong tie by transforming the counter-partner from an out-group stranger to an acquaintance of the in-group. To achieve the operation of *guanxi*, sophisticated interpersonal skills are necessary to build interpersonal trust, including providing treats, giving gifts, and doing favors (Tsang 2011). In brief, particularist *guanxi* operations require strong guanxi bases or sufficient emotional input as a precondition, with close and direct interpersonal relationships as the key medium. Hence, firms often give limited social trust to unspecific business partners; in other words, the trust radius of the firm is often small (Delhey et al. 2011; Smith 2010). Individual social capital can only be operated and be used to foster collective social capital within the scope of certain in-groups.

Moreover, the operations of particularist *guanxi* are quite meritocratic. Focal firms located in the center of the financing trust network were both initiators and sponsors in the formation and development of this trust network. They have a greater voice in confirming group identity, choosing members and forming regulations, and affecting the specific structure of the in-group network of trust relationship. The development of trust boundaries based on *guanxi* operations is largely determined by key actors' operation of its individual social capital. To some extent, the high implicit cost can pose as an obstacle to the continuous extension of the trust relationship network (Cheng 2004) whose trust boundaries are often

confined within the scope of the *guanxi* operations of those focal firms. Furthermore, these focal firms, with abundant economic resources, develop a relation of patron-client relationship with peripheral firms and acquire controlling authority in the network of trust relationship at the cost of providing public goods to produce in-group trust. In return, focal firms located in the center have strong motivation and capacity to build and maintain authority in the group, to consolidate bureaucratic power stratification, and to ensure trust relationships work to their advantage.

When trust boundaries cannot be extended, it is a pragmatic choice to strengthen the spillover effect of trust within the group, consolidating the group boundary and widen the gap of in-group trust and out-group trust. Formulating and implementing regulations inside the group is thus dependent on the closeness of the group structure and authority of key actors. The trust relationship networks developed according to this logic are limited in scale, with high density and bureaucratic structure. Therefore, this paper proposes the following research hypotheses:

Hypothesis 1: To build trust relationship network, the logic of particularist guanxi operations is the primary logic by which individual social capital fosters and develops collective social capital in the context of inter-firm networking for financing support.

Auxiliary hypothesis 1a: According to the logic of particularist guanxi operation, the extension of the trust relationship depends on the operations of focal firm' individual social capital; that is, the focal individual's social relation is positively correlated with the extension of its ego network of trust relationship.

Auxiliary hypothesis 1b: The logic of particularist guanxi operations relies on natural guanxi bases, such as kinship proximity, geographic proximity, and industrial proximity. The stronger the characteristics of kinship proximity, geographic proximity, and industrial proximity are in certain contexts, the easier it is for fostering collective social capital based on the operations of individual social capital; that is, these three characteristics are mediators.

Auxiliary hypothesis 1c: According to the logic of particularist guanxi operations, the trust behavior of the focal firm possesses a stronger in-group tendency and its trust radius is smaller.

Auxiliary hypothesis 1d: The financing trust network, built on the logic of particularist guanxi operations, is inclined to form as a small sectarian group with a bureaucratic power structure and high network density. The trust radius of focal firm has a mediating effect on individual social capital and financing trust network.

Logic of social prestige recognition

Zucker (1986) has proposed a characteristic-based mode of trust production. The trustor makes the decision of whether to trust or not depending on the reliability of the trustee's past behavior and prestige (Zucker 1986). In research on family businesses in China, Whitley (1991) has pointed out that besides building trust in relationship, Chinese people mainly base trust on contact experience (Whitley 1991). In Western society, the primary logic of social trust construction is to strengthen group identification so as to form general trust of "outsiders." The core issues of group identification are consensus in value and qualification of classification homogeneity, centering on the social estimation of reliability. For instance, qualification is regarded as one of the basic conditions for entrepreneurs to

engage in financing cooperation and to extend trust. Without the qualification of classification homogeneity, effective group identity is unlikely to occur.

In the context of Chinese society, social prestige, which is the long-term accumulation of doing favors and saving face and consists of either positive or negative social estimation of the network group toward individual members, is the critical medium of group recognition. For instance, in inter-firm cooperative financing, it is still difficult for the trustor to collect sufficient "soft information" of all varieties about the trustee and to accurately estimate its capacity and reliability, though the trustor can take advantage of frequent and close contacts. As a comprehensive estimation of the firm's "status," which includes capacity, reputation, and social status, social prestige serves as the standard measurement of the qualification. In early stages, recognition of social prestige contains delicate "face engineering" and "image decoration", while during later stages it includes more rational instrumental calculation. Under the restriction of "gossip mechanism", social prestige signals quite reliable information. It is very easy for social prestige, as a result of group assessment, to obtain common recognition within a certain social group or circle, which facilitates the extension of social trust to strangers conforming to standards of group assessment.

Instead of direct personal relationship chains, flowing social prestige becomes the significant medium of social trust construction. The trust radius of the focal firm is greatly extended and potential trustees are no longer confined within certain in-groups Kinship proximity, geographic proximity, and industrial proximity are not the only paths by which trust develops and spreads. A more open trust network helps to form a trust relationship network at a large scale. The screening of qualified members indicates that focal firms are located in a generally balanced inter-firm structure and their trust boundaries can no longer be dominated by any single focal firm. A focal firm, though located in the center of some network, is embedded in this open club and regulated by group norms. The trust relationship network built on this logic is characterized by stronger group structure, in which multiple individuals with similar social status and identity qualifications simultaneously function as focal actors in such relationship network with oblate structure. Therefore, this paper proposes the following research hypotheses:

Hypothesis 2: It is an important approach to foster and develop collective social capital based on operations of individual social capital in the context of financing trust networks that use social prestige as a medium and strengthen identification to prestige identity so as to construct a trust relationship network.

Auxiliary hypothesis 2a: According to the logic of social prestige recognition, the higher the prestige of focal firms in the central position, the better it is for the extension of its ego network of trust relationship.

Auxiliary hypothesis 2b: It is easier for the logic of social prestige recognition to be effective among individuals of similar qualification. The more similar the scale characteristics are within the group, the easier it is for individual social capital to foster collective social capital. In other words, homogeneity of scale is the mediator.

Auxiliary hypothesis 2c: According to the logic of social prestige recognition, focal firms in the central position possess a higher level of social trust to non-specific trustees and then a larger trust radius.

Auxiliary hypothesis 2d: The financing trust network built on the logic of social prestige recognition is inclined to be oblate and discrete. Structurally, it is included to be a

large-scale financing trust network. The trust radius of the focal firm is a mediator of social prestige and of the structure of the financing trust network.

Research design
Variable definition and concept operationalization
Individual social capital

This paper measures individual (firm) social capital with two dimensions—social relation and social prestige. The variable of social relation is measured by the sum of work places of the top management team of the focal firm and standardized in the range from 0 to 1. All data about work experiences of top managers are coded and counted from current resumes of every focal firm (public company). The variable of social prestige is measured by the following questionnaire items: whether the entrepreneur is a member of the People's Congress or the Chinese People's Political Consultative Conference (CPPCC); whether the entrepreneur has received any important social honors; whether the entrepreneur acts as a leader of the industry association; whether the entrepreneur used to be a government official; and whether the enterprise is listed as a top 100 enterprise in the municipal. Results are standardized from 0 to 1 and extracted to one principle factor of social prestige. The Cronbach's α value of the five questionnaire items is 0.717, with a rather good reliability. Furthermore, the value of KMO is 0.756 and Bartlett's sphericity test statistics is 217.193 (df:10, $p < 0.000$) for the test. With factor analysis, one principal factor is extracted which explains 48.138% of variance with good validity. In order to confirm causality, data on individual social capital is collected in the year of 2010.

Collective social capital

This paper defines the structure of financing trust network as the indicator of collective social capital. The rationale is as follows: (1) inter-firm financing supports in the form of guarantees, loans, and shares reveals inter-entrepreneur/inter-firm social trust (Wu et al. 2011) and mutual trust is the core of financing relationship; (2) social trust is often identified as the main content or primary consequence of collective social capital, thus its key measurement (Portes 1998; Adler and Kwon 2002); and (3) in the existing literature, it is common to measure collective social capital by structural characteristics (Payne et al. 2011). Specifically, this paper uses the type of structure of the financing trust network as dependent variable.

   To clarify causality, data on financing trust networks are collected from cross-sectional data form 2013, including 267 focal firms embedded in 182 financing trust networks. By taking into account of network size and number of focal firms, along with observations on the specific network structure, this paper classifies 182 financing trust networks into 3 ordinal categories, named as sectarian (where number of focal firm = 1, the network size < 7), transitional (where network size is between 7 to 30), and open network (where number of focal firm > 4, the network size > 30). Table 1 contains statistics of the structural characteristics of the three categories and Fig. 2 demonstrates the structural form of the typical network. The three categories are significantly distinct from each other in terms of structural characteristics and specific form. As the structural statistics in Table 1 and Fig. 2 show, the sectarian network is a small network with high density that described in auxiliary hypothesis 1d, while the open network is an oblate and discrete network with large

Table 1 Structural characteristics of the three categories of financing trust network

Category	No.	Network size		Network density		No. of focal firm	
		Mean	SD	Mean	SD	Mean	SD
Sectarian	130	3.48	1.421	.41	.298	1	
Transitional	45	12.60	6.206	.23	.116	1.44	.693
Open	7	97.57	85.866	.04	.024	9.86	7.058

scale that described in auxiliary hypothesis 2d. Compared to the sectarian network, the trust boundaries of the open network are extended with a relatively high level of collective social capital.

Trust radius of firms

To measure firm trust radius, this paper uses focal firms' preference to trust between in-group actors and out-group actors i.e, the extent to which they trust a non-specific business business partner (Delhey et al. 2011; Smith 2010). The variable of trust radius is measured in three dimensions: non-relational transaction, non-connected guarantee relation, and non-connected joint venture. To measure the level of relational transactions between firm and its partners, the existing literature commonly uses the ratio of sales amount of major clients in total sales and the ratio of purchase amount of major suppliers (Xu et al. 2016). The more significant the relational transactions are, the more likely it is for the firm to prefer in-group trust. This reverse index measures non-relational transactions, formulated as 1-Max (the percentage of purchase amount of top 5 suppliers, the percentage of sales amount of top 5 clients). Measurements of non-connected guarantee relation that the focal firm offers or receives guarantee for bank loan to or from non-connected partners, and non-connected joint venture that the focal firm joint-ventured with non-connected parties are counted as the number of existing guarantee relations and joint ventures in 2013 that achieved with partners other than specified connected partners in terms of supervision regulation of Chinese Securities Commission. These two variables measure the frequency of firms conducting

Fig. 2 Example of structures of three trust network categories
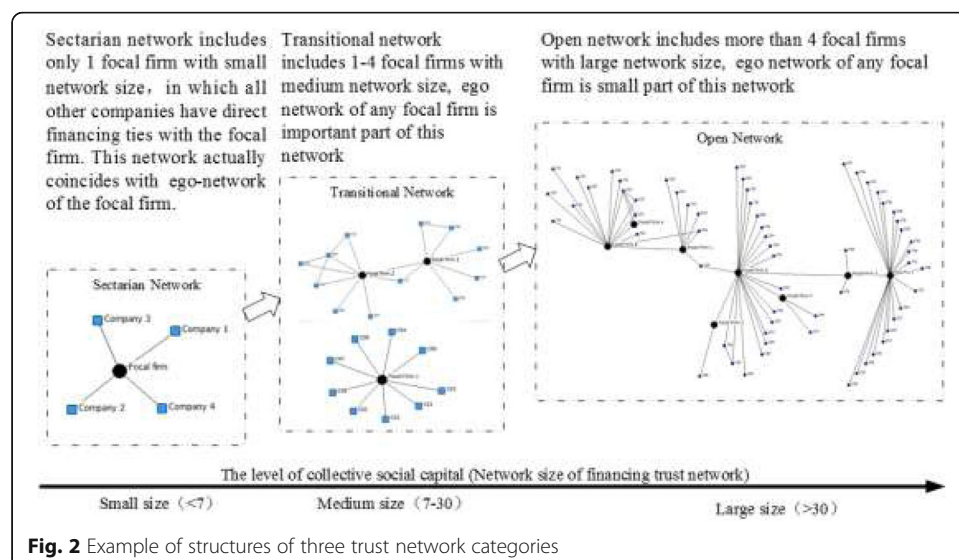
cooperative financing with non-specific customers or suppliers and reflect the trust level of focal firms to non-specific transactional objects, which are standardized into the range of 0–1. The Cronbach's αvalue of three measurements is 0.722. The value of KMO is 0.617 and Bartlett's sphericity test statistics is 196.867 (df:3, $p < 0.000$). With factor analysis, one principal factor is extracted which explains 67.334% of variance. The principal factor is adopted to measure the variable, named here as trust radius factor. The focal firm's trust radius is measured from data collected in the year of 2010.

Variables of social context

This paper generates two groups of social context variables: relationship variables and classification variables. The first group contains variables of the relational context, including kinship proximity, geographic proximity, and industrial proximity. Kinship proximity is measured by the percentage of family business in the local financing trust network in which each focal firm is located. Family business refers to a family holding company in which family members take the post of chairman of the board or general manager (Wu et al. 2018). Geographic proximity is measured by the biggest percentage of network members from the same counties in the financing trust network. Industrial proximity is measured by the biggest percentage of business from the same industries in the financing trust network. The variables of relational context are standardized.[1] The second group contains variables of classification homogeneity, using the scale of the firm to measure the classification homogeneity in the financing trust network in which the focal firm is located. To be specific, this paper classifies firms into public companies, corporations, other major companies, and small companies. The homogeneity of membership firms in financing trust network is measured in terms of scale classification by Herfindahl-Hirschman Index[2] The value of H ranges from 0 to 1. The value of 1 indicates the highest level of classification homogeneity. The measurement is conducted in the year of 2010.

Control variables and endogenous control

This paper adopts company history, company size, business diversification, and public listing as control variables. Company history is measured by the years from the registration of focal firm to the year 2013. Company size is measured by the logarithm value of total assets in 2010. Business diversification is measured by the number of business lines reported in the annual report from 2010. These variables are all standardized and valued from 0 to 1. The variable of public listing is a dummy variable, valued 1 if listed in mainboards of Shanghai or Shenzhen Securities Exchanges, otherwise valued 0.

The financing trust network is long-term and persistent. The validity period of an official guarantee agreement between public companies is generally over 1 year. Agreements of shareholding and joint ventures have an even longer validity period. The classifications of financing trust network in which a focal firm was located in cross-sections of 2010 and 2013 is auto-correlated. Moreover, open networks and a part of transitional networks contain multiple focal firms; the variable values of focal firms within the same financing trust network may have an intrinsic correlation. To control for potential endogeneity, this paper generates a group dummy variable and a classification dummy variable. The cross-sectional data from 2010 includes 93 sectarian networks with 93 focal firms, 29 transitional networks

with 58 focal firms, and 7 open financing trust networks with 67 focal firms. This paper generates seven group dummy variables to identify the seven largest open networks so as to control for the most of endogeneity brought in by network grouping. This paper also generates two dummy classification variables to identify sectarian and transitional networks, so as to control for the endogeneity brought in by network classification.

Sample and data

Sampling and data source

The empirical sample of this paper is 267 public companies, registered in Zhejiang Province, and publicly listed on the Shanghai, Shenzhen, or Hong Kong stock markets. After dropping samples with missing data, the effective sample includes 218 companies. The focal firms' social capital and structural characteristics of financing trust network is coded and measured from two cross-sections of 2010 and 2013. The financing trust networks sponsored by public companies are largely the main framework of regional inter-frim financial networks, and have significance for regional development and economic security. Open prospectuses, annual reports, and announcements of public companies from 2010 to 2013 offer basis for our dataset. It is further supplemented by open information from official websites of these public companies. Other information collected from company websites and public media is cross-checked with other information sources.

Financing trust network

The inter-firm financing trust relationship is defined as mutual trust relationship that rooted in inter-firm financial connections by offering loan guarantee, entrusted loans, private lending, or jointly venture for each other. This paper generates financing trust networks in Zhejiang at two cross-sections of 2010 and 2013 according to the following procedure. First, the author collected the company list of all public companies that are registered in Zhejiang Province of China and publicly listed in Shanghai, Shenzhen, and Hong Kong stock markets. These companies are sampled as focal firms in this study. Then, the method of snowballing sampling is used to identify financial connections existed between focal firms and their financial partners. Agreements of loan guarantee, shareholding of significant minority, and entrusted loans are carefully identified and used to expand ego networks of every focal firms. The business partners (companies) whose majority of shares is controlled by the focal firms are ignored because this study considers these companies together with the focal firms as persons acting in concert and treat them together as one node in the financing trust network. Third, further information about financial connections of the business partners of the focal firms are gathered to expand network ties based on the primary ego network of focal firms. Fourth, other information about inter-firm financial connections, especially financial connections of the top 100 major corporations in Zhejiang Province, are collected from their official websites and public mediums are gathered. Related financial connections among the focal firms, partners of the focal firms, partners of these partners, etc., are identified by the method of snowballing to supplement the network ties of financial trust networks. Direct and indirect relations among focal firms are carefully addressed in the coding process. According to node connectivity, each cross-sectional dataset is

coded as multiple 0–1 matrixes. Each matrix represents an interconnected subnetwork of financing trust. The financing chains are handled as omnidirectional relations. In the generation of networks, the direct and indirect connections among focal firms are the focus concern of this study. They will determine which forms of network (sectarian, transitional or open network) the financing trust network belong to.

Analysis of empirical results

Descriptive statistics and correlation results

Table 2 lists descriptive statistics for the main variables. It shows that in general top managers have abundant individual social capital in terms of social relation; sampled companies have rather good social prestige and a significant prestige gap exists among sampled companies. While the means of the three variables of relational context are high, reflecting characteristics of kinship proximity, geographic proximity, and industrial proximity, the means of classification homogeneity are small, reflecting that financing trust networks often contain different types of firm members. Table 3 lists the correlation analysis of the main variables. There is no significant correlation between social relation and social prestige, after testing two different aspects of enterprise's social capital. Both social prestige and social relation show significant correlations with ordinal categories of financing trust network and trust radius. There are significant correlations among the four context variables.

Individual social capital and the development of individual trust network

Table 4 reveals the relationship between social relation, social prestige, and scale of the ego network of focal firms. Model 4 contains regression results without controlling endogeneity. Model 5 and Model 6 contain regression results after controlling endogeneity with group dummy variables and category dummy variables respectively. In Model 5, two of seven group dummy variables are significant ($p < 0.1$ and $p < 0.01$). In Model 6, two category dummy variables are significant ($p < 0.01$). Given that regression coefficients of key variables in Model 5 and Model 6 are significantly distinct from those in Model 4, it is necessary to control for endogeneity. Regression results of all

Table 2 Descriptive statistics of main variables $N = 218$

Variable	Minimum	Maximum	Mean	Standard deviation
Social relation (unstandardized)	11	97	38.660	15.270
Social relation (standardized)	.000	1.000	.322	.178
The factor of social prestige	.010	1.000	.475	.349
The factor of trust radius	.049	1.000	.232	.141
Kinship proximity	.010	1.000	.540	.315
Geographic proximity	.010	1.000	.662	.241
Industrial proximity	.020	1.000	.606	.268
Classification homogeneity	.040	1.000	.450	.136
Company history (unstandardized)	3	25	13.505	4.961
Company size (unstandardized)	17.955	26.296	21.448	1.171
Business diversification (unstandardized)	1	8	2.716	1.516

Table 3 Correlation analysis of main variables

	Category of financing trust network	Scale of self-centered network	Trust radius	Social relation	Social prestige	Kinship proximity	Geographic proximity	Industrial proximity	Classification homogeneity	Public listing	Company history	Company size	Business diversification
Ordinal category of financing trust network	1												
Scale of self-centered network	.510***	1											
Trust radius	.568***	.470***	1										
Social relation	− .288***	.123*	− .305***	1									
Social prestige	.359***	.219***	.513***	− .197	1								
Kinship proximity	− .511***	− .377***	− .419***	.038	− .212**	1							
Geographic proximity	− .170**	− .174**	− .084	− .02	− .059	.137**	1						
Industrial proximity	− .131*	− .032	.072	.06	− .018	− .005	.254***	1					
Classification homogeneity	.185***	.128*	.124*	− .065	− .028	− .210***	− .104	− .141**	1				
Public listing	.252***	.223***	.383***	− .132*	.206**	− .249***	− .068	− .008	.061	1			
Company history	.242**	.189***	.203***	− .061	.151*	− .160**	− .012	− .045	.038	.575***	1		
Company size	.344**	.369***	.397***	− .138**	.442**	− .274***	− .135**	.012	− .004	.235***	.122*	1	
Business diversification	.067	.072	.205***	− .04	.301**	− .058	− .105	− .102	.052	.199***	.104	.172**	1

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table 4 Regression results of individual social capital and the development of a trust network

Independent variables	Dependent variables: self-centered network size (the development of trust network)					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Social relation	.150***	.142**	.152***	.133**	.071**	.144**
	− 0.039	− 0.039	− 0.039	− 0.041	− 0.034	− 0.039
Social prestige	0.007	0.003	0.009	0.024	0.03	0.005
	− 0.023	− 0.023	− 0.023	− 0.024	− 0.02	− 0.024
Kinship proximity		− .052**		− .091**	− .053**	− .049*
		− 0.026		− 0.024	− 0.021	− 0.026
Geographic proximity		− 0.007		− 0.041	− 0.03	− 0.007
		− 0.03		− 0.031	− 0.027	− 0.03
Industrial proximity		0.014		− 0.007	0.022	0.015
		− 0.027		− 0.027	− 0.023	− 0.027
Classification homogeneity			0.046	0.067	0.033	0.035
			− 0.052	− 0.054	− 0.045	− 0.052
Constant	0.003	0.03	− 0.022	− 0.019	− 0.035	0.009
	− 0.035	− 0.043	− 0.045	− 0.054	− 0.046	− 0.053
Grouping endogeneity					Controlled	
Category endogeneity	Control	Control	Control			Control
Control variables	Control	Control	Control	Control	Control	Control
Effective sample	218	218	218	218	218	218
Adjusted R^2	0.301	0.306	0.3	0.248	0.496	0.304
F	12.681***	9.711***	11.351***	8.149***	13.552***	8.915***

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. Standard errors are in brackets. In Model 1, Model 2, Model 3 and Model 6, two dummy variables used to control endogeneity are statistically significant. In Model 5, only two in seven group dummy variables have significant regression coefficients

models in Table 4 demonstrate that social relation is positively correlated with the scale of ego network of focal firms ($p < 0.01$). Research results conform to theoretical expectations and empirical results of the existing literatures. Due to financing repression, private firms rely on *guanxi* operation to seek inter-firm financing supports. The achievement of all kinds of financing supports, in forms of credit guarantee, entrusted loan, private lending, shareholding, joint venture, etc., largely depends on the operations of *social relation*. The more abundant the company's social relation are, the easier it is for the ego financing trust network to be developed and extended. The rise of social prestige, however, does not have significant influence on the extension of individual trust network. Social prestige is not significantly correlated with ego network size ($p > 0.1$). The particularist *guanxi* operation is the primary logic for extending the financing trust network at the individual level.

Model 2 adds three relational context variables (kinship proximity, geographic proximity, and industrial proximity), and shows that kinship proximity has a significantly negative correlation with the extension of the individual trust network ($p < 0.05$). That is, the stronger the kinship proximity is, the easier it is to constrain the extension of the ego financing trust network. On the one hand, this phenomenon can be understood as the negative effect of the fast increase in marginal cost of *guanxi* operations in the existing of the differential mode of association of trust. On the other hand, according

to the logic of particularist *guanxi* operations, focal firms are inclined to construct and develop trust relations within familiar small groups that limit the opportunity for focal firm to seek financing supports from out-group partners. In Model 2, the context variables of geographic proximity and industrial proximity do not have a significant negative influence on the extension of the ego trust network of focal firm. Model 3 addresses the context of classification, showing that there is no significant correlation ($p > 0.1$) between classification homogeneity and the extension of the ego trust network of focal firm ($p > 0.1$). The results of full models (Model 5 and Model 6) mainly support primary research conclusions in Model 1, Model 2, and Model 3 (Table 4).

Individual social capital and the trust radius of firm

This paper examines the influence of individual social capital, along with contextual variables on the trust radius of focal firms (Table 5). Model 7 reveals that social relation are negatively correlated with the trust radius of focal firm ($p < 0.01$) and social prestige is positively correlated with the trust radius ($p < 0.01$). This result supports hypotheses 1c and 2c of this paper. According to the logic of particularist *guanxi* operations, emotional trust facilitates inter-firm cooperative financing. Focal firms often target trust partners within familiar groups, consequentially contracting the trust radius of the focal firm. According to the logic of social prestige recognition, however, focal firms estimate the reliability of out-group partners through social prestige to construct cognitive trust and thus has relatively large trust radius. Meanwhile, the kinship proximity is negatively correlated with the trust radius of the focal firm ($p < 0.01$). The stronger the kinship proximity is, the easier it is for group members to have an emotional connection. The consequential clannishness adversely effects the enlargement of the enterprise's trust radius. Furthermore, the industrial proximity is positively correlated with the trust radius ($p < 0.01$). The homogeneity of industrial proximity consolidates firms' transactional trust to out-group partners. In Model 7, geographic proximity and classification homogeneity have neither significant nor direct influence on the trust radius of focal firm.

Model 8, Model 9, and Model 10 additionally test the interaction effect of kinship proximity, geographic proximity, and industrial proximity with social relation and social prestige respectively. In Model 8, the interaction term of kinship proximity and social relation is not statistically significant ($p > 0.1$), demonstrating that except for its direct influence on the trust radius, kinship proximity does not mediate the effect of social relation and the trust radius of the company. This result does not support research hypothesis 1. It is probably because the majority of public companies registered in Zhejiang are controlled and managed by families. The particular features of this sample, that is the prevalence of kinship proximity, makes it difficult to clarify the interaction effect of kinship proximity and individual social capital. In Model 8, the interaction term of kinship proximity and social prestige is significantly negative ($p < 0.01$). In the context with strong characteristics of kinship proximity, the logic of particularist *guanxi* operations is more likely to dominate and restrain the logic of social prestige recognition. In other words, the two logics compete in certain social contexts. In Model 9, the interaction term of geographic proximity and social relation is significantly negative ($p < 0.05$), confirming that geographic proximity strengthens the negative effect of the logic of particularist *guanxi* operations on the trust radius of the enterprise. In Model 10, the interaction term of industrial proximity and social relation is significantly

Table 5 Regression analysis of the trust radius of enterprise $N = 218$

Independent variable	Dependent variable: trust radius of focal firm							
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Social relation	−.143*** (.041)	−.222*** (.072)	.089 (.112)	.083 (.111)	−.131 (.128)	.106 (.233)	−.011 (.229)	.044 (.228)
Social prestige	.116*** (.024)	.215*** (.042)	.118* (.061)	.010 (.048)	−.038 (.078)	−.011 (.126)	−.071 (.125)	−.056 (.124)
Kinship proximity	−.073*** (.027)	−.045 (.058)	−.079*** (.027)	−.064** (.026)	−.068** (.027)	−.101* (.059)	−.093 (.057)	−.063 (.059)
Geographic proximity	.018 (.031)	.017 (.031)	.136* (.076)	.021 (.031)	.018 (.031)	.143* (.078)	.136* (.076)	.125 (.076)
The industrial proximity	.076*** (.028)	.064** (.028)	.075*** (.028)	.106 (.076)	.074*** (.028)	.009 (.084)	−.001 (.082)	.033 (.082)
Classification homogeneity	.041 (.054)	.020 (.054)	.045 (.053)	.021 (.053)	−.089 (.122)	−.116 (.131)	−.152 (.129)	−.161 (.129)
Social relation × kinship proximity		.130 (.126)					.195 (.135)	.171 (.135)
Social prestige × kinship proximity		−.188*** (.069)				−.155** (.073)	−.155** (.072)	−.154** (.071)
Social relation ×geographic proximity			−.350** (.156)			−.376** (.160)	−.318** (.157)	−.301* (.157)
Social prestige ×geographic proximity			.004 (.085)			−.049 (.087)	−.005 (.086)	−.000 (.085)
Social relation × industrial proximity				−.362** (.178)		−.229 (.195)	−.165 (.190)	−.236 (.190)
Social prestige × industrial proximity				.173** (.072)		.216*** (.079)	.227*** (.077)	.212*** (.077)
Social relation × classification					−.026 (.274)	.113 (.307)	.154 (.299)	.166 (.300)
Social prestige × classification					.351** (.168)	.298* (.180)	.318* (.178)	.296* (.177)
Constants	.187*** (.055)	.197*** (.056)	.107 (.074)	.176*** (.065)	.259*** (.077)	.184 (.112)	.202* (.109)	.243** (.111)
Grouping endogeneity							Controlled	
Category endogeneity	Control	Control	Control	Control	Control			Control
Adjusted R^2	.479	.497	.488	.504	.485	.503	.534	.531
F	17.644***	16.307***	15.747***	16.720***	15.613***	13.188***	10.956***	13.263***

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. Standard errors are in brackets. In model 7, model 8, model 9, model 10, model 11, and model 14, two dummy variables for controlling endogeneity are statistically significant. In model 13, four in seven group dummy variables have significant regression coefficients

negative ($p < 0.05$), showing that industrial proximity strengthens the influence of the logic of particularist *guanxi* operations and, to some extent, intensifies small group clannishness within the same area of trade. The industrial proximity, however, does not reject the logic of social prestige recognition while supporting the logic of particularist *guanxi* operations. In Model 10, the interaction term of industrial proximity and social prestige is significantly positive ($p < 0.01$), demonstrating that the industrial proximity strengthens the influence of the logic of social prestige recognition and promotes the firm's financing trust to unspecific partners in the same trade. These results thus reflect that in some social contexts, these two logics can coexist independently and simultaneously. The competing relation between these two logics is not necessary.

Model 11 tests the interaction effect of classification homogeneity, social relation, and social prestige. The interaction term of classification homogeneity and social prestige is significant and positive ($p < 0.05$), showing that classification homogeneity strengthens the influence of the logic of social prestige recognition and helps focal firms extend their trust radius. In the social context with strong equality and qualification recognition, focal firms are inclined to develop cognitive trust based on social prestige and to promote their trust to out-group partners. This result confirms research hypothesis 2. Model 12, Model 13, and Model 14 are full model tests, which show that the logic of particularist *guanxi* operations and the logic of social prestige recognition can coexist and independently operate in overlapping social contexts, though the kinship proximity, to some extent, restrains the positive influence of social prestige on the trust radius of the enterprise.

Mediating effect of the trust radius

As mentioned in previous sections, this paper classifies financing trust networks into three ordinal groups according to empirical data: sectarian, transitional, and open networks (valued respectively as 1, 2, 3). Compared with sectarian networks, open networks possess a large network scope and high level of collective social capital. According to the research hypotheses, financing trust networks, built on the logic of particularist *guanxi* operations, are similar to the sectarian network in terms of structure, while financing trust networks, built on the logic of social prestige recognition, are similar to open networks in terms of structure. The trust radius of the focal firm, that is the focal firm's preference between in-group trust and out-group trust, has an important mediating effect. The preliminary analysis of the mediating effect in this paper has confirmed the hypothesis.

This paper employs Karlson-Holm-Breen (KHB) analytical technique (Breen et al. 2013) to divide the total effect of social relation and social prestige on the structural classification of the financing trust network into direct effect and indirect effect by trust radius of the firm, so as to clarify the mediating effect of the trust radius of focal firms. KHB analytical technique can compare coefficients of nested nonlinear probability models with the same dataset and meet the "continuous neglect hypothesis," thus can be used in logit, ologit, Probit, and OLS regression with nominal variable or ordinal variable as independent or dependent variables (Kohler et al. 2011; Breen et al. 2013). Since ordered nominal variables are included in the test of mediating effect, KHB analysis is chosen to clarify the mediating effect of the trust radius of focal firms.

Table 6 reveals that after controlling for the endogeneity brought in by network category, the coefficient of the total effect of social relation on network category is − 3.550 ($p < 0.01$). Financing trust network built on the logic of particularist *guanxi* operations is similar to the sectarian network in terms of structure. The coefficient of direct effect is − 2.404 ($p < 0.05$) and the coefficient of indirect effect through trust radius of the enterprise is − 1.145 ($p < 0.05$). The trust radius of the enterprise has a partial mediating effect, representing about one-third of the total effect. After controlling for endogeneity, the coefficient of total effect of the social prestige on network category is 1.111 ($p < 0.05$). Financing trust network built on the logic of social prestige recognition is similar to the open network in terms of structure. The coefficient of direct effect of social relation is not statistically significant ($p > 0.1$) and the coefficient of indirect effect through trust radius is 0.928 ($p < 0.05$). The trust radius of the enterprise has a full mediating effect. Results of the KHB analysis demonstrate that the trust radius of focal firm has a critical mediating effect on the influential mechanism of individual social capital to the structure of financing trust network. The operation of individual social capital can influence the macro structure of financing trust network through its influence on the trust radius of focal firms and the decision of what category of financing trust network the focal firm choses to enter.

Discussion

Based on empirical evidence from the financing trust networks in Zhejiang Province, this paper argues that the logic of particularist *guanxi* operations and the logic of social prestige recognition are two relatively independent theoretical approaches. Which logic to choose at the individual level depends on the firm's social capital endowment and embedded contextual environment. Because these two logics of construction collective social capital contain different trust construction processes, their preconditions, operational logics, realization processes, and social consequences are distinct. Therefore, each logic needs to cooperate with the appropriate social contextual environment so as to efficiently produce collective social capital. In reality, these two theoretical approaches may interweave and cooperate in complex, diverse, and overlapping social

Table 6 KHB analysis of mediating effect $N = 218$

Independent variable	Dependent variables: network type, mediating variable, trust radius of firm		
	Model 15	Model 16	Model 17
	No endogeneity control	Grouping endogeneity	Category endogeneity
Social relation			
Total effect	− 3.271*** (.921)	− 4.883*** (1.072)	− 3.550*** (.982)
Direct effect	− 1.514 (.959)	− 3.684*** (1.107)	− 2.404** (1.016)
Indirect effect	− 1.758** (.633)	− 1.200** (.521)	− 1.145** (.504)
Social prestige			
Total effect	1.910*** (.534)	1.171** (.602)	1.111** (.569)
Direct effect	.350 (.547)	.310 (.632)	.183 (.599)
Indirect effect	1.560** (.639)	.861** (.445)	.928** (.461)
Adjusted R^2	.320	.460	.420

The regression model is ologit, other variables include company history, company size, business diversification, public listing, kinship proximity, geographic proximity, industrial proximity, and classification homogeneity. Group controlling variables are added to Model 16 and classification control variables are added to Model 17

contexts. Though regression results show that kinship proximity may restrain the logic of social prestige recognition, the two logics remain effective respectively in the overlapping context, indicating a stronger symbiosis than rivalry. The specific structure of the trust relationship network would help to comprehend the conclusion of symbiosis (Fig. 3), which further shows that the two logics form a relation of coexistence and symbiosis in the local financing trust network in Zhejiang. In Fig. 3, the open financing trust networks in Taizhou can be intuitively divided into several small sectarian sub-networks. Sub-networks are interconnected through shares and guarantees based on the logic of social prestige recognition. The particularist *guanxi* operation is the basic logic for the formation of sectarian sub-networks. Individual social prestige determines whether the focal firm can access structural holes connecting other small groups, and whether the focal firm is qualified to participate in more open trust relation networks. Because of the recognition of social prestige, several sectarian small-group networks can structurally interconnect and form an open financing trust network at a large scale.

This paper argues that both the logic of particularist *guanxi* operations and the logic of social prestige recognition are a social operational mechanism of Chinese people in the social structure of differential mode of association. The differential mode of association emphasizes "the differentiation of in-group and out-group" with different social trust patterns for acquaintances and strangers. In-group trust and out-group trust have distinct social psychological processes and operational mechanisms. The logic of particularist *guanxi* operations contains the social psychological process of emotional trust, whose primary approach is to draw out-group partner that is outside the trust boundary in the differential mode of association into the trust boundary through fictive kinship and a series of *guanxi* operations. This logic has a strong in-group preference. The operational process of social relation is in fact the expanding process of focal firms by which they extend their self-centered differential mode of association. The structure of a sectarian small-group network typically takes a core-periphery structure formed by the interest-dependent relationship between focal firm and peripheral enterprises. Sectarian financing trust networks thus have quite limited collective social capital. Under

Fig. 3 Schematic diagram of branches of a Taizhou open financing trust network in 2010
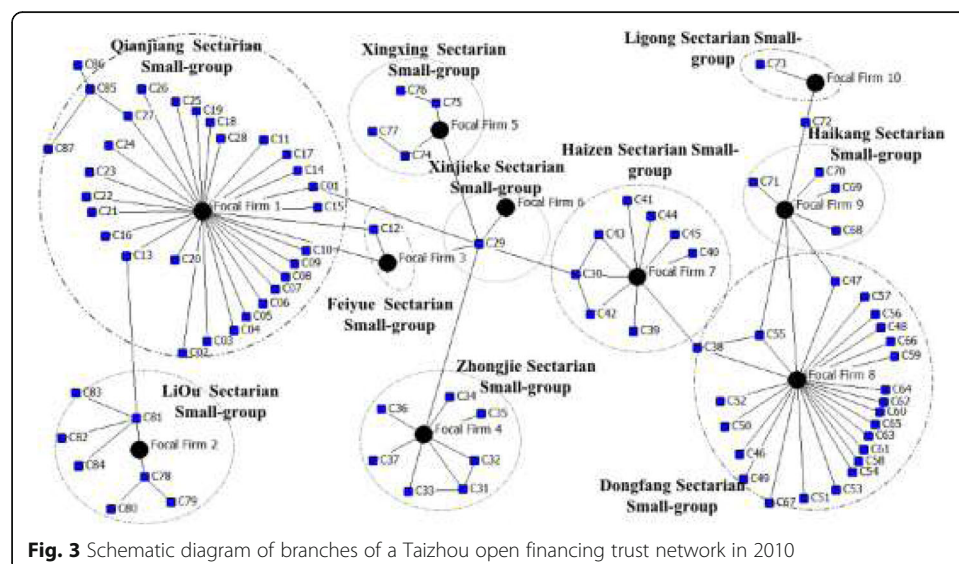
the logic of particularism, the cultivation of high-level collective social capital can hardly be achieved. This is also the reason that much of the literature suggests that Chinese people can hardly construct general trust on the logic of particularism.

The majority of the literature on Chinese people's social trust has been devoted to understanding the in-group trust structure and underscored the influence of particularism on Chinese society (Weber 1915). Discussions about how Chinese people construct trust relationships beyond the differential mode of association are rare. The existing literature about particularism often neglects the fact that Chinese Confucian culture does have a trust construction approach via social prestige. The logic of social prestige recognition implies the social psychological process of inter-firm cognitive trust construction. Under this logic, the key to developing a trust relation is to recognize the trustee through social prestige and to build chains of cross-small-group structural holes with overt out-group preference. The qualification process helps to form a multi-centered and oblate relation structure and equal relational transactions among focal firms. An open financing trust network, built on this logic, is a large-scale network structure of trust relationship. For instance, the largest financing trust network in the city of Hangzhou in 2013 contained 25 focal firms and 286 local major companies with an unparalleled amount of collective social capital. The sectarian small-group network and open network are significantly distinct in terms of structural form and structural characteristics. Network sizes are successively enlarged in the three kinds of trust networks. Compared with the sectarian small-group network, the open network has more extended trust relations and greater collective social capital. The transitional network stands between these two.

Conclusion and limitations

This paper proposes two theoretical hypotheses about how collective social capital is constructed based on operations of individual social capital: the logic of particularist *guanxi* operations and the logic of social prestige recognition. The paper tests the two hypotheses in the context of inter-firm networking for financing supports. Analytical results demonstrate that these two logics are both pragmatic approaches to foster collective social capital based on operations of individual social capital in the context of Chinese society. The logic of particularism is strengthened in contexts with strong characteristics of kinship proximity, geographic proximity, and industrial proximity. Focal firms are inclined to contract their trust radius and construct sectarian small groups with strong emotional trust. Yet the logic of particularism is strengthened in contexts with strong characteristics of classification homogeneity. Focal firms are inclined to expand their trust radius, to strengthen cognitive trust to unspecific partners, and to emerge into a large-scale open trust network. The trust radius mediates the influence of social relation and social prestige on the macro structure of the trust relation network. Although these two logics compete to some extent, the two logics remain respectively effective in the overlapping context, indicating a stronger symbiosis than rivalry. Both the logic of particularist *guanxi* operations and the logic of social prestige recognition are bottom-to-top fostering mechanisms from individual social capital to collective social capital in Chinese existing social structure of differential mode of association.

Given the complexity of cross-level dialog on the topic of social capital, this paper is an exploratory effort, though this paper has proposed empirical evidence of two logics regarding how collective social capital is constructed based on the operation of individual social capital. Further empirical evidence is required to verify and develop the conclusions from this paper. The generalization of conclusions derived from the context of inter-firm networking for financing supports also requires further verification.

Endnotes

[1]The formula is standardized value = 0.99 × (unstandardized value-minimum)/(maximum-minimum) + 0.01.

[2]The formula is $H = \sum P_i^2$ P_i stands for the percentage of category i.

Abbreviation
KHB analytical technique: Decomposition of effects in nonlinear probability models with the KHB method, which was developed to compare the estimated coefficients between two nested nonlinear probability models (Karlson et al. 2010; Breen et al. 2011). This method is named after by its three inventors of Karlson, Holm, and Breen

Availability of data and materials
The datasets on which the study of this manuscript rely is publicly gathered, coded, and analyzed under specific funds and designed not for any other purposes except certain academic purposes, and the network of financial connections is still sensitive for most of surveyed companies. For the privacy of focal companies and other companies, this study chooses not to share public this dataset. Researchers in related fields of course can contact the authors (wubao@zjut.edu.cn) for detailed datasheet for this studies only for academic purposes, if the usage of this dataset.

Author's contributions
The author Dr. WB is responsible for the study leading to this article, and solely contributed to the writing of this article. The author read and approved the final manuscript.

Authors' information
Bao WU is Professor and Co-Director of China Institute for Small and Medium Enterprise, Zhejiang University of Technology. His research interest is economic sociology.

Competing interests
The author declare that he have no competing interests.

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