

Trust and Industry Network in Social Capital: Evidence from Manufacturing SMEs in Japan

Kazuo KADOKAWA *

Abstract

This paper investigates the influence of trust on local management of manufacturing SMEs by analysing new questionnaire survey data. We found evidence that trust in management and transactions are only understood in the local presence of the *keiretsu* system. The management and transactions of local SMEs become more dependent upon larger enterprises as they become more trusted; otherwise, the dependency significantly declines. In addition, participation in social and business activities declines as SMEs are more integrated into the *keiretsu* system. Although the argument is limited to the relationship with large enterprises, the results support the specificity of trust and relationship as well as the selection of relationship by necessity.

Keywords: Social Capital, Industrial Location, Institutional Environment, Regional Specialization, Economic Growth

JEL codes: L2; R11; Z13

1. Introduction

The concept of social capital has recently attracted an increasing number of researchers in the field of regional science (Glaeser et al. 2002; McCann et al., 2010; Roskrige et al., 2012). Beginning in the latter half of the 1990s, the causal nexus between social capital and economic growth has been investigated by several authors such as La Porta et al. (1997), Knack and Keefer (1997), and Zak and Knack (2001). Since the theory has become commonly accepted by scholars, the role played by social capital in regional (Westlund, 2006; Glaeser & Redlick, 2009) and national (Castiglione et al., 2008; Svendsen and

* Junior Associate Professor, Dept. of Economics, School of Political Science and Economics, TOKAI University

Svendsen, 2009) economic growth is now widely applied in economic literature (Roskrugge et al., 2012).

In addition, the application of social capital has recently become much more common in the field of economic geography (Cooke et al., 2005; Iyer et al., 2005; Murphy, 2006; Holt, 2008; Huber, 2009; Rutten et al., 2010). According to Malecki (2011), social capital is the key to promoting regional, innovative learning and entrepreneurial activities, which suits the concept in the current issues of economic geography. In the same year, Farole, Rodrigues-Pose, and Storper (2011) reviewed industry-cluster literature and discussed how concepts of social capital, such as trust, social ties, and community identity, are theoretically associated with the institutional approach in economic geography¹⁾. With regard to these studies, 2010 might be viewed as the initial year when economic geographers began adopting a serious stance on the study of social capital.

Among wide-ranging applications of the concept of social capital, a number of recent studies have focused on the role of social capital and the locational decision-making process of firms in particular (Dahl & Sorenson, 2007; Glaeser & Kerr, 2009; Giannetti & Simonov, 2009; Lambooy, 2010; Audretsch et al., 2011). Among the studies that challenged the influence of social capital on locational choice, Feldman et al. (2005) theoretically specified the roles of horizontal networks in local firms and vertical ties between horizontally networked firms and the government. Dahl and Sorenson (2007) attributed the determinant of why entrepreneurs and managers prefer locations near their home base to locally accumulated social capital. In addition, Glaeser and Kerr (2009) highlighted the role of social capital in new entry rates of manufacturers and discovered that US manufacturing start-ups are generally attracted to small local suppliers and abundant workers in relevant occupations. Giannetti and Simonov (2009) and Malecki (2011) argued that social interactions are the key to facilitating local innovative and entrepreneurial activity. Additionally, a series of empirical studies by Klepper (2009) implies that many firms are launched in locations where the founders currently reside since they are socially embedded in their local communities and networks. In regard to the locational behavior of firms, many recent studies have highlighted the role of social capital, particularly in regard to the formation of industrial clusters and specialized industries among networked firms (Rutten et al., 2005; Cooke et al., 2005; Feldman et al., 2005; Stam, 2007; Staber, 2007; Huber, 2009; Tomlinson, 2011).

The literatures reviewed above more or less share a same causal mechanism in terms of

how social capital is relevant to the local promotion of management and transaction, which is summarized in Figure 1. This figure represents the dual nature of social capital that consists of institutional environment and social ties, both of which are associated with local management in a specific way²⁾. First, social capital consists of institutional environment, such as trust, shared norms, beliefs and values, and better institutional environment contributes the creation and preservation of social ties within which various production and management resources are embedded and retained. In this specific study, the institutional environment is represented by interpersonal trust, community identity, political awareness, religious faith and moral & ethics, which is discussed later.

Second, since firms are myopic (Maskell and Malmberg, 2007), their management decision is critically dependent upon the resources embedded and retained in local social ties, to which firms are potentially able to access and mobilize through the local capability of collective and cooperative actions³⁾. Resources here include various production knowledge, technologies, supplies, demands and public supports, which all embedded in trust-based and long-lasting social ties and beneficial for sustaining localized competitiveness (Portes and Sensenbrenner, 1993; Cooke and Morgan, 1998; Narayan, 2002; Inkpen and Tsang, 2005; Joshi 2006; Tura and Harmaakorpi, 2005; Lundvall, 2006; Moody and Paxton, 2009; Staber,

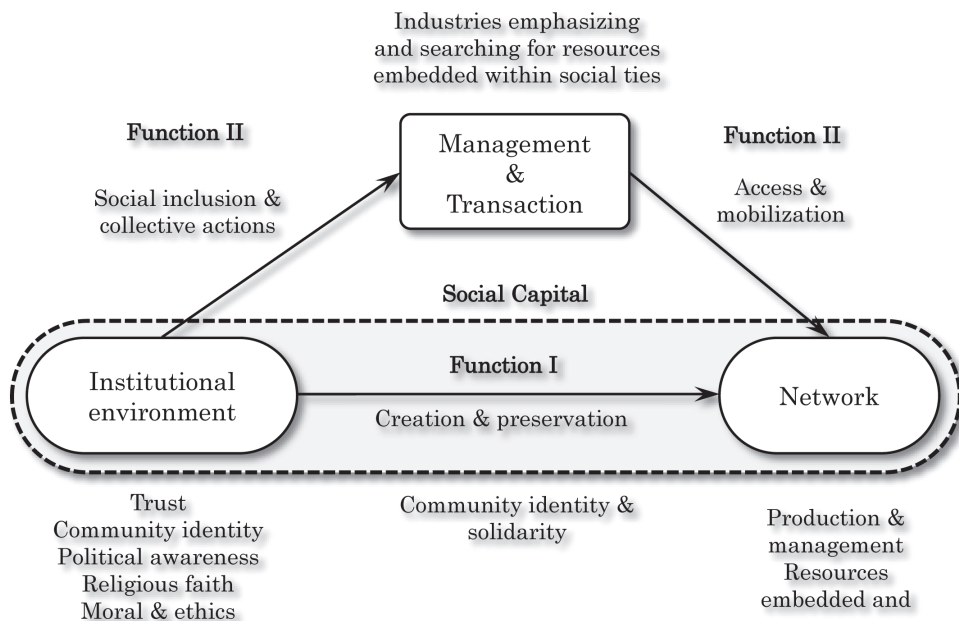


Figure 1: The casual mechanism how social capital contributes to local management and transaction

2011). Combining those two, the scholars argue that better institutional environment reinforces social ties, local firms becomes more reachable to resources embedded and retained within social ties and consequently better institutional environment provides more effective management opportunities to local firms through locally access and mobilized social ties.

In essence, there are three functions in the concept of social capital consisting of local institutional environments and networks. First, a better institutional environment promotes the creation and preservation of inter-firm cooperative networks. Second, it improves the quality of collective actions by including firms in the cooperative network and helps firms to access and mobilize the resources embedded within the network for their management. Therefore, those two functions are the creation and preservation of network and the access and mobilization of network, where network is the central character of social capital.

However, there two types of vagueness left in the general mechanism of social capital, as pointed out by the concept of relationship capital (McCann et al. 2010). One is associated with the pairwise specificity of trust and relationship. It might be too idealistic to imagine a situation in which firms mutually trust one another and all related agencies are supportive and trustworthy, which indifferently contribute to the development of any network for the entire group of firms. Rather, it is more realistic to consider firms able to trust a few limited agencies and develop and strengthen limited relationships only among trustworthy agencies. In this case, trust becomes specific to individual relationships; to other external agencies, it is irrelevant to the creation and preservation of the specific networks. As long as firms can rely their management and transaction on related agencies only when the agencies are trustworthy, stronger trust should be observed in the relationship of sturdy interdependency.

Furthermore, the necessity of a relationship is unclear. Although local institutional environment might contribute evenly to the creation and preservation of any network, firms necessitate particular networks according to management needs, and they are not motivated to maintain all types of existing networks, particularly when the networks have little impact on management. Some social capitalists view the creation and preservation of networks as an investment decision, and firms invest effort in network development because they expect rewards in doing so (Glaeser et al. 2002; Patulny and Svendsen 2007 for a review). This implies that firms can be selective to whichever network most benefits them and selectively maintain necessary networks according to the expected resources. If so, as management and

business transactions increasingly rely on a particular network, other activities such as personal, voluntary, public and technological activities become relatively unimportant. This eventually demotivates firms' involvement in such social activities. Therefore, there must be a selection and substitution of networks as the benefits and resources retained in networks are biasedly distributed within networks where firms are encompassed.

In essence, firms' trust should be specific to each particular relationship, and the creation and preservation of networks is due in large part to the firms' necessity. This study aims to clarify these two types of vagueness. The subject of the investigation is small- and medium-sized enterprises (SMEs) in Japanese manufacturing. SMEs are one of the most appropriate subjects in social capital study because their management and transaction are often ad-hoc and trust-based, and they are largely embedded in the industry network. The questions discussed so far can be translated into the following hypotheses.

2. Hypothesis

This study proposed five hypotheses. The first hypothesis is intended to examine whether or not the types and characteristics of networks vary across regions. Since the concept of social capital is mainly a spatial one, the differences in network should be observed for individual regions as a basic premise. After the differences in regional network are confirmed, the second and third hypotheses examine the specificity of trust to relationship. This study distinguishes trust placed in larger enterprises from that in other local SMEs. This is because Japanese manufacturing organizations are often characterized by the *keiretsu* system, where the management and transaction of local SMEs are significantly dependent upon larger enterprises, and we expect that local SMEs' high trust of large enterprises contributes more to the creation and preservation of strong ties to large enterprises. The fourth and fifth hypotheses are associated with the necessity of relationship. As local SMEs are vertically integrated into the *keiretsu* system with larger enterprises, other social and business activities tend to be less important, and participation in such activities is expected to decline, which eventually results in the erosion of networks. The details of the hypotheses are described below.

Hypothesis I : There is a significant difference in the local characteristics of industry networks among regions.

Hypothesis I is rather preliminary. The mechanism of social capital predicts that different levels of trust among firms eventually affect the density and strength of networks. Unless local characteristics of industry networks are distinguished among regions, the study loses the foundation to compare the local influence of different types of trust on the creation and preservation of industry network. Hence, this hypothesis preliminarily confirms the regional variety of network for the examinations of subsequent hypotheses. In the questionnaire, the density and strength of industry network are estimated by the interdependency of management and transaction of each enterprise.

Hypothesis II : As their trust of large enterprises improves, local SMEs increase their transactions with large enterprises, and management becomes more dependent on large enterprises.

Hypothesis III : As their trust of other SMEs improves, local SMEs increase transaction with other SMEs and management becomes more dependent on SMEs.

Hypotheses II and III are concerned with the pairwise specificity of trust and network. There are two types of trust in social capital. One is a specific trust that belongs to a particular relationship in inter-firm transactions. Another is general trust that pertains to the overall community to which a firm belongs. Both hypotheses examine the role of specific trust and the correlation between the improvement of trust and increase of dependency on the trusted enterprises. Specifically, Hypothesis II examines the correlation between trust in large enterprises and expected dependency on large enterprises, and Hypothesis III applies the correlation to SMEs. From the perspective of the *keiretsu* system, Hypothesis II is more important because it examines the influence of local SMEs' trust of large enterprises on their vertical dependency on large enterprises and the endurance of the *keiretsu* system as a whole.

Hypothesis IV : As SMEs' social and cooperative activities with other agencies decline, local SMEs increase the number of their transactions with large enterprises.

Hypothesis V : As SMEs' social and cooperative activities with other agencies decline, local SMEs increase the number of their transactions with other local SMEs.

Hypotheses IV and V are concerned with the necessity of networks. In many empirical studies of social capital, social and business activities are used as indicators for the stock of social capital. However, as discussed above, firms can be selective to the needs of a network according to the demands of management. If so, as firm management becomes increasingly dependent on specific networks, the role of other activities should decline, and the involvement in social and cooperative activities should decrease, even if there are still benefits for participation. This idea is examined by comparing the degree of management dependency on larger enterprises and on other SMEs and the frequency of participation in social and business activities with other enterprises. From the perspective of the *keiretsu* system, Hypothesis IV is more important because as the management and transactions of local SMEs are vertically integrated with larger enterprises, other social and business activities would be less important, and this eventually erodes such social and business networks.

The objective of this study is the examination of those hypotheses. The next section describes the data and how questionnaire survey was conducted. The third section discusses the result of the analyses and the last section concludes the examination of the hypotheses.

3. Data

This section describes the nature of samples and the design of the questionnaire survey. The questionnaire survey was designed by the author and conducted in January and February of 2012 by commissioning to Teikoku Data Bank Co. Ltd. It was faxed to managers of 500 SMEs in manufacturing, who had been randomly chosen out of 14,467 potential respondents.

For the sample selection, three SMEs groups in different regions are deliberately selected. The first group is SMEs in Toyota and Okazaki cities of Aichi prefecture. Aichi encompasses the largest share of manufacturers and the greatest manufacturing producer in Japan. Moreover, Toyota and Okazaki cities, which are adjacent to one another, are the manufacturing centre of Aichi with a high density of major Japanese manufacturing enterprises. Therefore, we expect that SMEs in these cities gain more opportunities for management and transaction partnerships to larger enterprises, and they tend to increasingly depend upon large enterprises in the *keiretsu* system.

The second group comprises SMEs in adjoining Gifu and Kakamigahara cities, whose

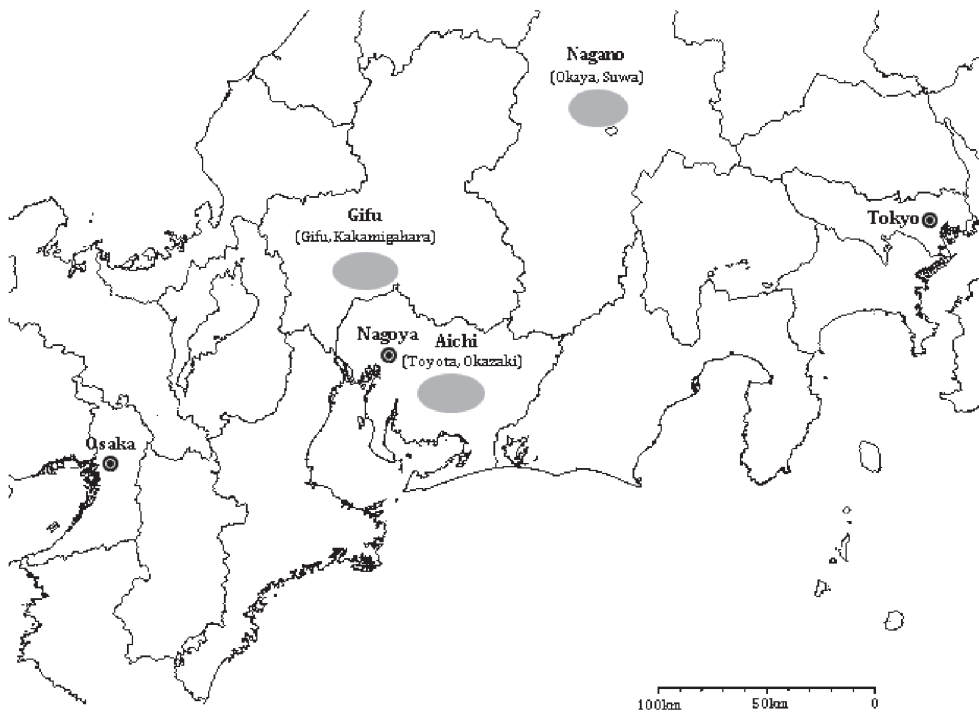


Figure 2: A map of Chubu-Tokai region in Japan and three cities for the questionnaire survey.

distance to Toyota and Okazaki cities are almost 100 km. They are chosen for the sample because there a number of subcontracting SMEs in the region, whose parent companies are mostly located in Aichi. In the meantime, characteristics of the SMEs include that they are rather typical and average compared with other Japanese manufacturing SMEs in terms of the geography, economy and manufacturing concentration. These SMEs can be fairly considered as representative SMEs among Japanese manufacturers.

Third, Okaya and Suwa cities in Nagano prefecture are selected because SMEs in the cities are one of the most studied groups of SMEs by Japanese Economic Geographers and widely known for the success of the well-functioning industry network among local SMEs (e.g. Braum 2002; Izushi 2003). SMEs in Nagano are rather independent from the *keiretsu* system and rely more on their own unique industry network across the nation and globe. Therefore, SMEs in Nagano are well contrasted to those in Aichi and Gifu in terms of their independence from the *keiretsu* system.

The questionnaire items are grouped into three categories. The first category is network category that is used to organize the dependent variable and to measure how much the

Table 1: Evaluation items in the questionnaire survey

Category	Variable	Statement
Network	Large enterprises	The management and transaction of your company is dependent upon large enterprises.
	SMEs	The management and transaction of your company is dependent upon other SMEs.
	Regional enterprises (current)	The management and transaction of your company is currently dependent upon regional enterprises.
	Regional enterprises (future)	The management and transaction of your company will continue being dependent upon regional enterprises.
Trust	Large enterprises	Large enterprises are trustworthy.
	SMEs	Other local SMEs are trustworthy.
Activity	Personal	Personal ties with business partners are important in the management and mutually help one another.
	Inter-firm	Cooperative inter-firm relationships are important and often voluntarily support other firms.
	Public	Public industry associations are important and often join in activities with public agencies
	Technological	Technological cooperation are important and often join in such trade and cross-industrial activities

management and transaction of SMEs are embedded in and dependent upon industrial network. Since network is a vague concept and scarcely cognizable even by persons within the network, the questionnaire specifically queried how much the management and transaction of respondent enterprise depends on other enterprises, which is intended to capture the density and strength of industry network.

In addition, in order to make the questions more specific, three types of dependency are arranged in the items. The first queries the dependency of the management of SMEs on large enterprises, which is to capture the vertical network between large enterprises and respondent SMEs. The relationship might be an upstream-downstream, parent-affiliation or contractor-subcontractor relationship. Second, the questionnaire asks about SMEs' dependency on other local SMEs, which concerns the presence of horizontal networks among SMEs of homogenous size. Third, in addition to the distinction between the two sizes of enterprise, this question adds a regional axis and characterizes how much the industry networks are localized in their own region. Since social capital tends to develop among enterprises at high densities, this category also considers the specific dependency on regional enterprises. This regional dependency is inquired for both current and future dependency because it is useful to assure that the dependency is currently present and expected to last long in the region.

Table 2: The share of respondent industries and the rate of collection for each prefecture

	Nagano	Gifu	Aichi	Total
Fabricate and non-ferrous metal	24.60%	31.10%	11.50%	27.80%
General machinery	11.50%	18.00%	17.30%	13.60%
Electrical machinery	27.90%	9.80%	21.20%	17.80%
Transport equipment	4.90%	19.70%	36.50%	15.40%
Precision instrument	26.20%	8.20%	1.90%	13.00%
Miscellaneous	4.90%	13.10%	11.50%	12.40%
Number of sample	61	61	47	169
Collection rate	52.80%	49.20%	37.60%	46.50%

The second category pertains to the notion of trust. Questions in this category are used for the examination of Hypotheses II and III. The most important type of trust in this study is SMEs' trust of larger enterprises which is expected to reinforce industrial ties in the *keiretsu* system. It asked about trust to other local SMEs and that is to be compared with the horizontal dependency on other local SMEs for the examination of the specificity of trust and dependency. The coefficients and their significances of those variables becomes the basis for the examination of Hypothesis II and III.

The third category is social and business activity, and the result is used for the examination of Hypotheses IV and V. As the management and transaction become increasingly dependent upon specific networks, other social and business activities are expected to become less meaningful to be invested. Here, four types of social and business activities are chosen for this category: personal business partnerships, voluntary bilateral cooperation among firms, involvement in public associations of commerce and industry and technological cooperation and exchange with other enterprises.

The respondents evaluated each statement on a five-point Likert scale from 1 to 5, representing 'agree very much', 'agree', 'neutral', 'disagree', and 'disagree very much', respectively. The responses were returned by fax to and collected by Teikoku Data Bank Co. Ltd. The rate of collection and share of respondent industries in the three prefectures are organized in Table 2. These firm-level responses are directly used for the independent variables of the following series of logit analyses.

4 . Result

This section consists of two subsections. The first subsection examines whether there are significant differences in the local characteristics of industry networks between the regions by using a t-test. After the significant regional difference is confirmed, the second subsection examines Hypothesis II, III, IV and V, which states that trust is positively associated with the formation of industry network, and other social and business activities decline as the management of enterprise increasingly relies on particular relationships.

Analysis of Dependent Variable

This section begins with an examination of Hypothesis I in which a significant difference in local characteristics of industry networks exists between the regions. Here, characteristics specifically refer to SMEs' management dependency on large enterprises in the *keiretsu* system and on other SMEs as well as regional enterprises in the present and future. Each pair of two regions is examined by use of a t-test for each type of dependency in rotation, and the network of each region is characterized by the average score, whose maximum is 5 and minimum is 1, and its statistical significance. The regions to which the SMEs belong become

Table 3: Average, standard deviation and the result of t-test between Nagano and Gifu

Network (Nagano - Gifu)				
	Large enterprises	SMEs	Regional enterprises (Present)	Regional enterprise (Future)
Average and standard deviation				
Avg. Nagano	3.387	2.597	2.613	3.387
Avg. Gifu	3.767	3.017	3.683	3.717
Stdv. Nagano	1.206	1.123	1.136	0.817
Stdv. Gifu	0.963	1.017	1.186	0.865
t-test between group				
t-value	-1.92	-2.17	-5.09	-2.16
p-value: one tail	0.0284	0.0161	6.82E-07	0.0163
Boundary: one tail	1.66	1.66	1.66	1.66
p-value: two tail	0.0568	0.0323	1.36E-06	0.0326
Boundary: two tail	1.98	1.98	1.98	1.98

Table 4: Average, standard deviation and the result of t-test between Aichi and Gifu

Network (Aichi- Gifu)				
	Large enterprises	SMEs	Regional enterprises (Present)	Regional enterprise (Future)
Average and standard deviation				
Avg. Aichi	3.957	2.957	4.000	4.109
Avg. Gifu	3.780	3.017	3.695	3.712
Stdv. Aichi	1.103	1.197	1.083	0.737
Stdv. Gifu	0.966	1.025	1.193	0.872
t-test between group				
t-value	0.87	-0.27	1.38	2.52
p-value: one tail	0.1931	0.3936	0.0858	0.0066
Boundary: one tail	1.66	1.66	1.66	1.66
p-value: two tail	0.3861	0.7872	0.1715	0.0131
Boundary: two tail	1.99	1.99	1.98	1.98

the dependent variable, and the interpretation of the result is used for the subsequent series of logit analyses.

Table 3 represents the results of comparison between SMEs in Nagano and Gifu. Those in Nagano are prominent in the well-functioning industry network among SMEs, and their management is less dependent upon both large enterprises and other local SMEs; instead, they are independent from dependency. This is confirmed by the statistical significance. Moreover, the management and transaction of SMEs in Gifu are more dependent on larger enterprises and other SMEs, and more embedded in the regional industrial network, both currently and in the projected future. This is also confirmed by statistical significance.

Table 4 exhibits the comparison of SMEs in Aichi and Gifu. Unlike the previous case, they are relatively similar to one another. Both are dependent upon larger enterprises and regional enterprises. Although the significance in the differences is weak, important differences are found in the average of large enterprises and SMEs. While the management of SMEs in Aichi is more influenced by large enterprises, SMEs in Gifu are more affected by other SMEs.

Finally, Table 5 describes the results of comparison between Nagano and Aichi, which is expected to provide the greatest differences among the three comparisons. SMEs in Nagano are least dependent on all large enterprise, other SMEs and regional enterprises, and those

Table 5: Average, standard deviation and the result of t-test between Nagano and Aichi

Network (Nagano - Aichi)				
	Large enterprises	SMEs	Regional enterprises (Present)	Regional enterprise (Future)
Average and standard deviation				
Avg. Aichi	3.957	2.957	4.000	4.109
Avg. Nagano	3.387	2.597	2.613	3.387
Stdv. Aichi	1.103	1.197	1.083	0.737
Stdv. Nagano	1.206	1.123	1.136	0.817
t-test between group				
t-value	2.57	1.60	6.48	4.80
p-value: one tail	0.0058	0.0565	1.68E-09	2.70E-06
Boundary: one tail	1.66	1.66	1.66	1.66
p-value: two tail	0.0117	0.1129	3.36E-09	5.40E-06
Boundary: two tail	1.98	1.98	1.98	1.98

in Aichi are most influenced by the dependency. This is confirmed by a t-test, and significances are found for all types of management dependency.

The results described above conclude the examination of Hypothesis I that there is a significant difference in local characteristics of industry networks between the regions. Apparently, SMEs in each region have different types of dependency on large enterprises, other SMEs and regional enterprises, all of which are verified by t-tests. Therefore, this result adopts Hypothesis I. The remainder of this section examines the other four hypotheses.

Logit Analysis

Based on the dependent variable, a series of logit analyses is performed for independent variables in the categories of trust and activity. The analysis is performed for firm-level data, and the subject of the analysis is individual responses from sample SMEs. Since social capital is a spatial concept, SMEs are grouped based on their regional location (i.e. Nagano, Gifu or Aichi), and the comparison is drawn between each pair of regions. Hence, the dependent variable becomes binary data, which is to distinguish two different regions by either 1 or 0 for all examinations. Specifically, the dependent variable is 1 when SMEs belong to one region and 0 when they belong to the other region.

Table 6 shows the results of the first logit analysis. The six models are examined for the result. Model 1 includes all independent variables while Models 2 and 3 only include variables belonging to the categories of trust and activity, respectively. Model 4 only considers trust of larger enterprises while Model 5 only utilizes trust of other SMEs for the independent variable. For Model 6, the independent variables are selected based on a stepwise method, and the selection is designed to maximize AIC for the fittest combination of the variable. Moreover, the average, standard deviation of each group and their t-statistics are presented in the lower half of the table.

The interesting case in Table 6 is that the management and transaction of SMEs in Gifu is more dependent both on large enterprises and other SMEs than those in Nagano. According to our expectation from Hypotheses II and III, SMEs in Gifu should trust both large enterprises and other SMEs more than those in Nagano. This prospect is supported by the significant correlations of trust in larger enterprises as well as trust in other SMEs. While the coefficient of trust in large enterprises is constantly significant, that of trust in other SMEs is not steady. However, the result reveals the significance in Model 5, and we accept the significance for the positive correlation of trust in other SMEs.

In addition, in the category of social and business activity, the results are rather mixed for both efficient and significance. According to Hypotheses IV and V, SMEs should become less cooperative as their management and transaction become more dependent upon large enterprise and/or other SMEs. However, while a significant correlation is found for technological cooperation, other activities are either not significant or even negative. Although the result is indefinite of the assessment of Hypothesis IV, it is at least apparent that significant local trust of large enterprises and SMEs does not automatically improve social and business activities in the region, which is counterintuitive to the general supposition of social capital but rather supports the selection of necessary relationship.

Table 7 compares the response of two groups of SMEs in Aichi and Gifu. This comparison is interesting because even though the significance is weak, the management and transaction of SMEs in Aichi relies more on larger enterprises, and that of SMEs in Gifu is more dependent on other SMEs. The findings based on these results can be summarized as two main ideas.

First, in the trust category, SMEs in Aichi apparently trust large enterprises more than those in Gifu, whereas SMEs in Gifu trust other SMEs significantly more than those in Aichi. This contrasting result is valuable to argue that the creation and preservation of network and

Table 6: Result of logit analysis for Nagano and Gifu; dependent variable is 1 for SMEs in Nagano and 0 for SMEs in Gifu

	Trust				Activities				AIC	
	Intercept	Colleagues	Large enterprises	Other SMEs	Local government	Personal	Inter-firm	Public		Technological
Model 1	coefficient -4.738 p-value 0.043*	0.442 0.3845	0.749 0.0115*	0.116 0.7556	-0.087 0.7795	-0.053 0.8849	0.072 0.8073	-0.453 0.1053	0.568 0.0507	169.96
Model 2	coefficient -4.379 p-value 0.0363*	0.361 0.4318	0.693 0.0133*	0.282 0.4038	-0.108 0.6827					166.82
Model 3	coefficient -2.106 p-value 0.2159					0.202 0.5251	0.265 0.295	-0.429 0.0927	0.557 0.0397*	163.90
Model 4	coefficient -2.509 p-value 0.0029**		0.7729 0.00215**							162.42
Model 5	coefficient -2.203 p-value 0.0327*		0.6338 0.0300*							168.15
Model 6	coefficient -2.952 p-value 0.00795**		0.7986 0.00189**					-0.4605 0.08193	0.5866 0.03693*	161.21
Average and standard deviation										
Avg. Nagano		4.03	3.02	3.35	2.89	4.08	3.31	3.11	2.92	
Avg. Gifu		4.13	3.48	3.61	2.98	4.16	3.48	3.00	3.13	
Stdv. Nagano		0.44	0.74	0.70	0.83	0.61	0.81	0.99	0.93	
Stdv. Gifu		0.43	0.85	0.59	0.74	0.64	0.77	0.91	0.83	
t-test between groups										
t-value		-1.26	-3.21	-2.16	-0.68	-0.74	-1.15	0.66	-1.34	
p-value: one tail		0.1048	0.0009	0.0165	0.2491	0.2300	0.1261	0.2564	0.0919	
Boundary: one tail		1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	
p-value: two tail		0.2097	0.0017	0.0329	0.4981	0.4601	0.2522	0.5128	0.1838	
Boundary: two tail		1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	

The level of significance is 0.05 for *, 0.01 for ** and 0.001 for ***

Table 7: Result of logit analysis for Aichi and Gifu; dependent variable is 1 for SMEs in Aichi and 0 for SMEs in Gifu

	Trust					Activities					AIC
	Intercept	Colleagues	Large enterprises	Other SMEs	Local government	Personal	Inter-firm	Public	Technological		
Model 1	coefficient 1.476 p-value 0.776411	1.066 0.303879	3.109 0.00354***	-3.579 0.001037**	2.938 0.003464**	-1.945 0.001107**	-1.451 0.024879*	-0.184 0.743999	-0.772 0.187194	78.53	
Model 2	coefficient -7.038 p-value 0.027485*	0.344 0.579592	2.214 0.0000891***	-2.370 0.000248**	1.530 0.003574**					101.70	
Model 3	coefficient 7.5989 p-value 0.000315***					-1.219 0.001143**	-1.049 0.001537**	0.424 0.240978	-0.356 0.333754	121.89	
Model 4	coefficient -6.295 p-value 0.0000757***		1.5342 0.000112***							120.42	
Model 5	coefficient 1.516 p-value 0.174									141.00	
Model 6	coefficient 5.264 p-value 0.164261		3.1673 0.000207***	-3.4516 0.00087***	2.848 0.003263**	-1.8052 0.001843**	-1.5141 0.013756*		-0.9957 0.032313*	75.73	
			Average and standard deviation								
Avg. Aichi		4.22	4.17	3.36	3.47	3.55	2.89	3.00	2.98		
Avg. Gifu		4.13	3.47	3.60	2.98	4.17	3.47	3.00	3.13		
Stdev. Aichi		0.47	0.64	0.74	0.65	0.90	0.88	1.04	1.03		
Stdev. Gifu		0.43	0.85	0.59	0.75	0.64	0.77	0.92	0.83		
			t-test between groups								
t-value		0.95	4.87	-1.81	3.57	-3.94	-3.53	0.00	-0.83		
p-value: one tail		0.1724	2.0276E-06	0.0366	0.00027035	8.73598E-05	0.000324817	0.5000	0.2050		
Boundary: one tail		1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66		
p-value: two tail		0.3448	4.0553E-06	0.0731	0.0005407	0.00017472	0.000649634	1.0000	0.4100		
Boundary: two tail		1.99	1.98	1.99	1.98	1.99	1.99	1.99	1.99		

The level of significance is 0.05 for *, 0.01 for ** and 0.001 for ***

Table 8: Result of logit analysis for Aichi and Nagano; dependent variable is 1 for SMEs in Aichi and 0 for SMEs in Nagano

	Trust				Activities				AIC	
	Intercept	Colleagues	Large enterprises	Other SMEs	Local government	Personal	Inter-firm	Public		Technologica
Model 1	coefficient -5.039 p-value 0.32596	0.674 0.48926	3.039 0.0000121***	-1.027 0.13286	2.202 0.00491**	-2.279 0.00484**	-0.770 0.23062	-0.879 0.08949	0.414 0.23951	76.70
Model 2	coefficient -10.125 p-value 0.00407**	0.221 0.76	2.529 0.00000051***	-1.072 0.03859*	1.047 0.01875*					90.96
Model 3	coefficient 4.7883 p-value 0.0025**					-0.956 0.00338**	-0.468 0.08378	-0.215 0.43821	0.238 0.38008	137.77
Model 4	coefficient 9.292 p-value 0.000000171***		2.4715 0.000000172***							94.02
Model 5	coefficient -0.471 p-value 0.617			0.04484 0.87						149.59
Model 6	coefficient -1.618 p-value 0.61406		3.0682 0.0000107***	-1.0703 0.1062	2.1355 0.00553**		-0.7947 0.20263	-0.6648 0.15218		74.56
			Average and standard deviation							
Avg. Aichi		4.22	4.17	3.36	3.47	3.55	2.89	3.00	2.98	
Avg. Nagano		4.03	3.02	3.35	2.89	4.08	3.31	3.11	2.92	
Stdv. Aichi		0.47	0.64	0.74	0.65	0.90	0.88	1.04	1.03	
Stdv. Nagano		0.44	0.74	0.70	0.83	0.61	0.81	0.99	0.93	
		t-test between groups								
t-value		-2.08	-8.70	-0.05	-4.08	3.45	2.54	0.56	-0.30	
p-value: one tail		0.0200	2.83818E-14	0.4804	4.34162E-05	0.0005	0.0063	0.2873	0.3820	
Boundary: one tail		1.66	1.66	1.66	1.66	1.67	1.66	1.66	1.66	
p-value: two tail		0.0400	5.67635E-14	0.9609	8.68323E-05	0.0009	0.0127	0.5746	0.7640	
Boundary: two tail		1.99	1.98	1.98	1.98	1.99	1.99	1.99	1.99	

The level of significance is 0.05 for *, 0.01 for ** and 0.001 for ***

trust within it are specific to the relationship. In other words, firms can be dependent on a particular partner because they trust the partner, and trust is specific to particular relationships and untradeable, which assure Hypotheses II and III.

Second, in the activity category, all significant coefficients are negative, which indicates that trust and dependency on large enterprises reduces the incentive to participate in cooperative activities. Unlike the previous case, the result revealed a substitution between dependency on large enterprises and other activities, and that is consistent with Hypothesis IV.

Finally, SMEs in Aichi and Nagano are compared in Table 8. This comparison is important because between the three prefectures, SMEs in Aichi rely most on larger enterprises. The findings in Table 8 are summarized as two main ideas.

First, trust of large enterprises is significantly correlated with dependency on large enterprise, which supports Hypothesis II. Moreover, trust of other SMEs is mixed. This can be largely attributed to the similar average of trust of other SMEs in both regions. Hypothesis III is left unverified in the comparison.

Second, in the activity category, a significantly negative coefficient is found on personal cooperation, and weak negative coefficients are found for inter-firm and public cooperation, while that of technological cooperation is still positive. In the t-statistics, the averages of personal and inter-firm cooperation are significantly different between those groups, and the average is higher for SMEs in Nagano, which are less dependent on both larger enterprises and SMEs. Therefore, the data confirm that social and business activities decline, at least for personal and inter-firm cooperation, as SMEs are more integrated in industry network, at least with larger enterprises.

5. Conclusion

This section summarizes the findings of the study and settles the examination of the hypothesis. First, regarding Hypothesis I, there are significant differences in types of network between SMEs in Nagano, Gifu and Aichi. Therefore, the content and quality of industry network is region-specific, and they become useful subjects for the subsequent logit analysis.

Furthermore, the result of this study confirmed Hypothesis II, and the management dependency on larger enterprises grew as trust of larger enterprises was strengthened. This

was observed in all examinations. Third, in regard to Hypothesis III, the expected result was found for SMEs in Gifu when they are compared with those in Nagano and Aichi. However, mixed results were observed for Nagano and Aichi. Therefore, this study holds off the adoption of Hypothesis III and leaves its confirmation for further research.

Fourth, regarding Hypotheses IV and V, we found an inverse association between the frequency of participation in social and business activities on dependency on large enterprises (see Table 7 and Table 8). The participation declined as firms became more dependent on large enterprises, whereas it increased when their management relied more on other SMEs. Thus, we adopt Hypothesis IV and reject Hypothesis V.

Overall, we found clear results for dependency on large enterprise, as Hypotheses II and IV postulated. This implies that trust in management and transactions are only understood in the local presence of the *keiretsu* system. That is to say, the management and transactions of local SMEs become more dependent upon larger enterprises as they become more trusted; otherwise, the dependency significantly declines. In addition, participation in social and business activities declines as SMEs are more integrated into the *keiretsu* system. Although the argument is limited to the relationship with large enterprises, the results support the specificity of trust and relationship as well as the selection of relationship by necessity.

Moreover, the study revealed that trust is untradeable and resides within specific relationships, and SMEs are selective to industry network; particularly when they are integrated with large enterprises. As the role of specific networks becomes more significant than others, the role of other networks tends to decline. The results of this study can be associated with the cause of path dependency and institutional inertia because flows of knowledge and technologies tend to be confined in closed networks, and firms become less active to open the internal network and access to external networks, unless they are trustworthy enough to be invited into their own network.

Note

- 1) Regarding empirical studies, Cooke et al. (2005) evaluated the impact of social capital on the performance of local small- and medium-sized enterprises in 12 UK regions. Beugelsdijk and Schaik, (2005) investigated the regional differences in the social capital index across western European regions and its influence on regional economic development. Iyer et al. (2005) examined the spatial variety of social capital in the US, while Miguélez et al. (2005) determined that enhanced regional social capital yielded more patents. In addition, many recent studies emphasized the role of social capital in the regional innovation process (Hauser,

- 2007; Echebarria & Barrutia, 2011).
- 2) Moody and Paxton (2009) argue that, among many definitions of social capital, two things are in common. First, the certain social and economic actions are facilitated though the access and mobilization of social ties, and second the access and mobilization of social ties are supported by the quality of institutional factors such as trust, shared norms, beliefs and values (Lin 2008)
 - 3) The author prefers using “social ties” rather than “social network” because network emphasizes the roles of network structures and actors’ positions within the structure. This focus on dyadic ties follows the approach advocated by Tomlinson (2010).

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