Determinants of Social Capital in Korea

Donghun Joo, Joonkyung Ha, Man-Soo Joo

This study investigates the determinants of social capital in Korea using the law compliance indicator as a measure of generalized trust. Unlike other measures for social capital, the compliance indicator has been compiled for each province in Korea. This novel feature allows for better identification strategies than the country-level data. With the panel data of 16 regions in Korea, we find that in the demographic factors, such as gender and age structure, the compliance indicator is low for males and the elderly. Among variables for economic activity, unemployment rate and per capita GRDP show statistically significant effects. Moreover, the causality tests between the compliance indicator and economic activity show bilateral directions as expected.

Keywords: Social capital, Trust, Compliance index, Law, Regions in Korea

JEL Classification: Z10, O53, K30

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I. Introduction

Since Putnam (1993), economists have been interested in the role of social capital in economic development. One of the most important issues in this area is how to measure the level of social capital. Putnam (1993) defined social capital as "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions." Among those features of social capital, many empirical studies have focused on trust[1] for the reason of measurability. The most accepted social capital measure would be the trust indicator constructed by the survey question of "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" Instead of trust indicator, the rule of law indicator is also used as a measure of social capital in some related literatures. The rule of law indicator is regarded as one of the Worldwide Governance Indicators for 215 countries, including Korea, from 1996.[2]

In Korea, the trust index has been recorded sporadically in the Korean General Social Survey (KGSS) since 2003 with the same question. A similar index is also produced by the Korea Institute of Public Administration (KIPA) annually through Korea Social Integration Survey since 2013. The Korean government also produces a "kind of" trust indicator with the Social Survey implemented by Statistics Korea. Here, "kind of" is attached because the question is somewhat different from the KGSS questions. The question of the Social Survey asks "How do you believe that other people comply with the law?" and requests to choose the degree of compliance on a scale of one to five. In the sense that this question asks the subjective opinion of respondents, the indicator constructed with this question has an aspect of the usual trust indicator. At the same time, the indicator has some flavor of rule

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[1] Trust has two concepts in the social capital literature. The one is particularized trust, which arises in face-to-face interactions, and the other is generalized trust, which is toward strangers and arises when a community shares a set of moral values to create regular expectations of regular and honest behavior (Bjørnskov, 2007). The trust in this study means generalized trust.

[2] Rule of law indicator captures perceptions of the extent to which agents have confidence in and abide by the rules of society, particularly the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. See Kaufmann, Kraay, and Mastruzzi (2010).

of law indicator in the sense that it asks the opinion about the concrete behavior of compliance. We name this indicator the compliance indicator and use it as an auxiliary of the trust indicator.

Specifically, this paper investigates the determinants of social capital using the compliance indicator as a dependent variable that represents the trust of the society.[3] There exist several reasons to use the compliance indicator as a measure of trust in this study. First, the data set of the compliance indicator provides an ample environment for the analysis in the dimension of time and regions. The survey was implemented in the years of 1997, 2001, and 2005 and became a biannual occasion from 2008 in the 16 provinces of Korea. The fact that the compliance indicator in the survey is constructed for 16 domestic regions in Korea is the novel feature for our empirical analysis. Given that trust indicators are usually available only at a country level, the empirical analysis in the related literature must control the heterogeneity between countries, such as religion, race, and so on. Contrarily, a considerable degree of cultural homogeneity is guaranteed in our data as the cross-section data is obtained in a country, which alleviates the identification problem in the analysis and improves the reliability of the estimation. Furthermore, the sample size of the Social Survey is much larger than other surveys. The compliance indicator is based on 18,576 samples in 2014, whereas the KGSS trust index relies on roughly 1,300 samples.

Second, the compliance indicator as a measure of trust also has the flavor of rule of law, which can be a merit suitable for the study of social capital in Korea. Woo, Kim, and Jang (2007) argued that "western literature on social capital tends to emphasize the role of civic participation in the accumulation of social capital, ... and that these characteristics will ensure participation to lead to greater social trust. ... the differences in the trajectory of social development in Korea are likely to require a different policy approach in enhancing social capital." They proposed 'the public norms and institutions' as the major desirable areas of social capital policy research in the Korean context. As the trust corresponds with the public norm and the rule of law with the institutions, the compliance indicator seems to be an ideal measure

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[3] In this sense, we use "social capital" and "trust" interchangeably in this study.

for social capital research in the Korean context. The compliance indicator used as a trust measure in this study provides a useful way of analyzing the determinants of social capital from the macroeconomic perspective.

To fulfill this task, panel data models have been used to analyze the determinants of social capital. Endogeneity problems usually arise in the analysis of the determinants of the social capital. The fixed-effect panel data model is expected to alleviate this problem.[4] The fixed-effect model estimation result revealed the evident positive effects of employment and production to the compliance index in the region. Another empirical issue in the literature is the contribution of social capital to economic outcome. Social capital and economic activity may have reciprocal effects and the direction of causality may be highly contentious. This study checks the causality between them using the panel vector autoregressive (PVAR) model. There exist two kinds of PVAR model: one is used for macroeconomic and financial analyses and the other is used in micro studies. The latter disregards the interdependencies between cross sections and assumes sectoral homogeneity, whereas the former includes the dynamic and static interdependencies.[5] This paper uses the PVAR model used in micro studies suggested by Holtz-Eakin, Newey, and Rosen (1988) as the effects of one region's output on another region's social capital or vice versa seem to be negligible. The Granger causality test using PVAR confirmed the reciprocal relationship between the social capital and economic activity.

The remainder of this paper is structured as follows. Section 2 reviews the related literatures. Section 3 presents the construction of the data set and briefly explains the panel VAR model. Section 4 provides the empirical analysis results and their implication. Section 5 concludes.

II. Literature Review

Literatures on social capital mainly study the relationship between social capital and economic development. Numerous empirical studies

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[4] The existence of endogeneity will be verified through the Hausman test.
[5] Refer to Canova and Ciccarelli (2013).

on the effects of social capital on economic development exist. For instance, Knack and Keefer (1997), Whiteley (2000), Zak and Knack (2001), Beugelsdijk *et al.* (2004), and Delhey and Newton (2005) unveiled that trust as a social capital caused the cross-country differences in economic growth. Helliwell and Putnam (1995), La Porta *et al.* (1997), Rice and Sumberg (1997), Knack (2001), and Uslaner (2002), Djankov *et al.* (2007) revealed that trust contributes to the institutional development, such as the efficiency of the legislative system or the reduction of corruption.

Our main interest, however, is rather opposite: the determinants of social capital itself. Candidates are variables such as economic activities. The volume of literature on the determinants of social capital is relatively small compared with that on the consequences of social capital. We review below the studies that are directly related to our subject centered on the data used as a measure of social capital and the selection of explanatory variables in the model.

Many studies about the determinants of social capital were implemented with the individual survey data. For instance, Alesina and La Ferrara (2002), used the trust survey data provided by the General Social Survey (GSS) for the United Stated from 1974 to 1994. They considered age, marital status, gender, race, education, income, employment status, religion, and so on as individual determinants. They also tested the effect of heterogeneity on trust with the size, median income, crime, Gini coefficient, and so on of the regions. Glaeser *et al.* (2000) investigated the determinants of trust using GSS data. They considered age, education, income, gender, marital status, residential area, religion, and so on. Parts (2013) divided the determinants of social capital into two groups: the psychological and socio-economic characteristics of individuals versus contextual or systemic factors at the level of community/nation. She focused on individual-level determinants of social capital, such as personal income, education, family status, personal experiences, and so on. She considered four components of social capital, namely, general trust, institutional trust, social norms and formal networks, and extracted 12 indicators from the European Values Study (EVS) survey.

In the case of Korean literatures, studies on the determinants of social trust mostly used individual data. Kim (2006) explored the effects of social network and government policies for enhancing trust on trust with logit model using the 2004 Korean GSS (KGSS) data. Gender,

education, and age were included as control variables but had no statistical significance. Park (2005) investigated the effect of generation to trust by also using KGSS. He found that income and education had positive relationship with trust and that younger generation showed higher trust.

Meanwhile, some studies on the determinants of social capital were implemented with country-level data. Bjørnskov (2007) analyzed the effects of income inequality and race structure on generalized trust using the data of the World Values Survey conducted in 1997 and 1999–2001. Olsson and Hansson (2011) studied the effect of county size on the rule of law constructed by Kaufmann *et al.* (2005).

III. Data and Methodology

The determinants of social capital are analyzed using the panel data model, and the causality between social capital and economic activity is analyzed using the PVAR model. The reasons for using the data are given in the following two subsections. The comparison of the various measures of trust in Korea is presented first. Then, the general descriptions of the data are given. The PVAR model that is used to obtain the Granger causality between social capital and economic activity is briefly discussed in the last subsection. The explanation on panel data model is unnecessary as it is generally familiar to researchers.

A. Trust measure comparison in Korea

As aforementioned, the compliance indicator surveyed by Statistics Korea is used as a measure of social capital. The trend of the indicator for the whole country is presented in Figure 1 with blue diamond dots. The survey for compliance indicator asks the question of "How do you believe that others comply with the law?" and requests to choose the degree of compliance on a scale of one to five. The survey results are presented as a percentage of each scale. The compliance indicator is obtained as a weighted average of the scales using the percentages as weights. the indicator is standardized so that the center of the index is located at zero and ranged from −1 to 1.

Other social capital measures in Korea are presented in Figure 1. The left panel of the figure presents the reliability and trust index of KGSS
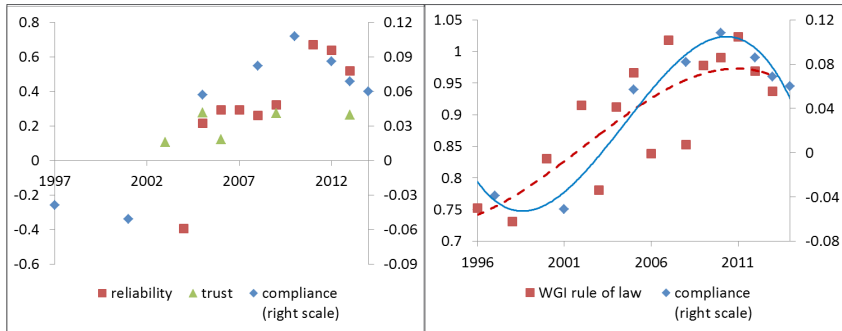
FIGURE 1

COMPARISON OF SOCIAL CAPITAL MEASURES IN KOREA

along with the compliance indicator. The question for the trust index
has been mentioned earlier. The index is constructed by assigning
1 for "yes" and −1 for "no". The reliability index is obtained from the
answers to the question of "How much do you think that our society
is trustworthy? Give the score from 0(don't trust) to 10(trust)." The
reliability index is constructed similar to the compliance indicator. The
trust index was surveyed only for the years of 2003, 2005, 2006, 2009,
and 2013[6], making it difficult to keep track of the recent trends in the
index. Meanwhile, the reliability index was surveyed almost every year
from 2004 to 2013. Interestingly, the trend of the reliability index shows
a remarkable synchronization with that of the compliance indicator in
the sense that both indexes turned from negative in 2004 to positive in
2005 and moved downward after 2009.

The right panel of the figure presents the WGI rule of law index
together with the compliance indicator. The dotted and solid lines are
third order polynomial trend lines for respective data series. The survey
data of the WGI rule of law index was most frequently recorded. It has
been surveyed biannually from 1996 to 2001 and annually afterward.
Although the WGI rule of law index appears to move erratically, it is
also well synchronized with the compliance indicator. The third-order
polynomial trend lines reveal the striking similarity between them.

With these comparisons between various social capital measures in
Korea, we believe that the compliance indicator used in this study as a

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[6] The data source for trust and reliability index is Kim, Kim, and Hyun (2016).
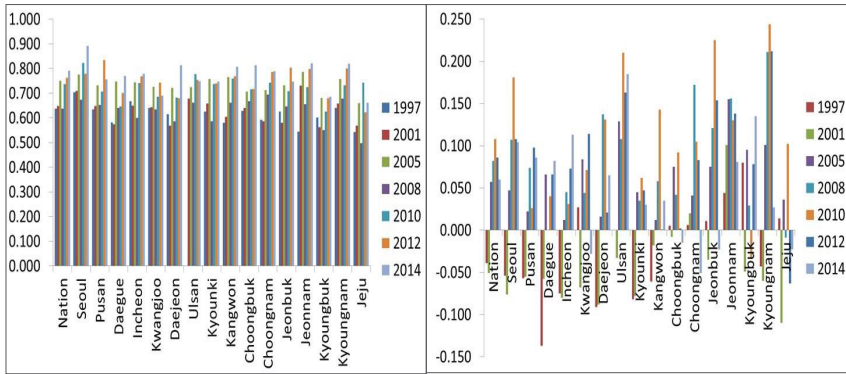
Figure 2
Compliance indicators for themselves (left) and others (right)

representative social capital measure is justifiable.[7]

Figure 2 reveals another interesting property of the compliance indicator. The figure presents the compliance indicator assessing respondents themselves on the left panel and assessing for others on the right panel in 16 regions in Korea. The former one is obtained through the question of "How do you believe that you comply with the law?" instead of "How do you believe that other people comply with the law?" This self-assessing compliance indicator is also standardized so that the center of the evaluation scores to be zero and ranged from −1 to 1. The self-assessing compliance indicator ranges from 0.5 to 0.9, whereas the compliance indicator assessing others ranges from −0.15 to 0.25. It implies that respondents are highly generous in evaluating their own law compliance attitude.

Although the self-assessing compliance indicators show no distinctive patterns, the compliance indicators assessing others have a couple of noteworthy patterns. First, the compliance indicators assessing others in almost all the regions turned from negative to positive in early 2000's immediately after overcoming the currency crisis in Korea. Second, they show downward trends in almost every region after the 2008 global financial crisis. These observations support the argument that the

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[7] The trust index surveyed by KIPA is recorded from 2013 to 2015 every year. The values for each year are 2.8, 2.8, and 2.7. We excluded this index from the comparison as the time series it extremely short.

compliance indicator assessing others contains objective features that make it a useful measurement for social capital in Korea and thus the compliance indicator assessing others is used as a measure of trust in this study.

B. Data description

Explanatory variables, demographic and economic, are chosen on the basis of related literature.[8] Demographic variables include gender, age, population, population flow, and the size of the region. [9] Economic variables include unemployment rate, fiscal independence, per capita tax revenue, per capita GRDP, and per capita consumption. These variables are structured as annual panel data for 16 provinces in Korea and from years 1997 to 2014. Fiscal independence and tax revenue are included to check the effect of public policy on trust.[10] Whether the public policy improves the trust in the society is one of the interesting issues in the literature on the determinants of social capital. Unemployment rate and GRDP are included to check the effect of overall economic condition on trust. The effect of income on trust should also be explored as regional income moves somewhat differently from regional production. However, regional per capita income is available only from year 2000 and thus per capita consumption is used as a proxy for income.

The values of population, the size of the region, per capita tax revenue, GRDP, and consumption are taken with natural log. The values of gender, age, education, population flow, unemployment, and financial independence are percentage ratios. Gender is the percentage of males. Age is the percentage of age over 60. Education is the percentage of college graduates or higher. Population flow is the ratio

[8] Alesina and La Ferrara (2002) mentioned that "the theory about trust is sketchy at best." This might be the reason that the explanatory variables are selected on the basis of the researcher's intuition or experience rather than theory.

[9] Heterogeneities of race or religion are also commonly tested explanatory variables in the literature but we excluded those in the belief that those heterogeneities are irrelevant or insignificant in the context of the regions in Korea.

[10] Public policies, such as encouraging social participation of the community or enforcing the rule of law, may contribute to the increase of social capital.
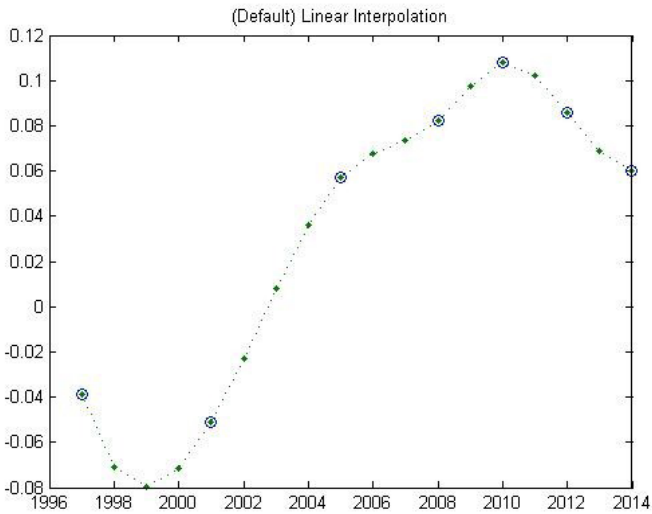
FIGURE 3
INTERPOLATION OF THE COMPLIANCE INDICATOR

of the sum of inflow and outflow to the population. Unemployment and fiscal independence[11] follow the definition of Statistics Korea.

All explanatory variables are available with yearly basis. However, the compliance indicator is not available for every year. Thus, the same model is estimated with two data sets: the one that includes only the data of the years that the compliance indicator is available and the other that includes all the years by interpolating the omitted years of the compliance indicator. Interpolation is implemented using the spline method. The interpolation result for the compliance indicator is given in Figure 3.

However, there exists another problem in the data. Ulsan was raised to one of the 16 provinces in 1997, which makes its time series data to be shorter than those of other regions. Thus, the model is also estimated with two data sets: the unbalanced panel data that includes Ulsan and the balanced one that excludes it. Given that the results of those two analyses are similar, only the results with 16 regions of

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[11] Fiscal independence is the ratio of autonomous revenue to total revenue in a region.

unbalanced panel data are presented.

C. Panel VAR model

The causality between output and social capital is explored. Thus, PVAR model is used, and Granger causality results are presented. There exist two kinds of PVAR model: the one that is used for macroeconomic and financial analyses and the other that is used in micro studies. [12] The former PVAR model is presented as follows:

$$y_{it} = A_i(l)Y_{t-1} + \varepsilon_{it} \qquad i = 1,...,Nt = 1,...,T, \tag{1}$$

where y_{it} is the vector of G variables, $Y_t = (y'_{1t}, y'_{2t}, \ldots, y'_{Nt})$ is the GN × 1 vector, a stacked version of y_{it} , ε_{it} is a G × 1 vector of random distur-bances, $A_i(l)$ is a polynomial in the lag operator. This model allows for interdependency between the cross-section entities. However, the num-ber of parameters that should be estimated increases exponentially. Furthermore, our interest is not so much in the effect of output in one region to the social capital in other regions or vice versa.

Hence, the latter panel VAR model is used and presented as follows:

$$y_{it} = A(l)y_{it-1} + \varepsilon_{it} \qquad i = 1,...,N \qquad t = 1,...,T, \tag{2}$$

where y_{it} is the vector of G variables, i = 1,...,N, A(l) is a polynomial in the lag operator, $\varepsilon_{it} = \alpha_i + \delta_t + u_{it}$. Holtz-Eakin (1986) proposed the esti-mation method of this model, and Abrigo and Love (2016) extended it to the GMM estimation, which is used in this study. Two main restrictions characterize this specification. First, it assumes common slope coef-ficients. Second, it does not allow for interdependencies across units. Due to these restrictions, the interest is typically in estimating the av-erage dynamics in response to shocks (the matrix $A(l)$). Meanwhile, the advantage of using a panel approach is that it increases the efficiency of the statistical inference, which would otherwise suffer from a small number of degrees of freedom when the VAR is estimated with a rela-tively short time series. Although this comes at the cost of disregarding cross section differences by imposing the same underlying structure

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[12] Refer to Canova and Ciccarelli (2004) and Jeong and Kim (2018).

for each cross-section unit, Gavin and Theodorou (2005) emphasized that the panel approach helps uncover common dynamic relationships. Considering the time span of our data, from 1997 to 2014, and common characteristics of 16 regions in Korea, we expect that this model is effective in our analysis.

IV. Results

A. Social capital determinants

In this study, the routine of panel data analysis is followed: the existence of the endogeneity problem is verified with the Hausman test, and the model is chosen between fixed and random-effects models. Table 1 presents the estimation results of the fixed and random-effect model estimation results with the pooled OLS estimation result using the data that include all the years by interpolating the omitted years of the compliance indicator. The chi-square statistic and its p-value of the Hausman test the fixed and random-effect model was 35.53 and 0.0001 respectively, indicating that the null hypothesis that the random-effect model estimation is not inconsistent is rejected. Therefore, the analysis will be implemented with fixed-effect models. The endogeneity problem

TABLE 1
SOCIAL CAPITAL DETERMINANTS: RE, FE, AND POOLED OLS

	FE		RE		Pooled OLS	
	Coeff.	t-val.	Coeff.	z-val.	Coeff.	t-val.
Population	−0.1070	−0.97	0.0275	1.95	0.0343**	2.63
Area size	0.9126*	2.38	−0.0186	−1.81	−0.0238**	−2.58
Gender	−0.0960*	−2.79	−0.0213	−0.92	−0.0048	−0.24
Education	0.0096*	2.47	0.0015	1.21	0.0020	1.86
Age	−0.0209*	−2.92	−0.0003	−0.12	0.0009	0.40
Pop. Flow	−0.0009	−0.50	0.0008	0.65	0.0009	0.87
Unemployment rate	−0.0078	−1.90	−0.0124**	−3.09	−0.0136**	−3.39
Fiscal independence	−0.0005	−0.70	−0.0011	−1.52	−0.0013	−1.72
Per capita tax revenue	0.0700	1.34	−0.0645*	−2.07	−0.0865	−3.15
Per capita GRDP	0.0924	1.41	0.1577**	6.09	0.1518**	7.05
Const.	−1.7485	−0.48	−0.5242	−0.48	−1.3275	−1.38

* $p < 0.05$, ** $p < 0.01$

has always been an issue in analyzing the relationship between social capital and its determinants. Fixed-effect panel data model is expected to naturally solve the endogeneity problem (Lancaster (2004)). Moreover, the statistical significance of the coefficients in the random-effect model is weak. Only the unemployment rate and per capita GRDP show the statistical significance, which is the same with the fixed effect model.

Table 2 presents the estimation results of fixed-effect models using only the data of the years that the compliance indicator is available. Model 1, which includes tax revenue and GRDP as explanatory variables, is first estimated. In this model, the effects of unemployment and GRDP on the compliance indicator are statistically significant at 5% significance level. Unemployment has a negative effect, and the GRDP has a positive effect on the compliance indicator. Model 2, which excludes GRDP, is also estimated. Model 3, which excludes tax revenue considering the possibility of multicollinearity between the tax revenue and GRDP, is also estimated. Model 4, which includes consumption as a proxy for income instead of those two variables, is estimated. When the variables of tax revenue, GRDP, and consumption are included one

TABLE 2

Social capital determinants: without interpolation

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	t-val.	Coeff.	t-val.	Coeff.	t-val.	Coeff.	t-val.
Population	0.1332	0.6	−0.0278	−0.1	0.1261	0.6	−0.0786	−0.4
Size of the area	1.2244	1.8	1.2304	1.8	1.2194	1.9	0.9704	1.5
Gender	−0.1165	−1.9	−0.0956	−1.5	−0.1176*	−2.0	−0.1107*	−2.0
Education	0.0001	0.0	0.0087	1.4	0.0003	0.0	0.0010	0.1
Age	−0.0160	−1.2	−0.0199	−1.5	−0.0166	−1.4	−0.0247*	−2.0
Pop. flow	0.0031	0.8	−0.0002	−0.1	0.0029	0.9	0.0028	0.9
Unemployment	−0.0279*	−2.2	−0.0252*	−2.0	−0.0278*	−2.2	−0.0373**	−3.0
Fiscal independence	−0.0017	−1.3	−0.0019	−1.4	−0.0017	−1.3	−0.0007	−0.5
Per capita tax revenue	−0.0127	−0.1	0.1857	1.9				
Per capita GRDP	0.2660*	2.0			0.2570**	2.8		
Per capita consumption							0.3697**	3.4
Const.	−8.1864	−1.2	−4.6981	−0.7	−7.9120	−1.3	−4.0386	−0.7

* $p < 0.05$, ** $p < 0.01$

by one as explanatory variables in each model, GRDP and consumption show statistically significant effects, as shown in Table 2.

Among the explanatory variables, the effects of population, the size of the area, education, population flow, and fiscal independence appear statistically insignificant. However, the rest of the explanatory variables show evident effects on the compliance indicator. Related with those effective variables, some results are interesting.

First, gender, defined as the ratio of male, shows significantly negative relationships with the compliance indicator in Models 3 and 4. Age, defined as the ratio of age over 60 to the population of the region, shows significantly negative relationships with the compliance indicator in Model 4. Previous related studies for Korea show inconsistent results. Park and Kim (2000), using the formal networks as a social capital measure, obtained opposite result to ours. Park (2005), however, obtained a negative relationship between age and trust in Korea. In Kim (2006), gender and age had no statistically significant relationship with social capital. In the literature for other countries, age shows a positive effect on trust in general while the effect of gender is in disagreement. Putnam (2000), Glaeser *et al.* (2000), Alesina and Ferrara (2002), and Parts (2013) argued that older people are more trusting. Gender had positive effects on trust in Alesina and Ferrara (2002), whereas negative effects in Parts (2013).

Second, the unemployment rate of regions has an evidently negative effect on the compliance indicator. Testing the effect of unemployment rate on social capital has few precedents. In a micro data analyses, it would not have been easy to test the effect of employment status of the respondent to the question on trust as the probability that the unemployed are included in the sample is not so high considering the sample size of the trust survey.[13] In a country-level data, testing the effect of unemployment on trust would also have been difficult because of heterogeneous labor markets among the countries. The regional data of a country used in this study is free from these problems.

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[13] Alesina and La Ferrara (2002) tested the effect of full-time and part-time employment status, without explaining their meanings. Freitag and Kerchner (2011) studied the effect of social capital on unemployment using a macro–quantitative cross–sectional data of 134 European regions. Campens et al. (2012) also studied the role of social capital in the labor market. However, studying the effect of unemployment on social capital is difficult.

TABLE 3
SOCIAL CAPITAL DETERMINANTS: WITH INTERPOLATION

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	t-val.	Coeff.	t-val.	Coeff.	t-val.	Coeff.	t-val.
Population	−0.1070	−1.0	−0.1253	−1.1	−0.0931	−0.9	−0.2091	−1.8
Size of the area	0.9126*	2.4	0.9140*	2.4	0.9847*	2.6	0.9703*	2.5
Gender	−0.0960**	−2.8	−0.0837*	−2.5	−0.0885*	−2.6	−0.0649*	−2.1
Education	0.0096*	2.5	0.0121**	3.5	0.0091*	2.4	0.0112**	3.2
Age	−0.0209**	−2.9	−0.0186*	−2.7	−0.0192**	−2.7	−0.0216**	−2.8
Pop. flow	−0.0009	−0.5	−0.0013	−0.8	0.0004	0.3	0.0002	0.1
Unemployment	−0.0078	−1.9	−0.0080*	−2.0	−0.0101**	−2.7	−0.0095*	−2.4
Fiscal independence	−0.0005	−0.7	−0.0005	−0.6	−0.0003	−0.4	0.0001	0.1
Per capita tax revenue	0.0700	1.3	0.1147**	2.8				
Per capita GRDP	0.0924	1.4			0.1457**	2.8		
Per capita consumption							0.1534**	2.7
Const.	−1.7485	−0.5	−1.3560	−0.4	−3.3523	−1.0	−2.7146	−0.8

* $p < 0.05$, ** $p < 0.01$

Hence, the data are suitable to test the effect of unemployment at the macroeconomic level.

Third, all other economic variables clearly show significant effects on the compliance indicator. Per capita GRDP and per capita consumption present positive effects on compliance indicator.[14] Although the regional government's revenue is included to test the effect of public policy on social capital, the variable seems more likely to work as a proxy for an economic activity in the model.[15]

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[14] Production and income can be used as measures of economic activity in a region. Although the discrepancy between production and income is usually negligible in a country level data, it may be significant in the regional level data. Between the two, income seems to be more relevant than production as a determinant of trust. The problem is that Statistics Korea provides regional per capita income only from 2000. For this data availability limitation, we use GRDP and consumption as economic activity variables.

[15] The correlation coefficient between per capita GRDP and per capita tax revenue is roughly 0.7. The correlation coefficient between per capita consumption and per capita tax revenue is approximately 0.85.

To check the robustness of the results shown in Table 2, which is obtained using the data without interpolation, the same estimations for each model are conducted using the data when the compliance indicator data is interpolated to use all the yearly data during 1997–2014. The results are presented in Table 3. The notable difference from the results of Table 2 is that the statistical significances of the size of the area and education appears in all type of models. Moreover, the results described in Table 2 are sustained overall. The results in Table 3 should be interpreted with caution as the estimation is obtained with artificially constructed data. Hence, we will not explore the further meaning of the estimation results with the interpolation data other than confirming the results obtained in Table 2.

B. Causation between social capital and economic activity

The causality between social capital and economic activity is also an important issue in the literature of social capital. In theory, the social capital, such as trust, can contribute to economic growth, for instance, by reducing the transaction cost in the financial market. However, the effect of social capital on economic activity is hardly an immediate one. The effect of economic activity on the accumulation of social capital is also lagged. In this respect, the panel VAR analysis was implemented to look over the causality between them. Concretely, the panel VAR Granger causality tests were implemented between compliance indicator and other economic activity proxy variables investigated in the models of previous subsection in turn using interpolated data to secure the time length for VAR model. The test results are presented in Table 4.

TABLE 4
PVAR Granger causality

Excluded	Lag (1)		Lag (2)	
	chi^2	Prob.	chi^2	Prob.
Per capita tax revenue	12.30	0.00	4.80	0.09
Compliance indicator	7.02	0.01	16.99	0.00
Per capita GRDP	14.70	0.00	2.52	0.28
Compliance indicator	5.57	0.02	3.39	0.18
Per capita consumption	14.17	0.00	3.30	0.19
Compliance indicator	0.65	0.42	36.60	0.00

PVAR(1) ESTIMATION RESULTS

	Compliance indicator lag		Economic activity lag	
	Coeff.	z-value	Coeff.	z-value
Compliance indicator	1.3716	12.54	0.1399	3.51
Per capita tax revenue	0.5569	2.65	1.1988	17.68
Per capita GRDP	1.277	16.3	0.0725	3.83
Compliance indicator	0.199	2.36	0.9428	52.42
Per capita consumption	1.3058	15.05	0.0847	3.76
Compliance indicator	0.0595	0.81	0.9703	67.5

Per capita tax revenue and compliance indicator showed a bilateral causality in both models of Lags 1 and 2. Per capita GRDP and compliance indicator showed a bilateral causality in the Lag 1 model but no causality in the Lag 2 model. Per capita consumption Granger caused compliance indicator but not vice versa in the Lag 1 model. Compliance indicator Granger caused per capita consumption but not vice versa in the Lag 2 models. Table 5 presents the PVAR(1) estimation results for each economic activity variables. These results confirm the usual expectation that economic activity and trust encourage each other, although the effectiveness of the result is limited by the relatively short period of time series.

V. Conclusion

This study investigates the determinants of social capital in Korea using the law compliance indicator as a measure of social capital. The compliance indicator data is constructed as a panel for 16 different regions in Korea from 1997 to 2014. Although the endogeneity problem is intrinsic in this kind of study, the fixed-effect panel data model provides a natural way to avoid this problem.

The analyses show that demographic factors, such as gender and age structure, affect the level of the compliance indicator in Korea. Specifically, the compliance indicator appears low in the males and old ages. Among economic variables, unemployment rate significantly and negatively affects the compliance indicator, which is a finding unknown

in previous literature. We also test the effect of a regional government's public policy on social capital by including the explanatory variables of fiscal independence and tax revenue. The effect of fiscal independence is not statistically significant.[16] Tax revenue is positively related to social capital but the statistical significance of the tax revenue disappears when the variables for economic activity are included together as explanatory variables. This implies that tax revenue is more like a proxy for an economic activity rather than for a public policy. Economic variables, such as GRDP and consumption, positively affect compliance indicator.

The literature on social capital generally assumes reciprocal effects between economic activity and social capital. We test this assumption with the panel VAR Granger causality analysis using the compliance indicator and economic activity variables. Ultimately, our analysis confirms bilateral causality between them.

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[16] This result does not necessarily mean that public policy is irrelevant to the social capital but that there should be more efforts to find the proxy for public policy.

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