Homeownership and investment for social capital in Japan: Dynamic Panel approach.

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Abstract

This paper explores how the rate of home-ownership and income inequality are related to the formation of social capital using panel data from Japan during the period 1986–2006. I have used Dynamic Panel estimation to control unobserved prefecture-specific fixed effects and an endogeneity bias. I have found through this estimation that the rate of home-ownership enhances the participation in voluntary activities, leading to social capital accumulation. This is in accord with findings from the United States (DiPasquale and Glaeser, 1999).

Key words: Social Capital, home-ownership, length of residency.

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1. Introduction

Since the 1990s, the concept of social capital has had a great influence on various fields of social science[1]. There are various definitions of social capital such as a social network, interpersonal trust, or social norms of reciprocity and trustworthiness. If social capital is defined as social network, social capital can be accumulated through participation in community and voluntary activities (Putnam, 2000). This view can be explained formally by the simple investment theory (Glaeser *et al.*, 2002). From a regional viewpoint, empirical analysis has been used to explore how social capital is formed based on the decision making of individuals; the suggestion is that home-owners are less likely to move from their current residences, and therefore are more inclined to invest in their local social capital (DiPasquale and Glaeser 1999; Hilber 2007).

Nonetheless, a social network of neighbors generates benefits for residents[2]. This benefit disappears if households move, thereby reinforcing low residential mobility (Kan 2007). This implies that if social capital can be strongly accumulated, people are less likely to move away (David *et al.*, 2010). However, there seems to be a reverse causality whereby people are apt to move to places and become home-owners where social capital formation is perceived to be larger, leading to an estimation bias. Furthermore, the culture and history of a residential area are also thought to influence a resident's decision-making concerning investment in the social capital of that area.

The estimation result is thought to suffer from biases such as the endogeneity of home-owners and the omission of an unobserved fixed effect of a residential place. Although DiPasquale and Glaeser (1999) used the instrumental variable to offset this

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[1] Recently, researchers from the field of regional science have been interested in the issue of social capital (see Glaeser and Redlick 2008; Kilkenny 2006; Westlund 2007).
[2] Social network considered as social capital appears to contribute to technological diffusion among colleagues (Yamamura 2008a).

endogeneity bias, they did not control for the unobserved fixed effects. By using panel

data from the 47 Japanese prefectures[3] over the period 1986–2006, this paper employs

the Arellano-Bond Dynamic Panel model (hereafter the AB model) to simultaneously

control for the unobserved fixed effect and endogeneity bias at the prefectural level.

The organization of the remainder of this paper is as follows: In section 2, data,

method of analysis and estimation strategies are described. The results of the

estimations and their interpretation are provided in section 3. The final section offers

concluding remarks.

2. Data and Methods

2.1. Data

Following the discussion in Putnam (2000), the degree of civic engagement such as

volunteer activities is considered to be an investment in social capital in this research[4].

I have obtained the proxy for investment in social capital from the report "The Survey of

Time Use and Leisure Activities" which provided prefectural data on the degree of

participation in volunteer activities every five years from 1986. This survey was

conducted by the Statistics Bureau of the Ministry of Internal Affairs and

Communications. Besides the proxy for investment in social capital, the rate of

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[3] A Japanese prefecture is roughly equivalent to a state in the United States or a
province in Canada.
[4] DiPasquale and Glaeser (1999) used various variables as proxies for the investment of
social capital because civic engagements covered various activities in daily lives.
Participation in volunteer activities reported in "The Survey of Time Use and Leisure
Activities" was divided into a number of categories. For instance, the survey for 2001
provided data for10 kinds of volunteer activities related to (1) health or medical
concerns, (2) the elderly, (3) the handicapped, (4) children, (5) sports, culture or arts, (6)
local improvements, (7) safety promotion, (8) conservation or environment, (9) disaster
response, and (10) others. These sub-categories changed according to survey years
although the sub-category "total volunteer activities" is available every survey year.
Inevitably, I have not use those sub-categories providing more detailed information
concerning investment for social capital due to data limitations.

home-ownership and other economic variables can be obtained for corresponding years[5].

Hence, this paper used prefectural level panel data, for each of the 47 prefectures and

quinquennial years (1986, 1991, 1996, 2001, and 2006). Hence, the total number of

observations is 235. Table 1 includes variable definitions, means, standard deviations,

maximum values, and minimum values.

2.2. Econometric Framework and Estimation Strategy

It can be seen from Figure 1 that rate of participation in volunteer activities is not

skewed. Figure 2 indicates that there is a positive correlation between the percentage of

participation in volunteer activities and home-ownership rates. Nevertheless, the

causality between these is ambiguous. As suggested in earlier works (DiPasquale and

Glaeser 1999; Hilber 2007), it seems appropriate that barriers to mobility give

individuals an incentive to invest in social capital. Nonetheless, Figure 2 possibly

suggests a reverse causality that people tend to become home-owners where investment

in social capital is large. I use regression estimation to clarify the causality as follows.

The AB model allows me to control for not only the fixed effect of a residential place

but also the endogeneity bias (Baliamoune-Lutz, 2009). Using the AB model, the

estimated function then takes the following form:

$SC_{it} = \alpha_1 SC_{it\_1} + \alpha_1 HOME_{it} + \alpha_2 CCENTER_{it} + \alpha_3 GINI_{it} + \alpha_4 INCOM_{it} + \alpha_5 POP_{it} + e_i + u_{it},$

where SC_{it} represents the dependent variable in prefecture i and year t. The lagged

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[5] The Gini coefficient of yearly income was sourced from the "National Survey of Family Income and Expenditure". This quinquennial survey was conducted by the Statistics Bureau of the Ministry of Internal Affairs and Communications in years 1984, 1989, 1994, 1999, and 2004. It should be noted that there is a two-year lag between the Gini coefficient and the proxy for investment in social capital. Besides the Gini coefficients and rate of participation in volunteer activities, the data used as independent variables in the regression estimation were sourced from Asahi Shimbunsha (2008).

independent variable, SC_{it_1}, is included as an independent variable. The α's represent

regression parameters, e_i unobservable prefecture specific effects that are controlled by

the AB model, and u_{it} the error term. In addition to the AB model, the OLS (ordinary

least squares) and the Fixed Effects models, where a lagged dependent variable is not

included as an independent, are both used to check robustness. The rate of

home-ownership, HOME, is used to capture the home-ownership effect. If a home-owner

tends to invest in social capital, the anticipated sign of HOME is positive. As discussed

by DiPasquale and Glaeser (1999), HOME is possibly correlated with unmeasured

factors included in u_t. HOME is thus thought to be an endogenous variable, resulting in

estimation bias[6], and hence, handled as such in the AB model. An endogenous variable

is treated similarly to a lagged dependent variable. Levels of endogenous variables

lagged by two or more periods can serve as instruments (Arellano 2003, Ch. 8).

Community centers are places where residents of a community gather. Accordingly,

such centers promote frequent gatherings for community activities. CCENTER, the

number of community centers per capita, is predicted to be positive valued. An

individual's decision seems to depend on those that surround the individual. For

instance, people are less likely to cooperate in resolving collective problems in more

heterogeneous communities (Alesina & La Ferrara, 2000; Yamamura 2008b). Hence,

residents are less likely to invest in social capital if income inequality as reflected by

GINI is relatively large. The sign of GINI is anticipated to be negative. Apart from

variables referred as above, several control variables are also included to capture

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[6] DiPasquale and Glaeser (1999) used individual data to explore the effect of individual
home-ownership on investment in social capital. They considered the average group
home-ownership rate where an individual lives as an exogenous variable and used it as
an instrument variable.

prefecture characteristics such as average income levels and population.

3. Estimation Results and their Interpretation

Table 2 presents estimations of the various variables using OLS and the Fixed Effects model. The Fixed Effects model controlled for the unobserved fixed effects for each prefecture but not the endogeneity bias. Table 3 exhibits similar results for the AB model where the unobserved fixed effects of each prefecture are taken into account and endogeneity bias is alleviated. I have attempted to estimate the elasticity so as to compare the magnitudes of dependent variables. Accordingly, dependent and independent variables are evaluated at the sample means, and therefore coefficient values reported can be interpreted as elasticities[7].

I begin by discussing results of Table 2, presenting the OLS result in column (1) and the Fixed Effects result in column (2). HOME takes positive signs in columns (1) and (2); however, HOME is statistically significant only in column (2). Moreover, coefficient of HOME for the Fixed Effect model is remarkably larger than that for OLS. This suggests that suppressing prefectural fixed effects alleviates the estimation bias, leading to HOME values that are statistically significant. Aside from HOME, parameters CCENTER, GINI, and INCOM display similar results for both OLS and the

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[7] For more details see Greene (1997, p.280).
In the linear model, $y = x'\beta + e$, the elasticity of y with respect to changes in x is defined as

$$\gamma_k = \frac{\partial \ln y}{\partial \ln x_k} = \beta_k \left(\frac{x_k}{y} \right).$$

There values can be estimated at the sample means as

$$\lambda_k = \beta_k \left(\frac{\overline{x_k}}{\overline{y}} \right).$$

The standard error in the elasticity of y, γ_k, can be calculated by the delta method (Greene 1997, pp. 278-280).

FE model. It is significant to note that GINI does take a negative sign. This implies that income inequality curbs participation in voluntary activities, resulting in a decrease in social capital.

I now turn to the results of Table 3. All dependent variables are treated as exogenous in column (1) while HOME, CCENTER, and GINI are treated as endogenous in columns (2), (3), (4). In column (3), INCOME is also treated as endogenous while in column (4), both INCOME and POP are also treated as endogenous. Before discussing details of the results, it is necessary to check the validity of the estimation model. The consistency of the AB model estimator relies on the fact that there are no second-order serial correlations arising from any disturbance in the first-differential equation. Therefore, one should first check a test for the null hypothesis that there are no such correlations (Baltagi 2005, p.141). The null hypothesis is not rejected in columns (1) – (4) and so all estimation results pass the test. Second, one needs to look at the results from the Sargan test, which is the test for over-identification restrictions. The null hypothesis is that the instrumental variables are uncorrelated with respect to some set of residuals and, so they are acceptable as instruments. If the null hypothesis is not rejected, the instruments are valid by this criterion. Only in columns (3) and (4) is the p-value of the Sargan test presented not rejected. Hence, I place greater importance on the results presented in columns (3) and (4).

Consistent with prediction, HOME_1 takes a positive sign and is statistically significant at a 1 % level in columns (1) – (4). Also in accord with expectation, the sign of GINI is negative and statistically significant at a 1 % level in columns (1) – (4). Considering Tables 2 and 3 jointly, home-owners are more likely to invest in social capital whereas income inequality reduces the investment for social capital. In contrast,

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the sign of INCOM is not stable and is statistically insignificant. POP is negative in column (1) and positive in columns (2) – (4). POP is statistically significant in column (3) but not in column (4). Hence, the effects of INCOM and POP are ambiguous.

4. Conclusions

The seminal work of DiPasquale and Glaeser (1999) provided evidence that a home-owner is more likely to become a good citizen by investing in social capital through participation in various social activities. However, their previous work does not control for the unobserved fixed effect; hence, its result seems to suffer from estimation bias. This paper explored how home-ownership influenced the investment in social capital using prefecture-level panel data during the period 1986–2006. Controlling for unobserved prefecture-specific fixed effects and using the AB model to offset the endogeneity bias related to home-ownership, home-owners are more likely to invest in social capital by participating in volunteer activities. This is in agreement with findings in the United Sates suggested by DiPasquale and Glaeser (1999).

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Table 1 Variable definitions and descriptive statistics

Variables	Definition	Mean	Standard deviation	Max	Min
SC	Percentage of people involved in volunteer activities (%).	30.4	5.58	46.3	17.4
HOME	Percentage of home-ownership (%).	67.4	8.06	84.2	40.8
CCENTER	Number of community centers per capita (per 1000 persons).	0.21	0.17	0.91	0.07
GINI	Gini coefficients	0.28	0.01	0.38	0.25
INCOM	Per capita income (million yen)	2.74	0.48	4.90	1.70
POP	Population (million).	2.64	2.41	12.3	0.61

Table 2 Determinants of investment in social capital

Variables	(1) OLS	(2) Fixed Effects
HOME	0.02	1.20***
	(0.16)	(3.43)
CCENTER	0.01	0.002
	(1.28)	(0.05)
GINI	-0.38**	-0.34**
	(-2.38)	(-2.21)
INCOM	0.32***	0.43***
	(4.70)	(6.76)
POP	-0.14***	0.17
	(-7.02)	(1.23)
Adj R- square	0.41	0.23
Observations	235	235

Notes: Numbers are elasticities. Numbers in parentheses are t-statistics. Superscript asterisks *, **, and ** indicate significance at 10, 5 and 1 percent levels, respectively. To save space, a constant term is included when an estimation was conducted but its result is not reported.

Table 3 Determinants of investment in social capital (Dynamic Panel model)

Variables	(1)	(2)	(3)	(4)
SC_1	-0.54***	-0.20***	-0.12**	-0.09**
(Lagged dependent variable)	(-5.79)	(-2.92)	(-2.26)	(-2.34)
HOME	0.93*	0.86*	1.12***	1.74***
	(1.89)	(1.85)	(2.73)	(5.03)
CCENTER	0.10	-0.07	-0.14*	-0.04
	(1.04)	(-0.92)	(-1.77)	(-0.63)
GINI	-0.68***	-1.66***	-1.65***	-1.18***
	(-5.74)	(-7.92)	(-7.88)	(-8.79)
INCOM	0.14	-0.07	-0.18	-0.16
	(0.89)	(-0.58)	(-1.62)	(-2.07)
POP	0.34***	0.45***	0.40***	0.17
	(3.18)	(3.10)	(3.22)	(1.61)
Serial correlation				
First order (P value)	0.88	0.00	0.00	0.00
Second order (P value)	0.35	0.83	0.83	0.64
Sargan test				
(P value)	0.00	0.06	0.13	0.13
Endogenous variables		HOME	HOME	HOME
		CCENTER	CCENTER	CCENTER
		GINI	GINI	GINI
			INCOM	INCOM
				POP
Wald Chi-square	234	442	520	422
Groups	47	47	47	47
Observations	141	141	141	141

Notes: Values and notations have the same significance as given in Notes to Table 2.

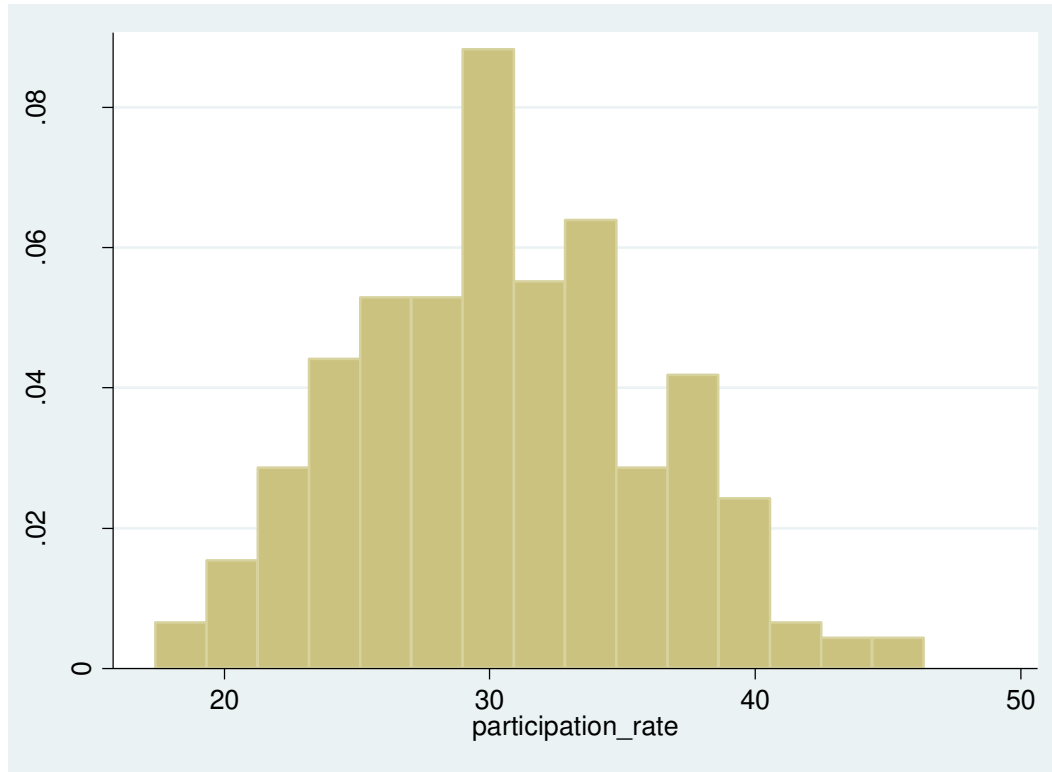Figure 1 Distribution of percentage of participation in volunteer activities

Figure 2 Relationship between home-ownership rate and percentages of participation in volunteer activities