Household Income and the OECD's Four Types of Social Capital

YODO Masato
Kyoto University

YANO Makoto
RIETI

Household Income and the OECD's Four Types of Social Capital[*]

YODO Masato[†]

Kyoto University

YANO Makoto[‡]

Research Institute of Economy, Trade and Industry / Kyoto University

Abstract

Social capital, possessed by each individual, acts like glue that keeps a society from disintegrating. In an old society in which external social bonds play an important role, ample incentives should exist for an individual to acquire social capital. In a modern economy, in which such social bonds play a minimal role, it is important to see if social capital translates into personal benefits. In order to capture such incentives, this study adopts the instrumental variable method and shows the two-way relationship in which social capital contributes to income at the same time that income contributes to social capital.

1. Introduction

Social capital is thought of as something like glue that keeps a society from disintegrating; it represents an individual's relationships with other individuals, which serve as a basis for various social networks to form.   Like human capital, on the one hand, social capital is perceived as something embodied in an individual.   Unlike human capital, on the other hand, its role has been thought of as more towards creating external economies to a society (Putnam (1993, 2000)).   This prompts an important question: What is an economic incentive for an individual to acquire social capital?   An old society in which external social bonds play an important role may offer ample incentives for an individual to acquire social capital; in such a society, the ability to create external economies to a society might be a key for an individual to live well in the society.   In a modern market economy, in which such external bonds play a much smaller role, the formation of social capital might be hampered unless an individual can benefit from his/her own social capital, which he/she can intentionally influence.

With these considerations, the present study addresses whether or not one's social capital leads to his/her personal benefits. [1]   At the same time, it examines what contributes to the formation of social capital.   At the same time, we investigate if social capital creates externalities in the smallest unit of society, namely, at a family level.

These questions cannot be resolved by checking a mere correlation between income and social capital.   In order to show the existence of an economic incentive to have social capital, it is necessary to establish a causality or, more specifically, that social capital contributes personal benefits. At the same time, it is important to see what contributes to the formation of social capital.   Towards this end, we take the instrumental variable (IV) approach separately to capture two-way interactions between social capital and income.   By doing so, this study provides evidence supporting that social capital contributes to income and investigate the factors, including income, that may contribute to the formation of social capital.

In order to deal with the primarily microeconomic issues above, a well-designed microdata is indispensable that renders estimations free from the associated endogeneity problem.   In order to address these questions, we adopt the social capital survey conducted in 2010 and 2013 by Yoji Inaba of Nihon University (*Inaba Survey*).   Because the *survey* is designed to capture the relationship between social capital and health (see Inaba, Wada, Ichida, and Nishikawa (2015)), it includes

---

[1] In the macroeconomic literature, ample evidence has been provided that shows that social capital contributes to income.   See Knack and Keefer (1997), Whiteley (2000), Zack and Knack (2001), and Algan and Cahuc (2010) for studies on macroeconomic impacts at national levels.   For studies at regional levels, Helliwell and Putnam (1995), Beugelsdijk and Smulders (2003), Beugelsdijk and Van Schaik (2005), Akcomak and Ter Weel (2009), and Dincer and Uslaner (2010).

questions on several potential instrumental variables as well as rather diverse questions on social capital.   Perhaps because social capital is a highly diverse concept, many existing studies focus on particular aspects.   We follow this approach by adopting the recent OECD's classification of social capital into the four types.   They are as follows:

      (i)   Personal Relationships;

      (ii)   Social Network Support;

      (iii)   Civic Engagement; and

      (iv)   Trust and Cooperative Norms.

In order to measure each type of social capital, this study picks thirteen questions from *the Inaba Survey* and classifies them into the four groups.   By conducting the principal component analysis for each group of questions, we obtain an index for each type of social capital.

The present study estimates income as a function of one of the four types of social capital and a set of exogenous variables (income generation function) and each type of social capital as a function of income and the exogenous variables (social capital formation function).   Our estimation results show that every type of social capital contributes to income at the same time that income contributes to the formation of every type of social capital.   In our estimation, we adopt various control variables, including education, occupation, sex, age, marital status, home ownership, and living environments.   These exogenous variables contribute to the four types of social capital and income in different manners.   In estimating either an income generation function or a social capital formation function, it is important to select a good instrumental variable to deal with the endogeneity problem between income and social capital.

In choosing an instrumental variable for income in the estimation of a social capital formation function, we assume that one's social capital is formed through his/her life experiences in the past and independent of his/her future economic state.   This reflects a distinct feature of social capital at least at this moment.   In the modern economics, normally, the value of capital is regarded as the sum of the present values that will be born to capital throughout the future time horizon; the current amount of capital is, therefore, thought of as a reflection of expectations on future economic states.   Social capital is different; at the moment, at which whether or not one's social capital translates into his/her own personal benefits has scarcely been treated in the economic literature, it is unlikely that the formation of social capital is guided by one's expectations on his/her own future economic state.

With this consideration, we adopt as an instrumental variable for income the level of issues and worries about one's future, which is asked in *the Inaba Survey*.   Our estimation results show that household income contributes to the four types of social capital, personal relationships, social network support, civic engagement, and trust and cooperative norms.   Among the exogenous variables, higher education contributes significantly to the formation of all types of social capital.

In choosing an instrumental variable for social capital in the estimation of an income generation function, we focus on the fact that in a modern market economy, the relationship by "blood" and "marriage" plays a much smaller social role than in an old society.   In an old society, it is not hard to imagine that external social bonds by "blood" and "marriage" played an important role.   In such a society, having reliable relatives would help to make more money because they would provide more business opportunities.   Even today, this might be the case if one lives in a rural area.   This is, however, unlikely for those living an urban area, where the modern market economy prevails.   In the modern Japanese society, in general, people sternly reject the use of such a connection.   In that case, it is likely that having powerful (or reliable) relatives is of little use for increasing one's income.   It is true that if one has a rich relative, he/she may receive a lucrative gift every now and then.   However, such a gift is unlikely to be perceived as a part of household income.   Besides, individuals who are lucky to have such relatives should be very rare.   For all these reasons, we may think that having reliable relatives is exogenous in the determination of household income.

With these considerations, we adopt as an instrumental variable for estimating income the level at which one finds his/her relatives to be reliable in dealing with daily issues and worries.   Our estimation results show that all the four types of social capital, personal relationships, social network support, civic engagement, and trust and cooperative norms, contribute positively to income.   In order to test the robustness of our results with respect to the influence of a market economy, we limit samples to those who live in an urban area.   Much the same results hold for the samples limited to those who live in urban areas with population at least as large as 200 thousand.

It is important to note that the variable for income in our estimation represents family income (household income) rather than individual income.   This is mainly because *the Inaba Survey* does not ask about a respondent's personal income but his/her family income.   There is however a more economic reason, which is to capture the external economies of social capital on a family, the smallest unit of society.   Instead of personal income, *the Inaba Survey* asks if the respondent is the main income earner of a family.   Our estimation results show that the social capital held by a non-main income earner of a household, such as a husband/wife and a student without income, contributes positively to family income.   This confirms that a non-main income earner's social capital creates external economies on the earning capacity of the main income earner.   (An alternative explanation of this result may be that a non-main income earner with larger social capital tends to find a spouse with a larger earning capacity.   This explanation is less likely true because the Wu-Hausman statistics show that the OLS estimator is unlikely to be exogenous.)   In order to test the robustness of these results with respect to the influence of a market economy, we again limit samples to those who live in an urban area.   Much the same results hold for the samples limited to those who live in urban areas with population almost as large as 100 thousand and for some cases as large as 200 thousand.

If family income is thought of as providing an incentive for family members to work, our

results evidence that there may be strong personal incentives for an individual to foster social capital in all forms.   Social capital creates not only purely personal benefits but also external economies to family members.   Both household income and higher education contribute to the formation of social capital in every form.   High school education, in contrast, contributes to the formation of civic engagement and trust and cooperative norms.   This positive contribution remains even if the endogeneity problem of household income is controlled.   In contrast, higher education negatively contributes to the formation of social capital if household income is controlled.

While the relationship between income and social capital has been observed in many existing studies, this study is new in capturing the two-way contributions of social capital to income and income to social capital separately by controlling the endogeneity problem between income and social capital.   The existing literature, in contrast, has been concerned with only a one-way contributions.   Moreover, very few existing studies using microdata control the endogeneity problem between income and social capital, as is discussed below.

As Putnam (2000, p. 319) points out, a large body of studies have been developed that suggest that "social ties can influence who gets a job, bonus, a promotion, and other employment benefits."[2]   A number of studies adopt microdata to investigate the existence of personal benefits. Those that focus on personal benefit in a developed economy are even fewer; see Narayan and Pritchett (1999) and Lin (2001), which are concerned with developing economies.   Reingold (1999) shows that the effect of social capital on job hunting and other job opportunities differ across race and education in Chicago.   Alesina and Giulano (2010) study the effect on female skills and labor market participation in 39 leading countries.   Zhang, Anderson, and Zhan (2011) focus on the U.S. economy and investigate if a particular type of civic engagement related social capital may contribute to income; Growiec and Growiec (2010) study the relationship among happiness, social capital and income by using Polish data.   Inaba, Wada, Ichida, and Nishikawa (2015) investigates the effect on life satisfaction and health perception of social capital and income.   These studies on microdata do not deal with the endogeneity between income and social capital.   One exception can be found in Growiec and Growiec (2016), who adopt an aspect of civic engagement (interest in politics and participation in education, art, music, and cultural activities) to show that some aspects of social capital in the forms of personal relationships and trust and cooperative norms may contribute to household income.

A number of studies have been concerned with the determinants of social capital.   Of those, Uslaner (2002), Glaeser, Laibson, and Sacerdotet (2002), Alesina and La Ferrara (2002), and Iyer, Kitson, and Toh (2005), Helliwell and Putnam (2007), and Kaasa and Parts (20098) adopt microdata

---

[2] See Burt (1997), Beliveau, O'Reilly, and Wade (1996), and Podolny and Baron (1997) for earlier studies.

to capture the effect of income on the generation of social capital at individual levels.   While these studies do not address the potential endogeneity problem, Christoforou (2011) deals with endogeneity by adopting the ownership of a dishwasher and a second house as instruments for income.

In what follows, we explain our data in Section 2.   We estimate an income generation function in Section 3 and a social capital formation function in Section 4.   In Section 5, we examine the effects of exogenous factors in the determination of social capital and income.   Section 6 is for concluding remarks.

2.   Data

We measure each of the OECD's four types of social capital by means of the principal component analysis.   For this purpose, for each type, we select suitable questions from the *Survey on Peacefulness in Life, Trust and Community Participation* (the title translated into English by the authors) collected in 2010 and 2013 by Yoji Inaba of Nihon University (*Inaba Survey*).   This survey aims to capture the relationship between social capital and subjective health.   According to Inaba (2011), the social capital related questions in the *Inaba Survey* are adopted from two earlier surveys, the *2003 Cabinet Bureau Office Survey* (see Inaba (2011), p. 109).

In the 2010 survey, 4000 residents from 20 years through 79 years old in 50 areas were randomly selected from the Residents Basic Address and sent the questionnaire by mail.   1599 clean responses were received.   In the 2013 survey, 10000 residents from 20 years through 79 years old in 100 hundred areas (100 in each area) were randomly selected from the *Basic Address* and sent the questionnaire, again, by mail; 3575 clean responses were received.

2.1.   The OECD's Four Types of Social Capital

The Inaba Survey asks a number of questions that are concerned with social capital.   In order to use the results in the 2010 survey and the 2013 survey together, we focus on the questions that are asked in both surveys.   Because a large number of respondents (housewives, househusbands, students, and unemployed) do not have a job, we do not include the work related questions so as not to lose samples.   With these considerations, this study focuses on the thirteen questions in measuring the OECD's four types of social capital; see Yodo and Yano (2017) for the specific questions.

Table 1 provides descriptive statistics for the answers to the thirteen social capital related questions, which will be explained below.   The OECD defines social capital related to personal relationships as "people's networks (i.e. the people they know) and the social behaviours that contribute to establishing and maintaining those networks" (see Scrivens and Smith (2013, p. 20)).

In order to measure this type of social capital by using the *Inaba Survey*, we adopted the four questions concerning (i) the extent of interactions with neighbors (Interactions with Neighbors); (ii), the number of neighbors with interactions (Interacting Neighbors); (iii) the extent of interactions with friends and acquaintance with interactions (Interacting Friends); (iv) the extent of interactions with relatives (Interacting Relatives).

The OECD defines social capital related to social network support as "the resources – emotional, material, practical, financial, intellectual or professional - that are available to each individual through their personal social networks" (see Scrivens and Smith (2013, p. 20)). The *Inaba Survey* contains three questions related to this type of social capital: Those questions ask about how, in consulting issues and worries in daily life, reliable and dependable the respondent find the following three types of people to be: (1) Neighbors (Reliability Neighbors), (2) relatives (Reliability Relatives), and (3) friends and acquaintance (Reliability Friends) to be in consulting with issues and worries in daily life?

The OECD defines social capital relating to civic engagement as "the activities through which people contribute to civic and community life, such as volunteering, political participation, group membership and different forms of community action" (see Scrivens and Smith (2013, p. 20). In order to measure this type of social capital, we adopt the questions asking (i) participation in local community activities (Local Community)), (ii) participation in volunteer, NPO, and civic activities (Volunteer), (iii) participation in sports, hobby, and pastime activities (Sports), and (iv) donation (Donation).

The OECD defines social capital relating to trust and cooperative norms as "the trust, social norms and shared values that underpin societal functioning and enable mutually beneficial cooperation" (see Scrivens and Smith (2013, p. 20)). In order to measure this type of social capital, we adopt the questions asking (i) if a respondent thinks that people can trust others in general (General Trust) and (ii) if he/she thinks that those whom he/she meets while travelling and at an unfamiliar place (Trust on Unfamiliar People)).

2.2. Measurements by the Principal Component Analysis

For each type of social capital, we conduct the principal component analysis by using the respondents' answers to the questions explained above. The results are summarized in Table 2. For each type, only the first principal component has a characteristic root larger than 1 and a proportion greater than 0.5 except for civic engagement. Moreover, the component loadings of all questions on each principal component are larger than 0.4. These results show that the four type of Japanese social capital under the OECD classification are all well presented by the first principal components. In the empirical study below, we adopt the first principal components as indices for the four types of social capital. Table 3 provides summary statistics for these four social capital indices along with those for

other variables.

Our principal component study empirically supports that the OECD classification of social capital as well as the sample questions that the OECD proposes to capture each type of social capital is of practical use. In what follows, we show the use of social capital indices under the OECD classification for an empirical analysis.

2.3. Control Variables

In addition to social capital related questions, *the Inaba Survey* asks a number of questions on the basic characteristics of respondents. Of those, history of education is important as an explanatory variable; it is treated as a proxy for human capital in this study. Household income is used as both a dependent variable, in estimating income, and a control variable, in estimating the amount of social capital.

In addition, *the Survey* provides a number of control variables. Table 3 summarizes those variables as well as summary statistics. It include sex (Male=0, Female=1), age (20th, 30th, 40th, 50th, 60th, and 70th), marital status (unmarried=0, married=1), occupation (Self-employed, which includes assisting a self-employed person(s), private employees, which included those employed by private firms and organizations, Executives, which included directors in a private company or a private organization, Public employees, which include teachers, Students, which include those who are not on any job, and Household jobs, which include housewives/husbands, a part-time/temporary employee, or others), home ownership (owning=1, other=0), and duration of living in the area residence at the current place. We also include characteristics of the area in which the respondent lives. They are the level of urbanization, the fraction of elderly people, average income, and income distribution (Jini coefficient).

3. Income Generating Function and Social and Human Capital

Individuals would have little incentive to form social capital within themselves unless social capital translates into personal benefits. From the economic viewpoint, therefore, it is important to check whether or not social capital leads to personal benefits. With this consideration, we investigate the contribution of each type of social capital to family income.

As is noted in the Introduction, a major economic contribution of social capital embodied in an individual is perceived as creating of positive externalities to a society. If such externalities are present, they can be captured by family income; a family is the smallest unit of a society. Those externalities may emerge from two channels. The first is the direct channel effect through which the social capital held by a family member may increase other family members' ability to earn income.

The second is the indirect channel through which a family member's social capital increases to another family member's social capital. By focusing on family income, as is shown below, we may check the existence of such externalities.

In order to check if social capital and human capital contribute to income, we adopt the four indices of social capital in the previous section. Human capital is measured by means of education level. In order to investigate whether or not social capital contributes to family income, it is important to deal with the endogeneity problem that may exist between income and social capital. For this purpose, we adopt the IV approach, estimating the following income generation function,

$$y_i = \alpha + \beta_i \overline{[SCN]}_i + \gamma \mathbf{x}_i \tag{1}$$

where y_i is individual i's household income, $\mathbf{x_i}$ is a vector of exogenous control variables, and $\overline{[SCN]}_i$ is the vector of theoretical values of different types of social capital estimated by the first stage IV estimation with an instrument z_i,

$$[SCN]_i = \sigma + \mathbf{\mu z_i} + \mathbf{\delta x}_i \ . \tag{2}$$

In *the Inaba Survey*, perhaps, the best candidate for an instrumental variable for social capital is given by the question asking how reliable and dependable the respondent find his/her own relatives to be in consulting issues and worries in daily life. In the determination of one's household income, the answer to this question is very likely to be exogenous, in particular, for those who live in a modern market economy. In an old society, it is not hard to imagine that external social bonds might have played an important role. In such a society, having reliable relatives might help to make more money because they may provide more business opportunities. Even today, this might be the case if one lives in a rural area. This is, however, unlikely in a modern market economy, in which such external bonds play a much smaller role. In the modern Japanese society, in particular, people sternly reject the use of such a connection. In that case, it is unlikely that having powerful (or reliable) relatives is of little use for increasing one's income. It is true that if one has a rich relative, he/she may receive a lucrative gift every now and then. However, such a gift is unlikely to be perceived as a part of household income. Besides, individuals who are lucky to have such relatives should be very rare. For all these reasons, we may think that having reliable relatives is exogenous in the determination of household income.

The reliability of relatives in dealing with daily issues and worries is included, along with those of friends and colleagues at workplace, in the principal component analysis measuring social network support, which does not present any problem in our estimation. In this principal component analysis, we assume that social network support reflects both exogenous and endogenous factors.

While, as is discussed above, the reliability of relatives in dealing with daily issues and worries is an exogenous factor, those of friends and colleagues at workplace may be determined simultaneously with household income.

3.1. Income Generating Function

Table 4 reports IV estimation results for the income generating function.   The results suggest that all four types of social capital contribute to family income.   The correlations between the instrumental variable and each of the four social capital indices are sufficiently high.   The first stage F statistics suggest that the instrumental variable is not weak; the F statistics are much larger than 16.38, which is the Stock and Yogo threshold for the tolerable bias level set at 10 percent.   The Wu-Hausman tests reject that the OLS estimator on each of the social capital indices is consistent; the p-values are all below 1 percent.

Remark 1: *Growiec and Growiec (2016) adopt as an instrumental variable an index reflecting one's interest in politics and participation in educational, art, music and cultural organizations, which the OECD classifies into civic engagement.   This study chooses not to follow their approach because we fear that each of the three questions in the Inaba Survey that are concerned with civic engagement might be closely correlated with household income.   Our estimation results in Table 4 supports this fear.*

Our results show that education (human capital) is an important factor to income.   High school education contributes to income significantly if social capital in the form of either personal relationships or social network support is included in the estimation.   The contribution is not significant if either civic environment and trust and cooperative norms are included as social capital. The higher education, the larger its contribution to income.

As is discussed above, having powerful, therefore reliable, relatives should not influence one's household income if he/she lives in an urban area, in which market forces prevail.   If, however, one lives in a rural area, even in a Japanese society, having powerful relatives might still translate into income.   In that case, the extent to which one finds his/her relative to be reliable does not serve as a good instrumental variable.

With these considerations, we keep the correlation between income and the instrumental variable as minimal as possible by limiting our samples to those who live in urban areas, in which case the reliability of relatives should serve as a better instrument.   Table 5 summarizes the estimation results that are obtained by using the samples who live in cities with population larger than 50 thousand, 100 thousand, 200 thousand and 500 thousand.   In this table, we report only partial results concerning

social capital. As the table shows, the estimation results do not change for social capital in the forms of personal relationships, social network support, and trust and cooperative norms if the samples are limited to those who live in cities with population larger than even 500 hundred thousand. Civic engagement appears positively to contribute to income for the samples living in cities with population larger than 100 thousand. For the samples living in cities with population larger than 200 thousand, our result is almost robust; the first stage F statistics falls to 16.148 just below Stock and Yogo's 16.38. This is most likely because the correlation between the index for civic engagement and the instrumental variable (the reliability of relatives) becomes too weak due to too small a sample size. These results show that even for people who live in a modern market economy, every type of social capital is likely contribute to income.

Table 4 captures the effects of exogenous variables for a given level of each type of social capital; because we adopt a common instrument for all the types of social capital, the joint effects of different types of social capital cannot be captured. Most of the control variables (except age) have much the same effects on income no matter which type of social capital is controlled.

Exogenous variable $\mathbf{x_i}$ contains education level, which may be thought of as a proxy for human capital. With this interpretation, Table 4 shows that household income may be thought of a function of human capital and social capital. It suggests that human capital acquired through higher education (after high school, non-vocational school education) positively contributes household income. Relative to middle school education (mandatory), high school education significantly contributes to household income only if personal relationships or social network support is controlled.

Relative to private company workers, people on all the other types of occupation earn less household income except for private company executives. The higher the average income of the area in which a person lives, the higher household income. Being female, married and owning home contribute to household income positively. The regions in which a person lives does not affect household income much except for certain regions (Hokkaido, Kinki, and Kyushu-Okinawa are negative factors relative to the greater Tokyo region (Kanto). No matter which type of social capital is controlled, being old (60s and 70s) is a negative factor to household income relative to being in 40s. In contrast, the effect of being in 20s and that in 50s depend on the type of social capital controlled.

The above results are summarized as follows:

Summary 1: *Not only human capital but also social capital in every type of the OECD's classification is likely positively to contribute to household income even in an economy in which market forces may prevail.*

3.2. External Effects of Social Capital

As is noted above, the household income function estimated above may reflect the external economies that a family member's personal social capital creates on other family members' earning. In order to capture those effects more precisely, we limit our samples to those who are not the main income earner of a family (non-primary income earner); *the Inaba Survey* asks if the respondent is the primary income earner of a family.

Table 6 summarizes the estimation results that are obtained by using the same instrumental variable as above. The correlations between the instrumental variable and each of the three social capital indices are sufficiently high. The first stage F statistics suggest that the instrumental variable is not weak; the F statistics are much larger than Stock and Yogo's 16.38. The Wu-Hausman tests reject that the OLS estimator on each of the social capital indices is consistent; the p-values are all below 0.5 percent.

These results suggest that the larger social capital that a non-primary income earner holds, the larger his/her household income. One might attribute this result to the non-primary income earner's ability to get associated with a primary income earner (or to be able to find a spouse) who has a higher ability to make money. This is unlikely the case because, if so, the non-primary income earner's social capital is set prior to a marriage. In that case, his/her social capital is exogenous to the current income, in which case the OLS estimators are unbiased. This does not agree with the Wu-Hausman test results, which rejects the OLS estimators are unbiased. All these considerations suggest that the OECD's four types of social capital create external economies within a family in making money.

In order to keep minimal the possibility that income and the instrumental variable are correlated, we again limit our samples to those who live in urban areas. Table 7 summarizes the estimation results that are obtained by using the samples who live in cities with population larger than 50 thousand, 100 thousand, 200 thousand and 500 thousand. In this table, we report only partial results concerning social and human capital. As the table shows, the estimation results do not change if the samples are limited to those who live in cities with population larger than 50 thousand, 100 thousand, and 200 hundred thousand. If the samples are limited to population larger than 500 thousand, the first stage F statistics fall clearly below Stock and Yogo's 16.38 for civic engagement and trust and cooperative norms.

This may be summarized as follows:

Summary 3: *A non-primary income earner's social capital in every form is likely to create external economies on household income even in an economy in which market forces are likely to prevail.*

3.3. Personal Benefits from Social Capital in a Market Economy

As is discussed in the Introduction, it is an important question whether or not the formation of social capital translates into personal benefits in the market economy in which social bonds play a much smaller direct role than in rural or old societies. In order to address this question, we next limit the samples to those who are primary income earners in a household. If the social capital held by the primary income earner of a family is positively correlated to household income, of course, it is possible that his/her social capital is increasing the income of non-primary income earners in the household. However, a positive correlation between the primary income earner's social capital and his/her household income suggests more clearly the existence of personal benefits of social capital than that between the non-primary income earner's social capital and his/her household, which is focused in the previous subsection.

Table 8 summarizes the estimation results with the samples consisting only of primary income earners and the same instrumental variable as above. The correlations between the instrumental variable and social capital in the form of each of personal relationships, social network support, and trust and cooperative norms are sufficiently high. The first stage F statistics for those types of social capital exceed Stock and Yogo's 16.38; in contrast, that for social capital in the form of civic engagement is 10.046. The Wu-Hausman tests reject that the OLS estimators on social capital in the form of personal relationships and trust and cooperative norms are consistent; the p-values are all below 1 percent. It does not reject that the OLS estimator on social capital in the form of social network support is consistent.

As in the previous subsections, we limit our samples to those who live in urban areas in order to keep minimal the possibility that income and the instrumental variable are correlated. Table 9 summarizes the estimation results with the samples limited to those who live in cities with population larger than 50 thousand, 100 thousand, 200 thousand and 500 thousand.

These results show that the estimation results are not as robust as in the cases above. For social capital in the form of personal relationships, the first stage F statistics exceed Stock and Yogo's cut-off value up to the samples living in cities with population more than 200 thousand while it falls to 15.5 for 500 thousand. The Wu-Hausman test rejects that, for all cases, the OLS estimates are consistent. The coefficients on personal relationship are significant for all cases.

In contrast, for social network support, although the first stage F statistics exceeds the cut-off for all limited sample sets, the Wu-Hausman test does not reject that the OLS estimators are consistent. The coefficients on social network support are significant for all cases.

For trust and cooperative norms, the first stage F statistics suggest that the instrument is not weak for the samples limited to those living in cities with population larger than 50 thousand. The Wu-Hausman test reject that the OLS estimator is consistent. The coefficient on trust and cooperative norms is significant. For larger population sizes, the first stage F statistics shows that the instrument is too weak. For civic engagement as well, the instrument is too weak.

12

These results can be summarized as follows:

Summary 4: *The social capital in the forms of personal relationships and social network support that the primary income earner of a family holds is likely to create personal benefits in the form of household income even in an economy in which market forces are likely to prevail. The social capital in the form of trust and cooperative norms that the primary income earner of a family holds may create personal benefits in the form of household income even if rural areas (with population smaller than 50 thousand) are excluded.*

4. Social Capital Formation Function

In the previous section, we have established evidence supporting that social capital translates into personal benefits. If so, the next question should be what might contribute to the formation of social capital. As is noted in the Introduction, various factors are investigated in the existing literature. The standard factors are: Sex, age, marital status, occupation, education, home ownership, and income. Because, however, each type of social capital is likely to contribute to income, in estimating the following social capital formation function,

$$[SCN]_i = \alpha + \boldsymbol{\beta}\mathbf{x}_i + \gamma\bar{y}_i \qquad (3)$$

it is necessary to deal with the endogeneity problem between social capital and income by using the IV estimation; $\bar{y}_i$ is the estimated value for y_i in the first stage IV estimation of

$$y_i = \sigma + \boldsymbol{\mu}_i\mathbf{z}_i + \boldsymbol{\delta}\mathbf{x}_i \quad . \qquad (4)$$

The Inaba Survey asks to rate the respondent the issues and worries on various aspects of one's daily life. Of those questions, we adopt the level of issues and worries on the respondent's own future ("level of worries on future") as an instrumental variable for household income. This reflects our view that one's social capital is formed through his/her entire life experiences, which may be a distinct feature of social capital at least at this moment. In the modern economics, normally, the value of capital is regarded as the sum of the present values that will be born to capital throughout the future time horizon; the current amount of capital is, therefore, a reflection of expectations on future economic states. Social capital is different; at the moment, at which whether or not one's social capital translates into his/her own personal benefits has scarcely been treated in the economic literature, it is unlikely that the formation of social capital is guided by one's expectations on his/her own future economic state. This prompts our choice of an instrumental variable.

13

With these considerations, we first conduct an IV estimation by using the "level of worries about one's own future."   As the table shows, the correlation between income and "level of worries about own future" is sufficiently strong.   The first stage F statistics are all greater than 50; the p-values by the Wu-Hausman test are all 0 percent.   The coefficients on household income are all significant.

The IV results show that all the coefficients on household income are significant at the 1 percent level.   This suggests that household income contributes to the formation of each type of social capital.

Table 10 shows that the effects of education (except vocational school) on the formation of each of the four types of social capital are significant except that two-year college education appears to be unrelated to the formation of either civic engagement or trust and cooperative norms.   If household income is held constant, high school education, relative to middle school, positively contributes to the formation of civic engagement and trust and cooperative norms.   In contrast, the contributions of higher education (two-year college, four-year college, and graduate education) are negative, if significant.

It is too hasty to interpret this result as showing that higher education does not contribute to the formation of social capital; the coefficients are for the case in which household income is held constant.   Since education is included in the first stage IV estimation, it might be that higher education contributes to household income so much that the resulting positive effect on social capital may exceed the actual contribution of higher education to social capital.

In order to evaluate this indirect effect, Table 11 summarizes the OLS estimation results with only the exogenous variables in equations (1) and (3).

With these considerations, Table 11 shows the net effects of different levels of education, which are obtained by the first stage and the second stage estimations combined.   As this table shows, four-year college education makes positive net contributions to all types of social capital. In contrast, either graduate school education relative to that of high school or high school education relative to that of middle school, may negatively contribute to personal relationships and social network support whereas it positively contributes to civic engagement and trust and cooperative norms.

The OECD puts the four types of social capital into two groups: Individual social capita (consisting of personal relationships and social network support) and collective social capital (consisting of the rest).   Our results suggest that people acquire collective social capital at the every stage of education whereas they acquire individual social capital through mandatory education and four-year college education periods.

Summary 5: *People tend to acquire every form of social capital through college education*

14

whereas they acquire only collective social capital at the cost of individual social capital through high school and graduate school education. The impact of higher education appears only indirectly through its contribution to household income.

5. Determinants of Social Capital and Income

What might appear odd in our IV estimation results is that the effects of higher education (above high school) are negative in many cases. For example, the coefficients on four-year college education are all negative and significant in the case in which the level of worries about unemployment is chosen as an instrumental variable. This, however, does not imply that higher education negatively contributes to the formation of social capital (in all types). Rather, it shows that higher education positively affects income, which increases each type of social capital. This indirect effect is larger than the overall effect of higher education on social capital. The negative coefficients on higher education capture the adjustments needed to correct the overshooting indirect effects of higher education on through income.

In order to double check the overshooting indirect effect, Table 11 reports the OLS estimation results with all the exogenous variables of the system. As this table shows, the coefficients on four-year college education are positive all types of social capital. The coefficients on graduate education and two-year college education are positive for civic engagement and trust and cooperative norms. The coefficients on middle school education are negative, which implies that high school education positively contributes to civic engagement and trust and cooperative norms.

6. Concluding Remarks

This study has investigated whereabouts of incentives for building social capital at a personal level. For this purpose, we have established evidence supporting that social capital contributes to household income and creates external economies within a family, enlarging household income.

Unless an individual can intentionally increase social capital by personal efforts, he/she cannot be incentivized even if social capital contributes to income. Our finding is that income and education at every level may positively contribute to social capital in every form. If, however, income is held constant, higher education may negatively contribute to social capital in every form although high school education may make a positive contribution to the formation of civic engagement and trust and cooperative norms. This implies that higher education is likely to contribute to the formation of social capital only via its contribution to income.

Our results suggest that high school education is a key to enhance what may be called

15

collective social capital under the OECD classification, which includes civic engagement and trust and cooperative norms (see Scrivens and Smith (2013)). College education as well significantly contributes to the formation of collective social capital. It is, however, only an indirect effect that increases income, which in turn increases collective social capital. This suggests that Japanese college education might function as more of a signaling device, whereas high school education contributes to the development of more fundamental human ability. Further research is needed to make a more conclusive observation on this point.

References

Alesina, A., & Giuliano, P. (2010). "The power of family." *Journal of Economic Growth* 15(2), 93–125.

Alesina, A., and La Ferrara, E. (2002). "Who Trusts Others?" *Journal of Public Economics* 85(2), 207-234.

Algan, Yann and Pierre Cahuc (2010). "Inherited trust and growth." *American Economic Review* 100(5), 2060–2092.

Akçomak, I.S., Ter Weel, B., 2009. "Social capital, innovation and growth: evidence from Europe." *European Economic Review* (5), 544–567.

Belliveau, M. A., O'Reilly, C. A., & Wade, J. B. (1996). "Social capital at the top: Effects of social similarity and status on CEO compensation." *Academy of Management Journal* 39(6), 1568-1593.

Beugelsdijk, S., & Smulders, S. (2003). "Bonding and bridging social capital: Which type is good for economic growth?" In W. Arts, L. Halman, & J. Hagenaars (Eds.), *The cultural diversity of European unity* (pp. 147–184). Leiden: Brill.

Beugelsdijk, S., & Van Schaik, T. (2005). "Social capital and growth in European regions: an empirical test." *European Journal of Political Economy* 21(2), 301-324.

Burt, R. S. (1997). "The contingent value of social capital." *Administrative Science Quarterly*, 339-365.

Christoforou A. (2011). "Social Capital across European Countries: Individual and Aggregate Determinants of Group Membership." *American Journal of Economics and Sociology* 70(3), 699-728.

Dincer, O. C., and Uslaner, E. M. (2010). "Trust and Growth." *Public Choice*, 142(1-2), 59-67.

DiPasquale, D and Glaeser, E. L. (1999). "Incentives and Social Capital: Are Homeowners Better Citizens?" *Journal of Urban Economics* 45(2), 354-384.

Glaeser, E. L., Laibson, D., and Sacerdote, B. (2002). "An Economic Approach to Social Capital". *The Economic Journal* 112(483), F437-F458.

Growiec, J., & Growiec, K. (2010). "Social capital, well-being, and earnings: Theory and evidence from Poland." *European Societies* 12(2), 231–255.

Growiec, K., & Growiec, J. (2016). "Bridging Social Capital and Individual Earnings: Evidence for an Inverted U." *Social Indicators Research* 127(2), 601-631."

Helliwell, J. F., and Putnam, R. D. (1995). "Economic growth and social capital in Italy." *Eastern Economic Journal* 21(3), 295-307.

Helliwell, J. F., and Putnam, R. D. (2007). "Education and Social Capital". *Eastern Economic Journal* 33(1), 1-19.

Inaba, Y. (2009). "Social capital and health in Japan: What has been confirmed and what has not. A commentary on Ichida and on Fujisawa." *Social Science & Medicine* 69(4), 506-508.

Inaba, Y. (2011). "A Summary of the 2010 Social Capital Survey". *SEIKEI KENKYU (Studies in Political Science and Economics)*, 48(1), 107-130 (in Japanese).

Inaba, Y., Y. Wada, Y. Ichida, and M. Nishikawa (2015). "Which part of community social capital is related to life satisfaction and self-rated health? A multilevel analysis on a nationwide mail surve in Japan," *Social Science and Medicine* 142, 169-182.

Iyer, S., Kitson, M., and Toh, B. (2005). "Social Capital, Economic Growth and Regional Development". *Regional Studies* 39(8), 1015-1040.

Kaasa, A., and Parts, E. (2008). "Individual-level Determinants of Social Capital in Europe Differences between Country Groups." *Acta Sociologica*, 51(2), 145-168.

Knack, S. and Keefer, P. (1997). "Does social capital have an economic payoff? Across-country investigation." *Quarterly Journal of Economics* 112(4), 1251–1288.

Lin, N. (2001). *Social capital: A theory of social structure and action.* Cambridge university press.

Narayan, D., & Pritchett, L. (1999). "Cents and sociability: Household income and social capital in rural Tanzania." *Economic Development and Cultural Change* 47, 871-897.

Podolny, J. M., & Baron, J. N. (1997). "Resources and relationships: Social networks and mobility in the workplace." *American Sociological Review* 673-693.

Putnam, R. D. (1993). *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, N.J: Princeton University Press.

Putnam, R. D. (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York, N.Y.: Simon and Schuster.

Reingold, D. A. (1999). "Social networks and the employment problem of the urban poor." *Urban Studies* 36, 1907-1932.

Scrivens, K. and C. Smith (2013). "Four Interpretations of Social Capital: An Agenda for Measurement," *OECD Statistics Working Papers*, 2013/06, OECD Publishing.

Uslaner, E. M. (2002). *The Moral Foundations of Trust*. Cambridge University Press.

Whiteley, P. F. (2000). "Economic growth and social capital." *Political Studies* 48(3), 443-466.

Yodo, M., and M. Yano (2017). "Social capital: Uniformity and heteogeneity," mimeo.

Zak, Paul J. and S. Knack (2001). "Trust and growth." *Economic Journal* 111(470), 295–321.

Zhang, S., Anderson, S. G., & Zhan, M. (2011). "The differentiated impact of bridging and bonding social capital on economic well-being: An individual level perspective." *Journal of Sociology and Social Welfare* 38, 119.

Table 1: Social Capital Related Questions

	Observations	Mean	SD	Min	Max
Personal relationships					
Extent of interactions with neighbors	5,132	2.743	0.769	1	4
Number of neighbors with interaction	5,126	2.663	0.765	1	4
Extent of interactions with friends and aquaintance	5,130	3.480	0.939	1	5
Extent of interactions with relatives	5,129	3.266	0.896	1	5
Socian network support					
Dependability of neighbors	4,992	2.963	1.067	1	5
Dependability of friends	5,010	3.639	0.993	1	5
Dependability of relaives	5,014	3.558	1.104	1	5
Civi engagement					
Participation in local community activities	5,174	1.896	1.233	1	7
Participation in sports, hobby, and pastime activities	5,174	2.688	1.991	1	7
Participation in voluneteer, NPO, and civic activities	5,174	1.567	1.166	1	7
Donation	4,974	3.495	1.735	1	8
Trust and cooperative norms					
Trust in others in general	4,958	5.060	2.272	1	9
Trust in others during travelling	4,907	4.532	2.423	1	9

Table 2: Principal Component Analysis

Personal Relationships

	PC1	PC2	PC3	PC4
Eigenvalues	2.123	0.824	0.667	0.386
Proportion	0.531	0.206	0.167	0.097
Cumulative proportion	0.531	0.737	0.904	1.000
Component loadings				
Extent of interactions with neighbors	0.562	−0.377	0.114	−0.727
Number of neighbors with interaction	0.546	−0.434	0.222	0.682
Extent of interactions with friends and aquaintance	0.470	0.294	−0.829	0.080
Extent of interactions with relatives	0.407	0.764	0.501	−0.003

Social Network Support

	PC1	PC2	PC3
Eigenvalues	1.782	0.663	0.555
Proportion	0.594	0.221	0.185
Cumulative proportion	0.594	0.815	1.000
Component loadings			
Dependability of neighbors	0.549	0.836	0.021
Dependability of friends	0.590	−0.405	0.698
Dependability of relaives	0.592	−0.371	−0.716

Civic Engagement

	PC1	PC2	PC3	PC4
Eigenvalues	1.914	0.815	0.733	0.538
Proportion	0.478	0.204	0.183	0.135
Cumulative proportion	0.478	0.682	0.866	1.000
Component loadings				
Participation in local community activities	0.545	−0.061	−0.520	0.655
Participation in sports, hobby, and pastime activities	0.437	0.729	0.515	0.113
Participation in voluneteer, NPO, and civic activities	0.564	0.026	−0.352	−0.747
Donation	0.440	−0.682	0.583	0.034

Trust and Cooperative Norms

	PC1	PC2
Eigenvalues	1.681	0.319
Proportion	0.841	0.159
Cumulative proportion	0.841	1.000
Component loadings		
Trust in others in general	0.707	0.707
Trust in others during travelling	0.707	−0.707

Table 3: Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
Personal relationships	5110	0.000	1.457	−4.736	3.425
Social network support	4954	0.000	1.335	−3.947	2.630
Civic engagement	4974	0.000	1.383	−1.675	6.219
Trust and cooperative norms	4865	0.000	1.297	−2.308	2.526
Household Income	4701	5.420	3.166	1	13
Sex(Female)	5174	0.545	0.498	0	1
Age					
20	5174	0.094	0.292	0	1
30	5174	0.150	0.357	0	1
50	5174	0.177	0.382	0	1
60	5174	0.233	0.423	0	1
70	5174	0.175	0.380	0	1
Marital Status	4770	0.780	0.414	0	1
Occupation					
Self Employed	5061	0.107	0.309	0	1
Executive	5061	0.026	0.159	0	1
Public Employee	5061	0.121	0.326	0	1
Student	5061	0.142	0.349	0	1
Household	5061	0.283	0.451	0	1
Education					
Middle School	5099	0.110	0.312	0	1
Vocational School	5099	0.114	0.317	0	1
Two-Year College	5099	0.110	0.313	0	1
Four-Year College	5099	0.239	0.427	0	1
Grad School	5099	0.023	0.150	0	1
Ownership of Residence	5082	0.790	0.407	0	1
Years Living in the Area					
< 1	5056	0.022	0.148	0	1
1 − 2	5056	0.025	0.157	0	1
2 − 5	5056	0.092	0.289	0	1
10 − 20	5056	0.186	0.389	0	1
≥ 20	5056	0.567	0.496	0	1
Long-term Residents	5172	0.428	0.117	0.223	0.712
Urbanization	5172	0.638	0.342	0.000	1.000
Senior Citizen	5172	0.236	0.047	0.117	0.371
Average Income	5172	1.456	0.344	0.750	2.733
Income Disparity	5172	0.305	0.013	0.274	0.339
City size(population)					
Tokyo city and Major cities	5172	0.258	0.437	0	1
≥ 200,000	5172	0.234	0.423	0	1
50,000 − 100,000	5172	0.173	0.378	0	1
< 50,000	5172	0.179	0.383	0	1
Region dummy					
Hokokaido	5174	0.051	0.220	0	1
Tōhoku	5174	0.078	0.267	0	1
Kōshin'etsu	5174	0.050	0.218	0	1
Hokuriku	5174	0.021	0.144	0	1
Tōkai	5174	0.121	0.326	0	1
Kinki	5174	0.154	0.361	0	1
Chūgoku	5174	0.065	0.246	0	1
Shikoku	5174	0.026	0.158	0	1
Kyushu and Okinawa	5174	0.113	0.317	0	1

Table 4:　Household Income Generation Function

Dependent variable：Household income
Estimation method: IV(instrumental variable＝reliability of relatives)

	(1)		(2)		(3)		(4)	
Personal relationships	0.766	(0.129) ***						
Social network support			0.250	(0.040) ***				
Civic engagement					2.238	(0.510) ***		
Trust and cooperative norms							1.365	(0.267) ***
Sex（Female）	0.138	(0.116)	0.485	(0.095) ***	0.582	(0.137) ***	0.682	(0.117) ***
Age								
20	0.391	(0.195) **	0.266	(0.187)	1.150	(0.325) ***	0.707	(0.232) ***
30	−0.375	(0.151) **	−0.462	(0.144) ***	0.122	(0.240)	−0.228	(0.173)
50	0.405	(0.141) ***	0.504	(0.135) ***	0.139	(0.207)	0.179	(0.169)
60	−1.421	(0.154) ***	−1.064	(0.137) ***	−2.270	(0.336) ***	−1.261	(0.167) ***
70	−1.872	(0.199) ***	−1.353	(0.166) ***	−3.458	(0.552) ***	−1.660	(0.210) ***
Marital Status	0.952	(0.124) ***	1.214	(0.109) ***	0.678	(0.201) ***	1.175	(0.130) ***
Occupation								
Self Employed	−0.860	(0.175) ***	−0.546	(0.152) ***	−1.180	(0.270) ***	−0.583	(0.181) ***
Executive	2.319	(0.275) ***	2.451	(0.263) ***	1.669	(0.423) ***	2.163	(0.309) ***
Public Employee	−1.127	(0.151) ***	−1.048	(0.142) ***	−1.484	(0.232) ***	−1.132	(0.168) ***
Student	−0.932	(0.159) ***	−0.752	(0.147) ***	−0.710	(0.210) ***	−0.660	(0.175) ***
Household	−1.489	(0.137) ***	−1.376	(0.129) ***	−1.712	(0.201) ***	−1.362	(0.153) ***
Education								
Middle School	−0.540	(0.163) ***	−0.515	(0.157) ***	0.355	(0.297)	−0.001	(0.218)
Vocational School	0.221	(0.147)	0.174	(0.140)	0.139	(0.200)	0.056	(0.168)
Two−Year College	0.679	(0.150) ***	0.634	(0.142) ***	0.376	(0.213) *	0.333	(0.179) *
Four−Year College	1.365	(0.116) ***	1.381	(0.111) ***	1.042	(0.179) ***	0.994	(0.149) ***
Grad School	2.244	(0.290) ***	2.291	(0.277) ***	1.764	(0.407) ***	1.628	(0.350) ***
Ownership of Residence	1.218	(0.135) ***	1.535	(0.110) ***	1.072	(0.199) ***	1.383	(0.137) ***
Urbanization	0.577	(0.261) **	0.332	(0.243)	1.007	(0.392) **	0.265	(0.286)
Senior Citizen	−2.086	(1.522)	−1.183	(1.446)	−6.466	(2.404) ***	−0.529	(1.707)
Average Income	0.822	(0.277) ***	0.761	(0.265) ***	0.561	(0.383)	0.986	(0.314) ***
Income Disparity	−5.317	(4.292)	−3.537	(4.085)	−5.016	(5.920)	−3.558	(4.832)
City size(population)								
Tokyo city and Major cities	−0.161	(0.150)	−0.140	(0.143)	−0.170	(0.206)	−0.142	(0.169)
≧ 200,000	−0.076	(0.148)	−0.064	(0.141)	−0.103	(0.202)	−0.211	(0.169)
50,000 − 100,000	−0.309	(0.164) *	−0.219	(0.155)	−0.722	(0.257) ***	−0.216	(0.184)
< 50,000	0.031	(0.184)	0.110	(0.175)	0.031	(0.252)	0.159	(0.207)
Region dummy								
Hokokaido	−0.874	(0.275) ***	−0.911	(0.262) ***	−1.061	(0.379) ***	−0.559	(0.316) *
Tōhoku	−0.221	(0.217)	−0.224	(0.208)	−0.211	(0.297)	−0.089	(0.246)
Kōshin'etsu	0.139	(0.227)	0.120	(0.217)	0.155	(0.310)	−0.189	(0.260)
Hokuriku	−0.371	(0.320)	−0.336	(0.302)	−0.883	(0.451) *	−0.541	(0.366)
Tōkai	−0.216	(0.152)	−0.135	(0.144)	−0.645	(0.237) ***	−0.344	(0.177) *
Kinki	−0.544	(0.165) ***	−0.397	(0.155) **	−0.615	(0.231) ***	−0.345	(0.182) *
Chūgoku	−0.286	(0.210)	−0.269	(0.200)	0.064	(0.294)	−0.462	(0.241) *
Shikoku	−0.044	(0.300)	−0.036	(0.286)	0.396	(0.423)	0.117	(0.337)
Kyushu and Okinawa	−0.614	(0.210) ***	−0.489	(0.199) **	−0.590	(0.288) **	−0.624	(0.236) ***
Constant	5.493	(1.589) ***	4.012	(1.488) ***	7.243	(2.321) ***	3.833	(1.762) **
First−stage partial R²	0.067		0.614		0.008		0.021	
First−stage F statistic	296.909		6552.580		33.998		83.870	
Wu−Hausman F statistic	28.272	(0.000)	7.275	(0.007)	33.982	(0.000)	27.856	(0.000)
N	4162		4163		4074		3998	

Notes: *, **, *** denotes statistical significance at the 10%, 5%, 1%, respectively.
　　　Standard errors are shown in parentheses. The number in the parenthese of Wu−Hausman F statistic is p−value

Table 5:   Household Income by Population Size

Household Income	population larger than 50 thousand			
Personal relationships	0.742 (0.142) ***			
Social network support		0.246 (0.044) ***		
Civic engagement			2.372 (0.612) ***	
Trust and cooperative norms				1.340 (0.300) ***
First-stage partial R2	0.068	0.617	0.008	0.020
First-stage F statistic	247.726	5480.460	25.3891	66.709
Wu-Hausman F statistic	23.284 (0.000)	7.020 (0.008)	27.473 (0.000)	21.116 (0.000)
N	3438	3442	3366	3300

Household Income	population larger than 100 thousand			
Personal relationships	0.750 (0.163) ***			
Social network support		0.249 (0.050) ***		
Civic engagement			2.358 (0.671) ***	
Trust and cooperative norms				1.414 (0.360) ***
First-stage partial R2	0.067	0.610	0.008	0.018
First-stage F statistic	191.644	4186.400	22.119	47.421
Wu-Hausman F statistic	19.495 (0.000)	6.823 (0.009)	21.831 (0.000)	16.222 (0.000)
N	2715	2717	2654	2608

Household Income	population larger than 200 thousand			
Personal relationships	0.910 (0.194) ***			
Social network support		0.303 (0.059) ***		
Civic engagement			2.804 (0.860) ***	
Trust and cooperative norms				1.701 (0.443) ***
First-stage partial R2	0.067	0.598	0.008	0.018
First-stage F statistic	142.719	2979.530	16.148	35.118
Wu-Hausman F statistic	23.247 (0.000)	8.807 (0.003)	23.207 (0.000)	17.729 (0.000)
N	2038	2036	1990	1959

Household Income	population larger than 500 thousand			
Personal relationships	0.819 (0.257) ***			
Social network support		0.279 (0.081) ***		
Civic engagement			3.077 (1.488) **	
Trust and cooperative norms				1.489 (0.575) ***
First-stage partial R2	0.067	0.596	0.006	0.017
First-stage F statistic	74.895	1535.340	5.76534	17.823
Wu-Hausman F statistic	9.881 (0.096)	7.237 (0.007)	10.404 (0.001)	7.610 (0.006)
N	1074	1073	1053	1036

Table 6: Household Income Generation Function for Non-main Income Earners

Dependent variable：Household income
Estimation method: IV(instrumental variable＝reliability of relatives)
Sample: Non-primary income earner

	(1)		(2)		(3)		(4)	
Personal relationships	0.852	(0.175) ***						
Social network support			0.296	(0.058) ***				
Civic engagement					2.306	(0.648) ***		
Trust and cooperative norms							1.527	(0.364) ***
Sex (Female)	0.110	(0.205)	0.409	(0.186) **	0.836	(0.273) ***	0.522	(0.220) **
Age								
20	0.087	(0.261)	−0.067	(0.252)	0.871	(0.412) **	0.459	(0.315)
30	−0.564	(0.208) ***	−0.728	(0.198) ***	−0.036	(0.322)	−0.363	(0.249)
50	0.468	(0.202) **	0.563	(0.193) ***	0.060	(0.294)	0.225	(0.238)
60	−1.375	(0.222) ***	−0.919	(0.198) ***	−2.205	(0.446) ***	−0.975	(0.235) ***
70	−1.456	(0.290) ***	−0.851	(0.249) ***	−2.938	(0.697) ***	−1.122	(0.305) ***
Marital Status	−0.072	(0.223)	0.368	(0.188) *	−0.533	(0.371)	0.386	(0.223) *
Occupation								
Self Employed	−1.148	(0.265) ***	−0.964	(0.246) ***	−1.465	(0.374) ***	−1.007	(0.293) ***
Executive	3.033	(0.858) ***	3.396	(0.815) ***	0.590	(1.387)	3.004	(0.994) ***
Public Employee	−1.465	(0.208) ***	−1.454	(0.199) ***	−1.778	(0.288) ***	−1.426	(0.237) ***
Student	−1.176	(0.209) ***	−1.021	(0.195) ***	−0.707	(0.277) **	−0.908	(0.237) ***
Household	−1.661	(0.196) ***	−1.606	(0.187) ***	−1.791	(0.262) ***	−1.412	(0.231) ***
Education								
Middle School	−0.624	(0.242) ***	−0.704	(0.234) ***	0.355	(0.433)	−0.172	(0.320)
Vocational School	0.468	(0.199) **	0.479	(0.190) **	0.240	(0.273)	0.314	(0.235)
Two-Year College	0.757	(0.188) ***	0.756	(0.180) ***	0.266	(0.283)	0.391	(0.234) *
Four-Year College	1.750	(0.185) ***	1.801	(0.176) ***	1.360	(0.283) ***	1.447	(0.228) ***
Grad School	1.413	(0.551) **	1.500	(0.529) ***	0.432	(0.760)	0.886	(0.639)
Ownership of Residence	0.823	(0.197) ***	1.132	(0.165) ***	0.663	(0.272) **	0.968	(0.206) ***
Urbanization	0.586	(0.375)	0.425	(0.355)	0.713	(0.504)	0.058	(0.428)
Senior Citizen	−1.701	(2.167)	−1.149	(2.075)	−7.896	(3.442) **	−0.464	(2.479)
Average Income	0.670	(0.393) *	0.617	(0.377)	0.298	(0.535)	0.896	(0.450) **
Income Disparity	−2.793	(6.184)	−3.592	(5.930)	−0.823	(8.203)	−2.227	(7.136)
City size(population)								
Tokyo city and Major cities	0.008	(0.215)	−0.045	(0.206)	−0.368	(0.294)	−0.087	(0.245)
≥ 200,000	−0.130	(0.210)	−0.110	(0.202)	−0.486	(0.287) *	−0.269	(0.243)
50,000 − 100,000	−0.380	(0.232)	−0.327	(0.222)	−0.860	(0.341) **	−0.406	(0.267)
< 50,000	0.159	(0.262)	0.252	(0.250)	0.081	(0.346)	0.180	(0.299)
Region dummy								
Hokokaido	−1.187	(0.402) ***	−1.393	(0.384) ***	−1.339	(0.524) **	−1.178	(0.463) **
Tōhoku	−0.378	(0.307)	−0.502	(0.294) *	−0.429	(0.400)	−0.181	(0.357)
Kōshin'etsu	0.009	(0.339)	−0.107	(0.323)	−0.323	(0.452)	−0.435	(0.392)
Hokuriku	−0.263	(0.464)	−0.559	(0.435)	−1.235	(0.640) *	−1.067	(0.548) *
Tōkai	−0.193	(0.217)	−0.051	(0.204)	−0.757	(0.351) **	−0.278	(0.253)
Kinki	−0.676	(0.236) ***	−0.503	(0.222) **	−0.911	(0.335) ***	−0.473	(0.263) *
Chūgoku	−0.613	(0.298) **	−0.615	(0.286) **	−0.237	(0.402)	−0.749	(0.342) **
Shikoku	−0.031	(0.412)	−0.100	(0.397)	0.381	(0.563)	−0.062	(0.468)
Kyushu and Okinawa	−1.062	(0.301) ***	−0.895	(0.285) ***	−1.090	(0.402) ***	−1.051	(0.341) ***
Constant	6.438	(2.245) ***	5.724	(2.150) ***	8.661	(3.082) ***	5.188	(2.572) **
First-stage partial R2	0.075		0.608		0.011		0.024	
First-stage F statistic	174.516		3321.440		22.642		51.139	
Wu-Hausman F statistic	16.341	(0.000)	6.233	(0.007)	19.040	(0.000)	18.635	(0.000)
N	2177		2181		2136		2082	

Notes: *, **, *** denotes statistical significance at the 10%, 5%, 1%, respectively.
Standard errors are shown in parentheses. The number in the parenthese of Wu-Hausman F statistic is p-value

Table 7: Household Income of Non-Main Income Earners by Population Size

Household Income	population larger than 50 thousand			
Personal relationships	0.884 (0.189) ***			
Social network support		0.314 (0.064) ***		
Civic engagement			2.738 (0.821) ***	
Trust and cooperative norms				1.669 (0.427) ***
First-stage partial R2	0.081	0.610	0.010	0.023
First-stage F statistic	154.673	2758.370	17.1666	40.018
Wu-Hausman F statistic	16.706 (0.000)	6.700 (0.010)	19.591 (0.000)	17.544 (0.000)
N	1797	1801	1767	1718

Household Income	population larger than 100 thousand			
Personal relationships	0.929 (0.214) ***			
Social network support		0.341 (0.074) ***		
Civic engagement			2.616 (0.809) ***	
Trust and cooperative norms				1.709 (0.466) ***
First-stage partial R2	0.084	0.605	0.013	0.026
First-stage F statistic	127.208	2122.090	17.617	34.498
Wu-Hausman F statistic	15.442 (0.000)	6.884 (0.009)	16.931 (0.000)	14.992 (0.000)
N	1415	1418	1388	1354

Household Income	population larger than 200 thousand			
Personal relationships	1.036 (0.255) ***			
Social network support		0.386 (0.088) ***		
Civic engagement			2.436 (0.761) ***	
Trust and cooperative norms				1.771 (0.529) ***
First-stage partial R2	0.084	0.592	0.017	0.028
First-stage F statistic	91.805	1460.460	17.289	27.934
Wu-Hausman F statistic	14.138 (0.000)	8.443 (0.004)	15.095 (0.000)	12.352 (0.001)
N	1040	1042	1021	997

Household Income	population larger than 500 thousand			
Personal relationships	0.623 (0.299) **			
Social network support		0.287 (0.120) **		
Civic engagement			1.357 (0.693) *	
Trust and cooperative norms				1.062 (0.690)
First-stage partial R2	0.105	0.601	0.025	0.024
First-stage F statistic	58.775	755.883	12.7084	11.831
Wu-Hausman F statistic	2.777 (0.096)	3.017 (0.083)	3.360 (0.067)	1.848 (0.175)
N	530	532	524	510

Table 8: Household Income Generation Function of Main Income Earners

Dependent variable：Household income
Estimation method: IV(instrumental variable＝reliability of relatives)
Sample: Primary income earner

	(1)		(2)		(3)		(4)	
Personal relationships	0.619	(0.192) ***						
Social network support			0.177	(0.054) ***				
Civic engagement					2.100	(0.859) **		
Trust and cooperative norms							1.124	(0.400) ***
Sex(Female)	−0.459	(0.189) **	−0.228	(0.168)	−0.250	(0.254)	0.005	(0.210)
Age								
20	−0.919	(0.316) ***	−0.934	(0.304) ***	−0.464	(0.492)	−0.478	(0.381)
30	−0.447	(0.212) **	−0.437	(0.202) **	−0.026	(0.349)	−0.313	(0.236)
50	0.547	(0.187) ***	0.623	(0.178) ***	0.438	(0.277)	0.337	(0.232)
60	−1.015	(0.212) ***	−0.776	(0.189) ***	−1.788	(0.508) ***	−1.071	(0.251) ***
70	−1.520	(0.278) ***	−1.119	(0.226) ***	−3.085	(0.910) ***	−1.466	(0.300) ***
Marital Status	1.343	(0.166) ***	1.433	(0.157) ***	1.099	(0.264) ***	1.401	(0.185) ***
Occupation								
Self Employed	−0.862	(0.232) ***	−0.552	(0.186) ***	−1.193	(0.394) ***	−0.514	(0.222) **
Executive	2.218	(0.272) ***	2.321	(0.258) ***	1.703	(0.470) ***	2.110	(0.308) ***
Public Employee	−0.920	(0.241) ***	−0.776	(0.224) ***	−1.233	(0.404) ***	−0.890	(0.266) ***
Student	−1.372	(0.285) ***	−1.256	(0.268) ***	−1.723	(0.452) ***	−0.929	(0.329) ***
Household	−1.895	(0.204) ***	−1.784	(0.191) ***	−2.233	(0.336) ***	−1.870	(0.227) ***
Education								
Middle School	−0.551	(0.210) ***	−0.471	(0.199) **	0.267	(0.420)	−0.014	(0.289)
Vocational School	−0.040	(0.210)	−0.179	(0.199)	0.087	(0.314)	−0.192	(0.231)
Two−Year College	0.849	(0.260) ***	0.695	(0.243) ***	1.069	(0.405) ***	0.552	(0.288) *
Four−Year College	1.137	(0.140) ***	1.138	(0.134) ***	0.889	(0.225) ***	0.789	(0.191) ***
Grad School	2.674	(0.317) ***	2.711	(0.303) ***	2.444	(0.460) ***	2.115	(0.413) ***
Ownership of Residence	1.028	(0.196) ***	1.364	(0.149) ***	0.787	(0.343) **	1.290	(0.179) ***
Urbanization	0.607	(0.346) *	0.323	(0.316)	1.287	(0.630) **	0.445	(0.372)
Senior Citizen	−2.306	(2.040)	−1.106	(1.909)	−4.468	(3.184)	−0.729	(2.240)
Average Income	1.001	(0.372) ***	0.985	(0.353) ***	1.029	(0.531) *	1.177	(0.420) ***
Income Disparity	−7.833	(5.796)	−3.983	(5.328)	−10.203	(8.905)	−5.137	(6.263)
City size(population)								
Tokyo city and Major cities	−0.156	(0.199)	−0.093	(0.189)	0.175	(0.298)	−0.066	(0.222)
≥ 200,000	0.063	(0.196)	0.063	(0.187)	0.412	(0.306)	−0.048	(0.221)
50,000 − 100,000	−0.095	(0.220)	0.005	(0.207)	−0.398	(0.374)	0.065	(0.244)
< 50,000	0.087	(0.245)	0.126	(0.234)	0.200	(0.351)	0.270	(0.277)
Region dummy								
Hokokaido	−0.575	(0.361)	−0.440	(0.339)	−0.741	(0.536)	−0.018	(0.419)
Tōhoku	0.026	(0.292)	0.143	(0.278)	0.141	(0.420)	0.101	(0.327)
Kōshin'etsu	0.417	(0.287)	0.473	(0.277) *	0.808	(0.449) *	0.211	(0.330)
Hokuriku	−0.365	(0.424)	−0.029	(0.397)	−0.416	(0.606)	−0.038	(0.471)
Tōkai	−0.194	(0.202)	−0.159	(0.193)	−0.400	(0.301)	−0.358	(0.236)
Kinki	−0.402	(0.220) *	−0.283	(0.206)	−0.230	(0.311)	−0.214	(0.241)
Chūgoku	0.006	(0.279)	0.049	(0.266)	0.398	(0.421)	−0.171	(0.328)
Shikoku	−0.379	(0.423)	−0.211	(0.394)	0.016	(0.602)	0.019	(0.469)
Kyushu and Okinawa	−0.096	(0.278)	0.017	(0.264)	0.138	(0.405)	−0.100	(0.311)
Constant	5.500	(2.187) **	3.466	(1.954) *	6.670	(3.396) **	3.559	(2.299)
First−stage partial R2	0.054		0.618		0.005		0.015	
First−stage F statistic	111.566		3151.620		10.043		29.223	
Wu−Hausman F statistic	9.851	(0.002)	0.586	(0.444)	12.094	(0.001)	8.494	(0.004)
N	1985		1982		1938		1916	

Notes: *, **, *** denotes statistical significance at the 10%, 5%, 1%, respectively.
Standard errors are shown in parentheses. The number in the parenthese of Wu−Hausman F statistic is p−value.

Table 9:   Household Income of Main Income Earners by Population Size

Household Income	population larger than 50 thousand			
Personal relationships	0.516 (0.216) **			
Social network support		0.147 (0.058) **		
Civic engagement			1.920 (1.003) *	
Trust and cooperative norms				0.932 (0.438) **
First-stage partial R2	0.051	0.623	0.004	0.014
First-stage F statistic	85.666	2653.580	6.75987	22.300
Wu-Hausman F statistic	5.689 (0.017)	0.528 (0.468)	6.678 (0.010)	4.301 (0.038)
N	1641	1641	1599	1582

Household Income	population larger than 100 thousand			
Personal relationships	0.452 (0.247) *			
Social network support		0.124 (0.065) *		
Civic engagement			2.105 (1.418)	
Trust and cooperative norms				1.091 (0.680)
First-stage partial R2	0.046	0.612	0.008	0.008
First-stage F statistic	61.620	1990.910	3.864	9.603
Wu-Hausman F statistic	3.589 (0.058)	0.548 (0.459)	4.375 (0.000)	2.624 (0.106)
N	1641	1299	1266	1254

Household Income	population larger than 200 thousand			
Personal relationships	0.711 (0.289) **			
Social network support		0.194 (0.075) ***		
Civic engagement			5.222 (5.488)	
Trust and cooperative norms				2.063 (1.157) *
First-stage partial R2	0.048	0.600	0.001	0.006
First-stage F statistic	48.173	1438.640	0.994	5.211
Wu-Hausman F statistic	7.676 (0.006)	1.070 (0.301)	6.909 (0.009)	5.742 (0.017)
N	998	994	969	962

Household Income	population larger than 500 thousand			
Personal relationships	1.254 (0.555) **			
Social network support		0.266 (0.105) **		
Civic engagement			−11.172 (22.778)	
Trust and cooperative norms				2.182 (1.165) *
First-stage partial R2	0.029	0.059	0.001	0.010
First-stage F statistic	15.496	732.254	0.239365	5.186
Wu-Hausman F statistic	7.194 (0.008)	3.709 (0.055)	7.981 (0.005)	7.091 (0.008)
N	544	541	529	526

Table 10: Social Capital Generation Function

Estimation method: IV(instrumental variable＝level of worries on future)

Dependent variable	(1) Personal relationships		(2) Social network support		(3) Civic engagement		(4) Trust and cooperative norms	
Sex(Female)	0.271	(0.067) ***	−0.092	(0.077)	−0.222	(0.066) ***	−0.328	(0.066) ***
Age								
20	−0.175	(0.123)	0.177	(0.138)	−0.502	(0.118) ***	−0.391	(0.120) ***
30	0.174	(0.095) *	0.419	(0.106) ***	−0.064	(0.092)	0.018	(0.092)
50	−0.226	(0.090) **	−0.359	(0.102) ***	−0.091	(0.088)	0.060	(0.088)
60	0.789	(0.115) ***	0.667	(0.125) ***	0.881	(0.111) ***	0.594	(0.111) ***
70	1.203	(0.138) ***	1.047	(0.152) ***	1.387	(0.133) ***	0.798	(0.133) ***
Marital Status	−0.123	(0.109)	−0.538	(0.122) ***	−0.226	(0.106) **	−0.453	(0.107) ***
Occupation								
Self Employed	0.707	(0.100) ***	0.419	(0.113) ***	0.493	(0.097) ***	0.261	(0.096) ***
Executive	−0.842	(0.233) ***	−1.104	(0.256) ***	−0.623	(0.227) ***	−0.817	(0.223) ***
Public Employee	0.577	(0.110) ***	0.601	(0.126) ***	0.588	(0.107) ***	0.453	(0.108) ***
Student	0.587	(0.102) ***	0.500	(0.116) ***	0.275	(0.099) ***	0.213	(0.102) **
Household	0.729	(0.118) ***	0.704	(0.133) ***	0.671	(0.114) ***	0.515	(0.117) ***
Education								
Middle School	0.277	(0.104) ***	0.267	(0.117) **	−0.170	(0.101) *	−0.188	(0.103) *
Vocational School	−0.114	(0.088)	−0.101	(0.099)	−0.047	(0.085)	0.010	(0.086)
Two-Year College	−0.302	(0.099) ***	−0.289	(0.111) ***	−0.123	(0.096)	−0.051	(0.096)
Four-Year College	−0.544	(0.116) ***	−0.658	(0.130) ***	−0.385	(0.113) ***	−0.274	(0.111) **
Grad School	−0.998	(0.229) ***	−1.274	(0.259) ***	−0.673	(0.222) ***	−0.458	(0.225) **
Ownership of Residence	−0.237	(0.122) *	−0.517	(0.134) ***	−0.440	(0.117) ***	−0.417	(0.116) ***
Years Living in the Area								
< 1	−0.020	(0.202)	0.352	(0.227)	0.105	(0.195)	−0.008	(0.200)
1 − 2	−0.119	(0.192)	−0.014	(0.216)	−0.140	(0.187)	−0.013	(0.187)
2 − 5	0.072	(0.116)	0.058	(0.131)	−0.012	(0.112)	−0.056	(0.113)
10 − 20	−0.007	(0.103)	−0.239	(0.117) **	−0.127	(0.100)	−0.167	(0.100) *
≥ 20	0.326	(0.094) ***	−0.078	(0.106)	0.189	(0.091) **	−0.135	(0.092)
Household Income	0.438	(0.065) ***	0.549	(0.072) ***	0.399	(0.064) ***	0.394	(0.064) ***
Long-term Residents	−0.069	(0.668)	−0.544	(0.754)	−0.027	(0.646)	−1.390	(0.644) **
Urbanization	−0.547	(0.164) ***	−0.529	(0.189) ***	−0.390	(0.159) **	−0.177	(0.159)
Senior Citizen	1.710	(1.108)	0.636	(1.243)	2.986	(1.072) ***	1.612	(1.065)
Average Income	−0.344	(0.195) *	−0.408	(0.216) *	−0.209	(0.188)	−0.638	(0.189) ***
Income Disparity	4.792	(2.573) *	5.034	(2.895) *	1.964	(2.489)	1.337	(2.499)
City size(population)								
Tokyo city and Major cities	0.089	(0.093)	0.056	(0.104)	0.071	(0.089)	0.002	(0.090)
≥ 200,000	0.070	(0.091)	0.012	(0.102)	0.046	(0.088)	0.077	(0.088)
50,000 − 100,000	0.272	(0.099) ***	0.243	(0.111) **	0.321	(0.095) ***	0.113	(0.096)
< 50,000	0.073	(0.111)	0.088	(0.125)	−0.004	(0.107)	−0.048	(0.107)
Region dummy								
Hokokaido	0.455	(0.188) **	0.606	(0.212) ***	0.458	(0.181) **	−0.064	(0.182)
Tōhoku	0.086	(0.131)	0.087	(0.148)	0.052	(0.127)	−0.027	(0.127)
Kōshin'etsu	−0.121	(0.135)	−0.036	(0.154)	−0.073	(0.130)	0.085	(0.131)
Hokuriku	0.234	(0.192)	0.177	(0.215)	0.370	(0.184) **	0.291	(0.191)
Tōkai	0.188	(0.092) **	0.225	(0.104) **	0.268	(0.089) ***	0.242	(0.090) ***
Kinki	0.403	(0.100) ***	0.342	(0.113) ***	0.251	(0.096) ***	0.077	(0.097)
Chūgoku	0.143	(0.130)	0.181	(0.146)	−0.040	(0.125)	0.201	(0.126)
Shikoku	0.021	(0.181)	0.040	(0.204)	−0.203	(0.175)	−0.171	(0.174)
Kyushu and Okinawa	0.406	(0.140) ***	0.333	(0.157) **	0.231	(0.135) *	0.152	(0.135)
Constant	−4.279	(1.016) ***	−3.319	(1.140) ***	−3.098	(0.978) ***	−0.806	(0.986)
First-stage partial R2	0.023		0.023		0.022		0.022	
First-stage F statistic	95.454		96.464		89.438		88.825	
Wu-Hausman F statistic	69.434	(0.000)	107.792	(0.000)	55.488	(0.000)	52.155	(0.000)
N	4172		4099		4085		4012	

Notes: *, **, *** denotes statistical significance at the 10%, 5%, 1%, respectively.
Standard errors are shown in parentheses. The number in the parenthese of Wu-Hausman F statistic is p-value.

Table 11:　　Net Effects to Household Income and Social Capital

Estimation method:OLS

Dependent variable	(1) Personal relationships			(2) Social network support			(3) Civic engagement			(4) Trust and cooperative norms			(5) household income		
Sex(Female)	0.481	(0.043)	***	0.199	(0.045)	***	−0.020	(0.043)		−0.098	(0.044)	**	0.246	(0.047)	***
Age															
20	0.047	(0.085)		0.430	(0.086)	***	−0.352	(0.084)	***	−0.228	(0.085)	***	0.244	(0.095)	**
30	0.019	(0.068)		0.253	(0.070)	***	−0.230	(0.068)	***	−0.114	(0.068)	*	−0.151	(0.073)	**
50	−0.017	(0.064)		−0.102	(0.066)		0.095	(0.064)		0.229	(0.065)	***	0.225	(0.069)	***
60	0.347	(0.066)	***	0.104	(0.068)		0.455	(0.066)	***	0.171	(0.067)	**	−0.540	(0.071)	***
70	0.672	(0.079)	***	0.358	(0.081)	***	0.874	(0.078)	***	0.279	(0.079)	***	−0.660	(0.084)	***
Marital Status	0.465	(0.051)	***	0.189	(0.052)	***	0.274	(0.051)	***	0.083	(0.051)		0.660	(0.055)	***
Occupation															
Self Employed	0.511	(0.071)	***	0.141	(0.072)	*	0.319	(0.070)	***	0.091	(0.071)		−0.231	(0.076)	***
Executive	0.252	(0.121)	**	0.250	(0.126)	**	0.348	(0.121)	***	0.214	(0.120)	*	1.255	(0.128)	***
Public Employee	0.124	(0.066)	*	0.039	(0.068)		0.167	(0.066)	**	0.016	(0.066)		−0.514	(0.071)	***
Student	0.122	(0.059)	**	−0.030	(0.061)		0.131	(0.059)	**	−0.061	(0.060)		−0.674	(0.064)	***
Household	0.288	(0.066)	***	0.111	(0.068)		−0.004	(0.066)		−0.108	(0.067)		−0.362	(0.073)	***
Education															
Middle School	0.040	(0.071)		0.050	(0.074)		−0.384	(0.071)	***	−0.371	(0.072)	***	−0.267	(0.076)	***
Vocational School	−0.037	(0.064)		0.006	(0.066)		0.024	(0.064)		0.083	(0.065)		0.076	(0.069)	
Two−Year College	−0.027	(0.066)		0.084	(0.067)		0.133	(0.065)	**	0.205	(0.066)	***	0.333	(0.071)	***
Four−Year College	0.096	(0.051)	*	0.152	(0.053)	***	0.212	(0.051)	***	0.291	(0.051)	***	0.703	(0.055)	***
Grad School	0.003	(0.128)		0.002	(0.131)		0.294	(0.126)	**	0.473	(0.128)	***	1.165	(0.138)	***
Ownership of Residence	0.372	(0.054)	***	0.244	(0.055)	***	0.142	(0.053)	***	0.167	(0.054)	***	0.746	(0.057)	***
Years Living in the Area															
< 1	−0.212	(0.146)		0.078	(0.150)		−0.076	(0.145)		−0.229	(0.150)		−0.267	(0.158)	*
1 − 2	−0.326	(0.138)	**	−0.278	(0.142)	*	−0.394	(0.137)	***	−0.153	(0.139)		−0.200	(0.151)	
2 − 5	0.049	(0.086)		−0.025	(0.088)		−0.050	(0.085)		−0.102	(0.087)		−0.051	(0.092)	
10 − 20	0.181	(0.074)	**	−0.030	(0.076)		0.000	(0.073)		−0.028	(0.074)		0.184	(0.079)	**
≥ 20	0.420	(0.069)	***	0.006	(0.071)		0.220	(0.069)	***	−0.066	(0.069)		0.079	(0.074)	
Long−term Residents	0.555	(0.486)		0.323	(0.502)		0.491	(0.483)		−0.715	(0.485)		0.803	(0.519)	
Urbanization	−0.425	(0.121)	***	−0.285	(0.126)	**	−0.266	(0.121)	**	−0.063	(0.122)		0.165	(0.128)	
Senior Citizen	0.401	(0.798)		−0.774	(0.822)		1.703	(0.793)	**	0.417	(0.801)		−1.419	(0.859)	*
Average Income	0.081	(0.135)		0.111	(0.138)		0.228	(0.134)	*	−0.207	(0.135)		0.501	(0.144)	***
Income Disparity	4.063	(1.889)	**	4.128	(1.939)	**	1.343	(1.883)		−0.174	(1.906)		−1.259	(2.029)	
City size(population)															
Tokyo city and Major cities	0.038	(0.069)		−0.016	(0.070)		0.024	(0.068)		−0.028	(0.069)		−0.028	(0.073)	
≥ 200,000	0.033	(0.067)		−0.018	(0.069)		0.015	(0.067)		0.056	(0.067)		0.003	(0.072)	
50,000 − 100,000	0.157	(0.072)	**	0.125	(0.074)	*	0.242	(0.071)	***	0.004	(0.073)		−0.096	(0.077)	
< 50,000	0.050	(0.096)		0.016	(0.099)		0.011	(0.095)		−0.086	(0.097)		−0.066	(0.103)	
Region dummy															
Hokokaido	0.105	(0.134)		0.185	(0.137)		0.173	(0.133)		−0.299	(0.135)	**	−0.316	(0.144)	**
Tōhoku	0.050	(0.096)		0.016	(0.099)		0.011	(0.095)		−0.086	(0.097)		−0.066	(0.103)	
Kōshin'etsu	−0.096	(0.099)		0.040	(0.103)		−0.041	(0.098)		0.063	(0.100)		0.035	(0.106)	
Hokuriku	0.127	(0.138)		−0.027	(0.140)		0.218	(0.135)		0.044	(0.141)		−0.184	(0.150)	
Tōkai	0.153	(0.068)	**	0.164	(0.070)	**	0.213	(0.067)	***	0.188	(0.068)	***	−0.054	(0.072)	
Kinki	0.272	(0.072)	***	0.174	(0.074)	**	0.182	(0.071)	**	−0.033	(0.072)		−0.156	(0.077)	**
Chūgoku	0.021	(0.093)		0.083	(0.096)		−0.086	(0.093)		0.068	(0.094)		−0.108	(0.102)	
Shikoku	0.096	(0.134)		0.075	(0.138)		−0.109	(0.133)		−0.170	(0.135)		0.016	(0.143)	
Kyushu and Okinawa	0.232	(0.101)	**	0.136	(0.104)		0.117	(0.101)		0.005	(0.101)		−0.162	(0.109)	
Constant	−3.115	(0.734)	***	−1.972	(0.751)	***	−2.061	(0.730)	***	0.379	(0.739)		1.848	(0.788)	**
Adj R²	0.207			0.041			0.173			0.044			0.294		
N	4620			4498			4508			4427			4300		

Notes: Numbers in branckets are standard errors.
　　***, **, and * indicate significance at 1%, 5%, and 10% level, respectively.