Journal of International Economics and Management
Journal homepage: http://jiem.ftu.edu.vn

The impacts of social capital on rural household's income: empirical evidence from rural Vietnam

Do Ngoc Kien[1]
Foreign Trade University, Hanoi, Vietnam
Yuriko Minamoto
Meiji University, Tokyo, Japan

Received: 06 Mar 2020; **Revised:** 02 June 2021; **Accepted:** 29 June 2021
https://doi.org/10.38203/jiem.021.2.0027

Abstract

This study empirically examines how social capital affects household income in rural Vietnam using the VARHS 2012-2014 surveys. We operationalized four forms of social capital, which are formal social networks, informal social networks, government connection, and general trust. We illustrate that social capital is abundant and has positive impacts on household income in rural Vietnam. Among many dimensions of social capital, political and governmental connectivity is fundamentally essential for improving household income. Approaching governmental organizations through the friend network is much more effective than the relative network or family member network. This study provides evidence that informal network is also important. Connecting to the community through the participation of wedding ceremonies increases spiritual well-being and works as a type of social capital to increase household income. Surprisingly, we find no positive impact of general trust and other massive organizations, which are often claimed to be necessary, such as the Farmer Association or the Women Association.

Keywords: Social capital, Household income, Social organization

1. Introduction

Rural marginalization has been a globally widespread phenomenon. In every country, the economic well-being of the rural population is dramatically lower than that of the urban. Nonetheless, the rural area has a superior position. Coping with rural marginalization is an essential economic and political objective in Vietnam, where the rural is currently a subsistence place for about 64% of the population. The biggest challenge of improving economic well-

[1] Corresponding author: dongockien@ftu.edu.vn

being in the rural is that the marginal product of resources in this area is essentially lower than in the urban because of geographical remoteness. This restricts the inflow of resources, increases accessing and transaction costs, and reduces job opportunities. Financial capital and labor do not move from the urban to the rural to combine with the cheap land. In contrast, resources leave the rural to the urban to increase its marginal returns, which are originated from the agglomeration effect of being located proximately (Lewis, 1954; Lucas, 1988; Krugman, 1991; Fujita and Thisse, 1996; Duranton and Kerr, 2018).

Rural economic development closely relates to increasing the effective use of resources in the rural production's current structure by harnessing intrinsic aspects of the rural society as intangible assets. As Moyes *et al.* (2012) argue, "the key issue in rural development is no longer the region's capacity to attract enterprises from outside the region but the exploitation of its local resources to generate sustainable transformation". Wiessinger (2007) emphasizes that "rural marginalization can be largely explained by unfavorable conditions and missing resources, but not entirely and not in all regions". Some sparsely populated regions with a lack of policy measures, poor economic, and unfavorable climatic conditions prove to be even more viable than the regions that are much better off. Some kind of an intangible asset seems to be involved in the marginalization dynamism". He believes that such intangible assets linking to "intrinsic aspects" are embedded in the social structure of local communities. "Relational remoteness" does matter much more than geographical remoteness. It implies a response to rural marginalization. While geographical remoteness constitutes some challenges, it is possible to overcome through improving social connectivity, which is further crucial than proximity. These ideas represent some dimensions of social capital, which is a "missing link" and an "endogenous potential" of development. Natural, physical, and produced capital "determine only partially the process of economic growth because they overlook how the economic actors interact and organize themselves to generate growth and development. The missing link is social capital" (Grootaert, 1998).

In the case of Vietnam, while social capital is a prospective candidate for harnessing the endogenous potential in the rural, its impact is not always empirically evident. While the number of social capital studies is increasing, connecting social capital with the economic outcome is essentially rare, especially in rural studies. Most social capital research in Vietnam is in the field of sociology with general studies, which are concentrating on describing its nature and form without bonding to a specific economic issue. Some studies trying to connect social capital with rural development are often limited in general results, such as in Tuyet (2012), Quan (2014), and Ngan (2014). In the field of economics, empirical evidence is significantly weak, and usually, it is not systematic and not a focus of the research. There have been only two large-scale studies that use Vietnam Access to Resources Household Surveys (VARHS) with a focus on the impact of social capital on household savings (Newman *et al.*, 2014) and household per capita income (Markussen, 2017). The forms of social capital were, however, limited to women's associations and some other types of organizations.

This study is among the first ones to examine how different forms of social capital affect household income in rural Vietnam. It contributes to rural development literature by showing that it is possible to harness the endogenous potential in social capital for coping with rural marginalization. The study empirically shows what type and to what extent social capital impacts the household's income in rural Vietnam. It then provides empirical evidence that social capital with the political aspect is more related to economic outcomes than other aspects.

2. Literature review

2.1 The concept of social capital

Social capital is viewed differently among branches of social science, and even a universally accepted definition of social capital is not available in the economic literature. While the term "social capital" has been used for a century, social capital in its contemporary form is first identified by Bourdieu (1986) as "the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition - or in other words, to membership in a group". In his approach, Bourdieu examines social capital from the individual level and treats social capital as a private good, which is a resource that individuals benefit directly from their social relations. According to Bourdieu (1986), social capital is resources embedded in networks, but networks themselves are not in the form of social capital. Different from Bourdieu, Putnam *et al.* (1993) focus on collective social capital in which "social capital refers to features of social organizations, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated action". In this definition, social networks, trust, and norms of civic engagement are viewed as essential forms of social capital. Dense networks of horizontal exchange tend to be associated with healthy norms of reciprocity, high levels of trust, more available "stock" of social capital, and easier to cooperate voluntarily and higher benefit.

Portes (1998) points out that despite many differences, "the consensus is growing in the literature that social capital stands for the ability of actors to secure benefits by virtue of membership in social networks or other social structures". However, in another influent study, Portes (2000) argues that when scholars mention the word social capital, they might regard one of two distinct meanings depending upon levels of analysis. First, social capital takes individuals or small groups such as family as the units of analysis in Bourdieu's tradition, for what he named "individual social capital". Second, social capital can be the Putnam-inspired definition that includes features of networks, norms, and trust of a larger social unit such as community, for what he named "collective social capital". Portes (1998) also criticizes the logical circularity of Putnam's approach in the discussion of collective social capital that social capital is simultaneously a cause and an effect if it is seen as a feature of communities. Even there is nothing wrong with collective social capital, Portes (1998) believes that the "greatest theoretical promise of social capital lies at individual level".

Partly agreeing with Bourdieu, Coleman (1988) describes social capital as a resource embodied in inter-persons relations, and social capital in a variety of different entities with two characteristics, which are consisting of some aspect of social structure, and facilitating actions of individuals in such social structure. Different from Bourdieu, Coleman (1988) rejects the extreme opportunistic premises of social capital. Coleman (1990) argues that while "authority relations, relations of trust, and consensual allocations of rights which establish norms" can be viewed as resources for individuals, social capital should be viewed as reciprocal obligations, expectations, and trustworthiness together with the norms ensuring relations. In other words, Coleman (1990) takes Putnam's view that social capital is a type of public good, and the dense network and closure attribute of social capital are essential features.

Employing Bourdieu's individual approach, Burt (1997) develops the famous structural holes argument. In this argument, social capital is regarded as an advantageous position in social networks. Disconnections between individuals or holes in the structure of a network leave some people unaware of the benefits they could offer one another. Because "certain people are connected to certain others, trusting certain others, obligated to support certain others, dependent on exchange with certain others", certain network positions in the social structure have advantages of being the broker (information, control) in relations among people disconnected. Those information and control advantages are defined as social capital. Burt (1997) argues that the relative absence of ties facilitates individual mobility. While dense networks or strong ties tend to include redundant information, weak ties can be sources of new knowledge and resources. This argument is a different version of Granovetter (1973)'s hypothesis of "the strength of weak ties".

For better policy guidance, Woolcock (1998) suggests that the definition of social capital should focus on the source rather than the consequence. To him, social capital is "a broad term encompassing the norms and networks facilitating collective action for mutual benefit". This definition permits the incorporation of different dimensions of social capital. Using this definition, Woolcock and Narayan (2000) categorize studies on social capital and economic development into four perspectives, which are the communitarian view, the networks view, the institutional view, and the synergy view.

In summary, social capital can be viewed in two different forms, which are either collective or individual social capital. Social capital is maintained and reproduced through social interaction and can be mobilized either within-group, which is bonding social capital, or between-groups, which is bridging social capital, for a certain purpose and can facilitate collective action for mutual benefit.

2.2 The impact mechanisms of social capital

While different types of social capital should have different mechanisms to translate into economic outcomes, Collier (2002) argues that the concept of social capital describes both sides. It is "social" and "capital" with economic consequence. According to Collier (2002), social capital is "social" because it involves individuals behaving sociably, arising from a

nonmarket interaction that has an economic effect. This effect is not internalized by the prices in markets. In economics, this effect is named "externality", which is "First, the initiation of social interaction always involves an externality. Second, social interaction has an economic effect that is not mediated through the market. Third, this effect is usually not the primary purpose of the social interaction but is incidental or even unintended" (Collier, 2002). To be "capital," the economic effect of social capital must persist due to the persistence of either social interactions or the social interactions' effects even the social interactions themselves do not remain persistent.

To Bourdieu (1986), social capital is an unequal distribution of a particular "social power" reflecting an individual's access to networks. Social capital enables individuals to acquire benefits through opportunistic actions depending upon the nature of social obligations and available networks. Many studies find that social capital is an important element to foster the diffusion of knowledge and reduce transaction costs by enhancing trust and reduce opportunistic behaviors (Bowles and Gintis, 2002). According to Putnam *et al.* (1993), collective social capital in the form of networks, norms, and trust constitute a composite asset of a community, which represents its capacity for cooperating and taking collective action. When discussing two meanings of social capital, Portes (2000) argues that different definitions of social capital are sometimes "at odds in others" when opportunistic behaviors due to individual social capital undermine community norms constituting collective social capital.

Coleman (1988) points out three components of social organization that contribute to economic impacts of social capital: (1) obligations and expectations, which depends on the trustworthiness of structures, (2) potential for information flow, which inheres in social relation, and (3) social norms, which are accompanied by effective sanctions. Social norms result in a socially efficient outcome by allowing actors to gain an appropriate level of partial control of the action. As a result, the economic impact of social capital is originated from social control. It means that social ties bring individual benefit. Hence, the closure of the social structure is essential for the existence of effective norms and the trustworthiness of social structures, which allow for the increase in obligations and expectations.

Collier (2002) explains the sophisticated economic impacts of social capital through its nature of social interaction. First, social interaction can improve the ability to make allocative decisions through two mechanisms, which are copying or reducing transaction cost and pooling or putting all knowledge together. Second, social interaction can raise output through the knowledge about whether other agents are reliable, i.e. trust and reputation. Third, social interaction produces coordinated action in several ways, such as spontaneous coordination because of norms or conscious coordination because of conscious decisions.

Social capital does not always yield positive impacts. Many studies illustrate various channels that social capital yields a negative economic impact. Social capital is multi-dimensional. As an intrinsic aspect of rural society, social capital might be reflected in the "trust level" among local community members, which help to reduce the transaction costs. However, trust, which is a type of collective resource of a community, could be used for

selfish interest at the expense of other members in the rural community. Such activity could reduce the economic well-being of the community as a whole and destroy the "stock" of general trust. In such a case, social capital as an intrinsic aspect of the rural society cannot help to deal with rural marginalization.

As social connectivity, social capital reflects the social networks and connections available in rural communities. However, social connectivity might induce the costs of participating and maintaining. Maintaining bonding groups might include restriction in resource mobility as a type of social obligation that induces the opportunity cost of resources for the best use. When its benefits are not large enough, such type of social capital is the damaging one and reduces the household's economic well-being. Levien (2015) presents evidence from rural India that social capital in the form of social connectivity is harmful and undermines inclusive development when better-connected farmers take the position of a broker and capture all profits at the expense of other villagers. Sabatini (2008) reports that social capital in the form of family ties and strong social networks have a negative impact on per capita income and life expectancy.

2.3 Empirical evidence of the impact

Due to the multi-dimensional nature of social capital and economic well-being, there is a lack of systematic evidence of the impact of social capital on economic well-being, especially in developing countries. Estimating the impacts of social capital is often restricted by the fact that social capital is difficult to be operationalized and measured. Usually, empirical evidence is focused only on a particular dimension of social capital.

Putnam *et al.* (1993) provide evidence that social capital in the form of social networks in northern Italy attributes significantly to economic success. FAO (2014) reports that effective producers' organizations "can provide producers with a wide range of services: enhancing their access to natural resources, as well as input and output markets, information and knowledge and facilitating their participation in policymaking". However, such pieces of evidence were mainly discovered through a field study instead of carrying out an extensive household survey. The unavailability of large-scale household surveys poses a significant challenge to any effort to examine empirically the economic impacts of social capital, especially in the rural, around the world.

Narayan and Pritchett (1997) illustrate that in rural Tanzania, social capital in the form of official networks improves the income of households. In rural America, Hoyman *et al.* (2016) present that bridging social capital, which is a social organization with heterogeneous members, has a positive impact on per capita income. In rural Indonesia, Jumirah and Wahyuni (2018) estimate the impact of social capital in terms of trust, cooperativeness, and social network on household expenditure using the IV method. Their empirical results show that while social capital indicators in the form of social participation level and cooperativeness index yield a positive impact on household expenditure, social capital indicator in the form of trust index yields a negative impact on household's expenditure.

In Vietnam, when surveying in Da Hoi iron and steel production village in rural Vietnam, Nam *et al.* (2009) examine the determinants of the improvement in product lines, product quality, material procurement, product marketing, labor management, and overall economic performance of the rural enterprises. They use the binary variable of having siblings who established their businesses earlier and engaged in steel production as a proxy for social capital. They find that family ties have statistically significant and positive impacts on the production of more modern products. In terms of value-added, these ties have positive impacts with a marginal effect of about 0.1. They reveal that the personal ties with parents and siblings contributed to the improvements and performance of village enterprises. These ties are important determinants of the successful transformation of the village industry. While more research attention has been paid to Vietnamese enterprises (Cuong *et al.*, 2018; Vu, 2014; Nam *et al.*, 2009), studies about impact of social capital on the economic well-being of rural households are minimal. For example, Tuong-Anh and Quynh-Anh (2015) examine the impact of social capital on subjective well-being, which is coded from 1 to 4 for life satisfaction, in rural Vietnam using an OLS regression model. Such type of research suffers from a variety of problems: (1) It wrongly considers subjective well-being as a dimension of economic well-being that can be empirically modeled, (2) It provides no theoretical foundation but implicitly relaxes the functional form, (3) It suffers from spurious relationships/correlation when interpreting association as causality.

With more rigorous studies, there is limitation of research scopes in Vietnam. Ha *et al.* (2004) develop a reduced-form production function of rural households in a paper-recycling craft village to examine the impact of several types of social capital on household income and expenditure. They find that association membership does not have an impact on household income and social capital in terms of trust and reciprocity has a significant impact on household's income and expenditure. A limitation of this study is that it focuses on a small population of a village. Their sample is small with 67 observations of paper-recycling households and 105 general households, making any policy implication impossible. While not considering the case of income, Newman *et al.* (2014) report that social capital in the form of women association facilitates and helps to increase savings in formal and informal financial institutions. Markussen (2017) presents a significant impact of social capital in the form of political organizations and connection to government on per capita income in rural Vietnam. The limitation of Markussen (2017) is the lack of field study to understand the impact mechanism.

3. Analytical settings

3.1 Operationalizing social capital in rural Vietnam

Social capital is a multi-dimensional concept reflecting a type of resources, which are originated from social interaction, embedded in either relational connections or social structure, maintained through social connectivity, and mobilized for facilitating coordinated actions. In this paper, social capital is operationalized in four types: (1) Formal social network, which is the number of membership connections of the whole family in the social organizations;

(2) Informal network, which is the number of connections to social community; (3) General trust; and (4) Governmental connections, which reflect linking capacity or network of a household to governmental bodies. This is only one among many ways to conceptualize the multi-dimension of social capital. Although social capital is intangible, its current "stock" is abundant in rural Vietnam, according to summaries from the VARHS.

Table 1. Percentage of the household having at least one membership

	2008	2010	2012	2014
Any group	85.2	87.4	88.9	89.3
Communist Party	11.6	9.0	8.2	11.6
Communist Youth Union	30.2	17.3	18.6	12.0
Women Association	58.8	57.7	63.4	59.9
Farmers Association	38.0	39.4	32.0	40.9
Veteran Association	15.1	15.0	16.2	15.9
Elderly Association	22.8	21.7	25.6	26.2

Source: Calculated by the authors

Traditionally, the formal social network is measured by the number of memberships in formal organizations. In Table 1, more than 85% of households in rural Vietnam have at least one member of a type of formal social network. Among the six main associations, Communist Party membership has the lowest rate, which is about 10%. The rate of having memberships in Women Association is about 60%. The rate of having memberships in Farmer Association is about 40%.

The informal network illustrates how well a household connects to the local society besides official organizations. The VARHS operationalizes this concept in several ways, as shown in Table 2. More than 90% of the household has at least one person to turn to for money in case of an emergency. Almost 98% of households participate in at least one wedding in the previous year while the median number of weddings attended is about 15.

Table 2. Informal network in rural Vietnam

	2008	2010	2012	2014
Share of household with at least one person to turn to for money in case of emergency (%)	92.5	94.3	91.0	93.8
Share of household who attended at least one wedding last year (%)	96.6	98.3	98.7	98.0
Number of wedding attended (median)	15	13	15	16

Source: Calculated by the authors

Following the World Bank's World Values survey, a question about general trust "Generally speaking, would you say that most people can be trusted?" was asked in all waves of the VARHS surveys from 2006 to 2016. Table 3 presents a high trust level, which more than 81%, in rural Vietnam. This number is higher than that in the whole of Vietnam in 2006, which was

50.9%, in China in 2012, which was 60.3%, in Japan in 2010, which was 35.9%, and in the United States in 2011, which was 34.8%.

Table 3. General trust in rural Vietnam

	2006	2008	2010	2012	2014
Most people can be trusted (%)	84	86.9	82.5	87.2	81.7

Source: Calculated by the authors

Regarding governmental connections, the balanced sample of 2,600 rural households presents a significantly high rate. About 30% of the rural households in 2012 and 25% of the rural households in 2014 had at least one linkage to a government official through family members, relatives, or friends.

3.2 Hypotheses and analytical framework

This study employs operationalized types of social capital to construct the following hypotheses:

Hypothesis 1: The formal networks have a statistically significantly positive impact on rural households' income.

Hypothesis 2: Informal networks have a statistically significantly positive impact on rural households' income.

Hypothesis 3: General trust has a statistically significantly positive impact on rural households' income.

Hypothesis 4: Governmental connections have a statistically significantly positive impact on rural households' income.

Figure 1 presents an analytical framework for capturing the impact of social capital. Using a conventional production function approach, the rural resources in terms of capital, labor, land, and human capital together with social capital (SC), are assumed to transform through a "black-box" of the production process to generate the output of production. Such output then is converted into economic well-being, which is measured by direct consumption or market exchange for income. Formally, Y is a function of K, L, H, and SC.

While Y is the output of production, which should be measured by the amount of goods and services produced by the household, such aggregate data is conceptually not available. The straight use of quantity of output is impossible. Aggregate output needs to be converted into monetary terms using market prices. In this case, aggregate output is close to income plus the value of self-consuming output. As an empirical practice, the data of income are often used as a proxy[2]. It is consistent with the fact that income is a traditional proxy for economic well-being. This study follows Narayan and Pritchett (1997), Grootaert *et al.* (2002), Ha *et al.* (2004), Jumirah and Wahyuni (2018) to estimate an aggregate production function of the rural household.

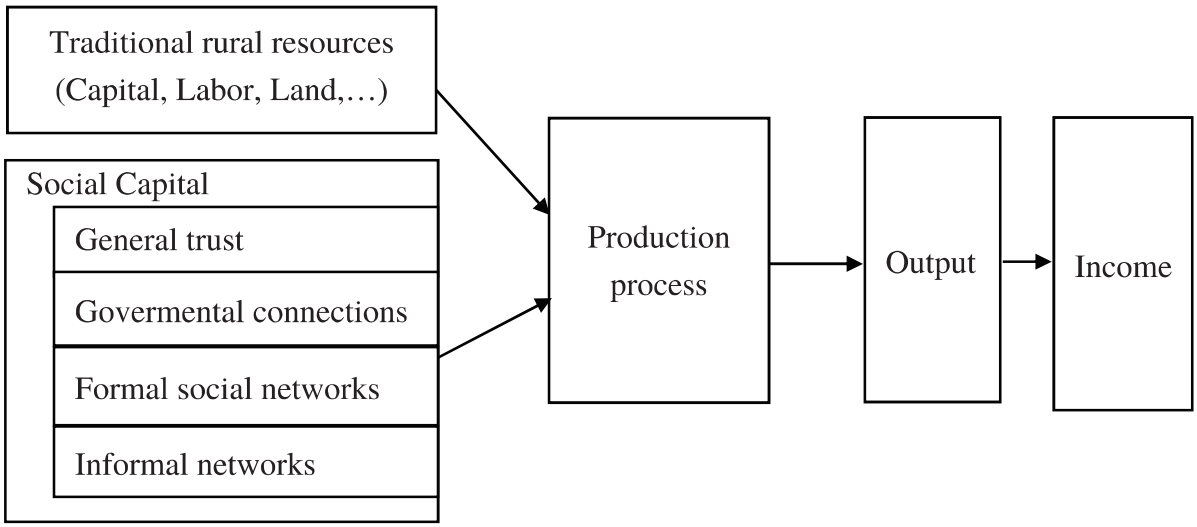

Figure 1. The analytical framework of the impact of social capital

Source: Authors' proposal

3.3 Empirical settings

In empirical settings, several regression models are employed, including pooled OLS, random-effects, and fixed-effects (with and without time effects):

$$\ln Y_{it} = \beta_0 + \beta_1.Charac_{it} + \beta_2.K_{it} + \beta_3.Land_{it} + \beta_4.L_{it} + \beta_5.HC_{it} + \beta_6.SC_{it} + \varepsilon_{it}$$

where t = 0 if the year is 2012 and t = 1 if the year is 2014; Y_{it} is the income of the household; ln is a natural logarithm form; Capital endowment K_{it} of household i in year t is the total value of durable assets in logarithm form as a proxy.

Labor endowment L_{it} of household i in year t is the total number of working days of all household members in inverse hyperbolic sine form in the previous year.

Land endowment $Land_{it}$ of household i in year t is operationalized in three types, which are owning and using land, renting and borrowing land, and lending and leasing land. Because there are many zero-values, the inverse hyperbolic sine transformation[3] is used instead of the traditional logarithm transformation. The living area in the logarithm form (m^2) is used as a proxy for the endowment of land for living.

Human capital endowment HC_{it} of the household i in year t is operationalized in (1) the age of the head, (2) the *military experience* - equal to one of the head used to serve in the army, and (3) the certificate of education of the head.

---

[2] Assuming that the rate of value of self-consuming output is α, then it is possible to rewrite: ln[Income] = ln[(1 - α).Output] = ln(1 - α) + ln[Output]. The difference between estimation in terms of income and in terms of output then is presented in the vector of slope β_0, not in vectors of coefficients of interest from β_1 to β_6.

[3] IHS(x) = arcsine(x) = $\ln(x+\sqrt{x^2+1})$. See Appendix 1.

$Charac_{it}$ is for household i's characteristics in year t, which include gender of the household head, two dummy variables for whether the household has migrants and whether the household engages in non-farm business. The interaction terms between these two types are also included to capture the fact that rural resources need to be shared between migration and non-farm business. We interact migration with non-farm entrepreneurship.

Social capital SC_{it} of household i in year t has four types: (1) Formal social network is measured as the number of membership of the whole family in either Communist Party, Youth Union, Women Union, Farmer Union, Veteran Union, or Elderly Group;[4] (2) Informal network is the number of wedding ceremonies that a household participated in the previous year; (3) General trust is a dummy variable, which equals 1 if a household agrees that almost everyone in the commune is honest and trustworthy, and 0 otherwise; and (4) Governmental connections include three dummy variables, which are equal to 1 if a household's members, relatives, or friends work in the government, and 0 otherwise.

Table 4 presents a summary of social capital data.

Table 4. Summary of social capital data

Variables/Covariates	2012		2014	
	Mean	Standard deviation	Mean	Standard deviation
The Communist Party	0.13	0.40	0.17	0.46
The Communist Youth Union	0.26	0.62	0.19	0.53
The Women Association	0.76	0.50	0.72	0.51
The Farmers Association	0.57	0.59	0.55	0.59
The Veteran Association	0.14	0.36	0.18	0.40
The Elderly Association	0.28	0.59	0.34	0.65
Number of Weddings	16.36	14.29	14.70	13.31
General trust	0.86	0.34	0.83	0.38
Political link: Household members	0.07	0.25	0.06	0.24
Political link: Relatives	0.17	0.37	0.21	0.41
Political link: Friends	0.17	0.37	0.14	0.35

Source: Calculation by the authors

The impact of social capital on a household's income is reflected in the vector of coefficients β_6. For estimating the impact β_6, this study employs the OLS, the random effect, and the fixed-effect models. The difference among these models is the assumption about εit. In the OLS model, error term ε_{it} is assumed to be uncorrelated with explanatory variables. In the other models, $\varepsilon_{it} = c_i + u_{it}$, in which c_i is individual-specific and u_{it} is an idiosyncratic error term, which is assumed to be uncorrelated with the explanatory variables. In the random effect model, c_i is a random variable, which is uncorrelated with the explanatory variables.

[4] These organizations are the main ones as the proportion of households having memberships in all samples is not less than 10%.

In the fixed-effect model, c_i is a random variable, which is allowed to be correlated with the explanatory variables.

The path from social capital to the income

Social capital and income might have a reverse relationship. Higher income generates higher social capital. For example, wealthier households are more likely to be invited to wedding ceremonies than the poor. However, the path from income to social capital is limited due to low financial barriers because of social organization memberships, governmental connections, and general trust. For the informal network, wedding ceremonies are more related to tradition than financial status and are mutual obligations. For example, if I invite you, I expect that you will invite me in the future. The value of a wedding present/gift is even recorded for future equal return. In this sense, it is argued that the impact, if any, is not from income to social capital, but from social capital to income. In the long run, the accumulation of some type of economic well-being (such as income) constructs financial capital or human capital. Similarly, this accumulation might construct social capital in the long run. However, this long-run relationship is not the focus of this study.

3.4 Model diagnostics and selection

Table 5 provides the regression results of the pooled OLS, the fixed-effect, the random effect, and the 2-way (individual and time) fixed-effect model.

The Breusch-Pagan Lagrange multiplier test is employed to choose between the pooled OLS model and the random effect model. The null hypothesis H_0 in the Breusch-Pagan Lagrange multiplier test is that variance across households is zero. The statistics $\bar{\chi}(1) = 188.16$ with p-value = 0.0000 implies that the null hypothesis H_0 is rejected, thus the simple OLS is less preferred to the random effect model. Secondly, the Hausman test is employed to test Hypothesis H_0: the difference in coefficients between the fixed effect model and the random effect model is not systematic. The statistics $\chi 2(24) = 172.61$ with p-value = 0.0000 implies that H_0 is rejected, thus the fixed effect model is preferred. Thirdly, the time dummy variable in the 2-way fixed effect model is statistically significant, implying that the time dummy variable should be included in the model or the 2-way fixed effect model is preferred to the one-way (individual) fixed-effect model. Finally, the null hypothesis of homoskedasticity is rejected using the modified Wald test for GroupWise heteroskedasticity. The 2-way fixed-effect model in Table 5 is reported with the p-value from heteroskedasticity-robust (Huber-White) standard errors.

Table 5. Model selection

	Pool OLS	Pool OLS with time	Random effect	Fixed effect	2-way fixed effect
Migration	0.1331***	0.1332***	0.1330***	0.1112***	0.1050**
Non-farm entrepreneurship	0.1631***	0.1689***	0.1640***	0.1340**	0.1497***
Interaction	-0.0813	-0.0764	-0.0943	-0.1397+	-0.1222+
Gender of the head	-0.0025	0.0052	-0.0092	-0.1558+	-0.0502
Age of the head	0.0043***	0.0041***	0.0041***	0.0061+	-0.0079**
Military service	0.0302	0.023	0.033	0.0674	-0.0434
Certificate/Degree	0.1433***	0.1364***	0.1570***	0.2037***	0.1158*
The Communist Party	0.1450***	0.1408***	0.1569***	0.2148***	0.1153**
The Communist Youth Union	0.0234	0.0316*	0.0261+	0.0207	0.0503*
The Women Association	0.0102	0.0138	0.0134	-0.0038	0.0207
The Farmers Association	-0.0650***	-0.0665***	-0.0500**	0.0386	0.0358
The Veteran Association	-0.0434	-0.0471+	-0.0307	0.048	-0.0292
The Elderly Association	0.0307+	0.0303+	0.0351+	0.0653	0.0317
Number of wedding ceremonies participated	0.1038***	0.1112***	0.0882***	0.0275+	0.0365*
General trust	-0.03	-0.0213	-0.0395+	-0.0581*	-0.0388
Political link: Family	0.0417	0.0481	0.0369	0.0227	0.0277
Political link: Relatives	-0.0113	-0.0299	0.004	0.0361	0.0005
Political link: Friends	0.0831**	0.1013***	0.0724**	0.0457	0.0739*
Living area, log	0.1293***	0.1272***	0.1271***	0.0712**	0.0534*
Land owning & using, IHS	-0.0017	-0.0016	-0.0027	-0.0105	0.005
Land renting /borrowing, IHS	-0.0013	-0.0012	-0.0013	-0.0019	0.001
Land lending/leasing, IHS	0.0160***	0.0166***	0.0156***	0.0061	0.0046
Durable assets, log	0.2518***	0.2437***	0.2382***	0.1326***	0.0991***
Working days, IHS	0.1445***	0.1497***	0.1462***	0.1375***	0.1630***
Time-effect		0.1533***			0.2106***
Constant	6.4897***	6.4366***	6.6770***	8.2262***	8.8541***
Adjusted/ Overall R^2	0.45	0.45	0.45	0.39	0.33

Notes: +, *, **, and *** corresponds to $p < 0.10$, $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

Source: Estimated by the authors

4. Empirical results and discussion

Among social capital indicators including in the model, four of them have a statistically significant coefficient, which are the number of Communist Party members, the number of Communist Youth Union members, the governmental connections in terms of having a friend in government, and the informal network in terms of the number of wedding ceremonies participated. The coefficients of other social capital indicators including general trust are statistically insignificantly different from zero.

4.1 The Communist Party and the Communist Youth Union

In the two-way fixed effect model, for one more Communist Party membership or one more Communist Youth Union membership in the household, the total income of the household increases by $100\times(e^{0.1153} - 1) \approx 12.22\%$ and $100\times(e^{0.0503} - 1) \approx 5.2\%$ on average, respectively. All other official social networks in this study including membership of professional organizations such as the Farmer Association or non-professional organizations such as Women Association, Veteran Association, and the Elderly Association do not have such impact. These results imply the vital role of political and governmental linkage in rural Vietnam. Engaging in a general political party itself cannot directly improve the household income. However, in Vietnam, important local development policies and strategies are typically have close involvement of local party organizations. In this sense, the more connections with the Communist Party, the more available information a household has. The role of these connections is more important in case collective action needs to be taken.

Information advantage: the case of Dinh Van Thuan

Box 1 presents the case of Dinh Van Thuan, who had an information advantage from his Communist Party membership and successfully transformed this advantage into economic success.

Another explanation for this result is recognized through an interview in rural Hai Phong[5] with a retired high-ranking government official and two farmers (one is a member of the Communist Party, and one is not). All of them argued that while the information advantage was not clear, the Communist Party membership related to a strict discipline and, hence, required rural households to have a more responsible living style and behaviors. As a result, a family with the Communist Party membership had fewer problems with alcohol, gambling, or violation than their counterparts without such membership. This implied higher productivity. This argument relates to Coleman's (1988) hypothesis that social capital in the form of social obligation results in a socially efficient outcome because it allows actors to gain an appropriate level of partial control of the action.

[5] Interview with Mr. K (a retired high-ranking governmental official), Mr. N (a member of the Communist Party), and Mr. T (a non-member of the Communist Party) in Thuy Nguyen province, Hai Phong city on January 30, 2019.

Box 1. The case of Dinh Van Thuan

Dinh Van Thuan (born in 1985) is a Communist Party member of Hai Dong commune, Hai Hau ward, Nam Dinh province. Most production land of the commune used to be cat clays, which are generally acid soils and located in high geographical positions and not suitable for irrigational works. As a result, it was significantly inefficient and unproductive for rice production. When the Communist Party organization and the local government of Hai Hau ward had as a policy of regrouping land, planning for specialized and concentrated regions, transferring unproductive rice and salt production land to agriculture and medicinal plant production, Thuan asked the support from his family and friends and decided to bid for 30,000 m2 of production land for the medicinal plant decided polyscias fruticose (*đinh lăng*), white shrimp (litopenaeus vannamei - *tôm thẻ chân trắng*), and oriental weatherfish (pond loach or dojo, *chạch sụn*). This initial investment brought Thuan a high annual profit, which was some hundred million Vietnam Dong. Thuan's successful business model was brought to study in his Communist Party cell and became a base for the Party cell's resolution on transforming business model and improving economic activities in Hai Dong commune. Through various meetings, Thuan found out that there were many young people without knowledge, capital, or employment in his commune. With his reputation as a Communist Party member and a successful entrepreneur, Thuan made friends and connected them with the Communist Youth Union of Hai Dong commune in which they could collaborate, share their knowledge, implement teamwork, involve in community activities, and support each other in economic activities.

Source: Lam and Khanh (2019)

Decreasing impact of connection

A weakness of the models presented in Table 5 is the implicit assumption that an additional connection yields the same impact on the percentage increase of total income. However, if sharing knowledge and information is one of the main channels that affect outcomes, the impact of the membership is much more significant than of the second one because a household as a unitary unit has its effective information-sharing mechanism. The strict discipline and requirements of responsible living style for Communist Party members also have certain impacts on other family members. It supports the view that the impact of later connection to the Communist Party should have less impact on the whole household. To capture this observation, instead of using the number of memberships, the inverse hyperbolic sine transformations (IHS) of the total membership of official social networks are used to re-run the 2-way fixed-effect model. The coefficients are re-estimated for two cases, which are using IHS transformation for the Communist Party membership variable only and using IHS transformation for all variables of social organization groups.

Table 6. Model comparison: inverse hyperbolic sine transformations

	2-way fixed effect		IHS with Communist Party membership only		IHS with all groups	
	Coeff.	**%Δ**	**Coeff.**	**%Δ**	**Coeff.**	**%Δ**
Number of Communist Party membership	0.1153	12.22	0.1571	15.71	0.1567	15.67
1	0.1153	12.22	0.1111	11.75	0.1108	11.08
2	0.1153	12.22	0.0703	7.28	0.0700	7.01
3	0.1153	12.22	0.0497	5.09	0.0495	4.95
4	0.1153	12.22	0.0381	3.88	0.0380	3.80
Number of Communist Youth Union membership	0.0503	5.16	0.0502	5.15	0.0596	5.96
1	0.0503	5.16	0.0502	5.15	0.0421	4.30
2	0.0503	5.16	0.0502	5.15	0.0266	2.70
3	0.0503	5.16	0.0502	5.15	0.0188	1.90
4	0.0503	5.16	0.0502	5.15	0.0144	1.45
5	0.0503	5.16	0.0502	5.15	0.0117	1.17
6	0.0503	5.16	0.0502	5.15	0.0099	0.98
7	0.0503	5.16	0.0502	5.15	0.00849	0.85

Source: Authors' estimation from VARHS 2012-2014

Comparing with the two-way fixed model in Table 5, the significance of all coefficients in the new estimations does not change in Table 6. Except for the case of transformed variables, the coefficients of other variables are also consistent in terms of magnitudes. In the new models with IHS transformation, the impact of additional connection to the communist party is not constant but depends on the total number of connections that a household has in the Communist Party[6].

Table 6 reports that the marginal impact of the first Communist Party membership on total income is significant, about 15%, but the fourth connection to the Communist Party yields only a 3.8% increase in total income. Similarly, if the marginal impact of Communist Youth Union membership is not constant but decreasing to the number of connections, the inverse hyperbolic sine transformations could be used to estimate the magnitude of the impact for each connection. The two-way fixed effect model is re-run with IHS transformation of social organizations memberships report that the marginal impact of the first connection to the Communist Youth Union is about 6%, but from the sixth connection has only an impact of 1%.

4.2 The Women Association and the Farmers Association

Table 5 illustrates that both the Women Association and the Farmers Association membership do not yield a statistically significant impact on the household's total income in both the one-

[6] If ln(y) is linearly dependent on IHS(x) $= x + \sqrt{x^2+1}$, $\frac{\partial \ln y}{\partial x} = \beta_1 \frac{\partial\left(x+\sqrt{x^2+1}\right)}{\partial x} = \frac{\beta_1}{\sqrt{x^2+1}}$ when x change 1 unit, ln(y) change $\frac{\beta_1}{\sqrt{x^2+1}}$ or y increase $(e^{\frac{\beta_1}{\sqrt{x^2+1}}} - 1)$ time, depending on the value of x.

way and two-way fixed model. However, in the OLS model without time effect, the OLS model with time effect, and the random effect model, the impact of the Farmers Association membership is consistently reported to be statistically significantly negative, implying damaging social capital. These mixed results could be explained by a hypothesis that the impact of Farmers Association on the household's total income is a group effect. For example, being a member of an organization has its own utility cost since the member must follow the organization of discipline or regulation together with the financial responsibility of fee contribution. When the negative group effect is greater than the positive effect of collectively embedded resources within the group, the net impact of engaging in the social organization might be negative. Namely, the number of memberships itself does not significantly affect the household's total income, but having a connection with the group generates an impact. Appendix 2 provides evidence to support this hypothesis. Engaging in Farmers Association has negative impact on the total income of the household. In the 2012 sample, 1351 or 52% of the households has membership in the Farmers Association. Among them, 217 or 16.1% left the Farmers Association in 2014.

4.3 Informal network

Table 7. Impact of number of connection

Connections	Impact (%)
0	3.717
1	2.615
2	1.646
3	1.161
4	0.889
5	0.718
6	0.602
7	0.518
8	0.454
9	0.404
10	0.364

Source: Estimated by the authors

The informal network in the form of the number of wedding ceremonies is reported in all models. While the estimated coefficient is minimal, which is about 0.0365 in the two-way fixed model, the impact is statistically significant. In rural Vietnam, the household that has more connection with the community life will enjoy not only higher spiritual well-being but also higher economic well-being. The empirical results show that when other things hold constantly and the number of wedding ceremonies participated by a household is large enough, which is more than 10, a 10% increase in the number of wedding ceremonies that a household participates is correspondent to a total income increase of about 0.365% in the two-way fixed model and 1.11% in the OLS with time effect model. When the number of wedding ceremony

participation is less than 10, the impact on income depends upon the current number of connections. Table 7 reports the estimation, which is re-converted from IHS transformation, in terms of percentage increase in total income. While the first connection increases household total income by 3.72%, the eleventh connection helps increase household total income by only 0.364%. After the eleventh connection, the impact is stable at the elasticity level of 0.365%.

4.4 Governmental connections and general trust

The importance of connectivity is also suggested by the impact of governmental connection. All models demonstrate the statistically significantly positive impact of connecting to the government through the friend network. The evidence from the two-way fixed effect model illustrates that having a friend working in the government yields $100\times(e^{0.0739} - 1) \approx 7.7\%$ higher total income for a household. The positive impact of governmental connections is not observed for relatives and family members, which are supposed to be closer networks. Having a relative or a family member working in the government does not yield a positive impact on household income. The coefficients in all models are not statistically significantly different from zero. These empirical results are in line with Granovetter's (1973) hypothesis about "the strength of weak ties" of which weak ties could be sources of new information and knowledge.

General trust is a type of collective social capital that is often difficult to be measured. Using a binary variable of agreeing that "most people in the commune are trustworthy" as a proxy, all the models in Table 5 do not support the view that general trust helps to improve the household's total income[7]. In the two-way fixed effect model and two OLS models, the coefficient of general trust is statistically insignificantly different from zero. In the one-way fixed-effect model and random effect model, this coefficient is statistically significantly negative, which are -0.058 and -0.04, respectively. This finding suggests that the household of whom the head believes that almost all people in the commune were trustworthy would suffer from a loss in total income of about 4-6%. This result is consistent with the finding in Jumirah and Wahyuni (2018), of which the trust index yields a 0.3% decrease in household expenditure. However, the damaging impact of social capital in the form of general trust disappears when the time effect is included in the model. This finding suggests that the negative impact of general trust is a time-specific impact. We test this hypothesis by re-running the OLS model without time-specific for each year. The results show that the negative impact of general trust is found in 2012 but disappears in 2014. Indeed, macroeconomic data from World Bank Development Indicators[8] show that the year 2012 is one of the most challenging years for Vietnam since the 1990s when the country has suffered from many external shocks after the 2008 global financial crisis. The country's growth rate has reduced from the peak level of 7.5% in the period of 1999-2019 to the lowest level of 5.2% in 2012. It is even lower than the level of 5.4% in 2009. From this side, our results shed new light on the relation of general trust

[7] Using the binary variable of not agreeing that "In this commune, people should be careful because there are some people who are untrustworthy" as a proxy for general trust, this study also finds no impact of such collective social capital.

[8] https://data.worldbank.org/indicator

as the collective social capital. While in the regular time trust might facilitate opportunistic behaviors, in the difficult time, it can be exploited for self-interest at the expense of people who trust others.

5. Findings, remarks, and conclusion

5.1 Findings and remarks

This study illustrates that social capital is abundant and has positive impacts on household income in rural Vietnam. Among many dimensions of social capital, political and governmental connectivity is fundamentally important for improving household income. Having a family member in the Communist Party, the Communist Youth Union, or having a friend working in a governmental organization significantly improves the economic position of the household, which is 12.2%, 5.2%, and 7.7% on average, respectively. This study also presents that approaching governmental organizations through the friend network is much more important than the relative network or family member network. This finding could be seen as evidence for Granovetter (1973)'s "the strength of weak ties" argument. This study finds no positive impact of other massive organizations, which are often claimed to be important in rural Vietnam[9], such as the Farmers Association or the Women Association. If it exists, the impact of the Farmers Association might be negative due to the bonding group effect. In this sense, it represents damaging social capital, of which the utility cost is larger than the group's benefit. This finding helps to explain the high rate of leaving the Farmers Association between 2012 and 2014.

This study provides evidence that informal network is important in rural Vietnam. Connecting to the community through the participation of wedding ceremonies does not only increase the spiritual well-being but also works as a type of social capital to increase the household income. A household involving in the community through participating in the first wedding ceremony enjoys a 3.72% increase in total income, and the marginal effect decreases with the number of wedding participating.

While collective social capital in terms of the general trust is believed to generate a positive impact on economic well-being, this study finds no such impact on the income of rural households in Vietnam. More seriously, in a difficult time, general trust has a negative effect when households with opportunistic behaviors pursuit selfish-interest benefits at the expense of one who trusts others.

References

Bourdieu, P. (1986), "The forms of capital", in Richardson, J. (Eds), *Handbook of Theory and Research for The Sociology of Education*, Greenwood Press, pp. 241 - 258.

Bowles, S. and Gintis, H. (2002), "Social capital and community governance", *The Economic Journal,* Vol. 112 No. 483, pp. F419 - F436.

[9] For example, responding to a VARHS question of benefit when joining an organization, 17.3% of interviewees referred to Farmers Association as bringing economic benefit while only 1.4% said the same thing about the Communist Party

Burt, R.S. (1997), "The contingent value of social capital", *Administrative Science Quarterly*, Vol. 42 No. 2, pp. 339 - 365.

Coleman, J.S. (1988), "Social capital in the creation of human capital", *The American Journal of Sociology,* Vol. 94, pp. S95 - S120.

Coleman, J.S. (1990), *Foundations of social theory*, Harvard University Press.

Collier, P. (2002), "Social capital and poverty: a microeconomic perspective", in Puttnam, R., Grootaert, C. and Van Bastelaer, T. (Eds), *The Role of Social Capital in Development: an Empirical Assessment,* Cambridge: Cambridge University Press, pp. 19 - 41.

Cuong, L.V., Ngoc-Anh, N., Ngoc-Minh, N. and Simioni, M. (2018), "Growth strategy with social capital, human capital and physical capital - Theory and evidence: the case of Vietnam", *Journal of Public Economic Theory*, Vol. 20 No. 5, pp. 768 - 787.

Duranton, G. and Kerr, W. (2018), *The logic of agglomeration*, The New Oxford Handbook of Economic Geography.

FAO. (2014), "Promoting economic diversification and decent rural employment towards greater resilience to food price volatility", Available at http://www.fao.org/fileadmin/user_upload/fao_ilo/pdf/Papers/DRE_Food_ Price_Volatility.pdf (Accessed 03 March, 2021).

Fujita, M. and Thisse, J.F. (1996), "Economics of agglomeration", *Journal of the Japanese and International Economies*, Vol. 10 No. 4, pp. 339 - 378.

Granovetter, M.S. (1973), "The strength of weak ties", *American Journal of Sociology*, Vol. 78 No. 6, pp. 1360 - 1380.

Grootaert, C. (1998), "Social capital: the missing link?", Social Capital Initiative Working Paper Series No. 3, *World Bank Group*, Available at http://documents.worldbank.org/curated/en/902971468764409654/Social-capital-the-missing-link (Accessed 03 March, 2021).

Grootaert, C., Oh, G.T. and Swamy, A. (2002), "Social capital, household welfare and poverty in Burkina Faso", *Journal of African Economies*, Vol. 11 No. 1, pp. 4 - 38.

Ha, N.V., Kant, S. and MacLaren, V. (2004), "The contribution of social capital to household welfare in a Paper-recycling craft village in Vietnam", *The Journal of Environment & Development*, Vol. 13 No. 4, pp. 371 - 399.

Hoyman, M., McCall, J., Paarlberg, L. and Brennan, J. (2016), "Considering the role of social capital for economic development outcomes in U.S. counties", *Economic Development Quarterly*, Vol. 30 No. 4, pp. 342 - 357.

Jumirah, J. and Wahyuni, H. (2018), "The effect of social capital on welfare in Indonesia", *Journal of Indonesian Economy and Business*, Vol. 33 No. 1, pp. 65 - 76.

Krugman, P. (1991), "Increasing returns and economic geography", *Journal of Political Economy*, Vol. 99 No. 3, pp. 483 - 499.

Lam, H. and Khanh, T.X. (2019), "Nguoi Dang vien o vung nong thon moi", *Nhan Dan's Newspaper*, Available at https://nhandan.com.vn/chinhtri/dang-va-cuoc-song/item/39682102-nguoi-dang-vien-o-vung-nong-thon-moi.html (Accessed 03 March, 2021).

Levien, M. (2015), "Social capital as obstacle to development: brokering land, norms, and trust in rural India", *World Development*, Vol. 74, pp. 77 - 92.

Lewis, W.A. (1954), "Economic development with unlimited supplies of labour", *The Manchester School*, Vol. 22 No. 2, pp. 139 - 191.

Lucas, R.E. (1988), "On the mechanics of economic development", *Journal of Monetary Economics*, Vol. 22 No. 1, pp. 3 - 42.

Markussen, T. (2017), "Social and political capital in rural Vietnam", in Tarp, F. (Eds), *Growth, Structural Transformation, and Rural Change in Viet Nam: a Rising Dragon on the Move*, Oxford University Press, pp. 181 - 201.

Moyes, D., Whittam, G. and Ferri, P. (2012), "A conceptualization of the relationship capital of rural small service firms", *Local Economy*, Vol. 27 No. 2, pp. 136 - 151.

Nam, V.H., Sonobe, T. and Otsuka, K. (2009), "An inquiry into the transformation process of village-based industrial clusters: the case of an iron and steel cluster in northern Vietnam", *Journal of Comparative Economics*, Vol. 37 No. 4, pp. 568 - 581.

Nam, V.H. (2014), "The roles of human and social capital in the development of manufacturing SMEs in Vietnam", *Journal of Economics and Development*, Vol. 16 No.1, pp. 5 - 22.

Narayan, D. and Pritchett, L. (1997), "Cents and sociability: household income and social capital in rural Tanzania", SSRN Scholarly Paper ID 604937, *Social Science Research Network*, Available at https://papers.ssrn.com/abstract =604937 (Accessed 03 March, 2021).

Newman, C., Tarp, F. and Broeck K. (2014), "Social capital, network effects, and saving in rural Vietnam", *Review of Income and Wealth*, Vol. 60 No. 1, pp. 79 - 99.

Ngan, D.T. (2014), *Vai tro cua von xa hoi trong Xay dung nong thon moi (Nghien cuu truong hop xa Thuong Mo, huyen Dan Phuong, thanh pho Ha Noi)*, Master's thesis, Hanoi National University.

Portes, A. (1998), "Social capital: its origins and applications in modern sociology", *Annual Review of Sociology*, Vol. 24 No. 1, pp. 1 - 24.

Portes, A. (2000), "The two meanings of social capital", *Sociological Forum*, Vol. 15 No. 1, pp. 1 - 12.

Putnam, R.D., Leonardi, R. and Nanetti, R.Y. (1993), *Making democracy work: civic traditions in modern Italy*, Princeton University Press.

Quan, D.V. (2014), "Phat huy vai tro cua von xa hoi trong xay dung nong thon moi", Ly luan Chinh tri, Available at https://tapchitaichinh.vn/nghien-cuu--trao-doi/trao-doi-binh-luan/phat-huy-vai-tro-cua-von-xa-hoi-trong-xay-dung-nong-thon-moi-88283.html (Accessed 03 March, 2021).

Sabatini, F. (2008), "Social capital and the quality of economic development", *Kyklos*, Vol. 61 No. 3, pp. 466 - 499.

Tuyet, N.T.A. (2012), "Von xa hoi trong quan ly va phat trien nong thon nuoc ta hien nay", *Xa hoi hoc,* Vol. 2 No. 118, pp. 33 - 40.

Tuong-Anh, N.T. and Quynh-Anh, T. (2015), "Social capital in rural areas of Vietnam and its impact on Households' life satisfaction", *Journal of Economics and Development*, Vol. 17 No. 3, pp. 60 - 88.

Wiessinger, G. (2007), "The importance of social capital in rural development, networking and decision-making in rural areas", *Journal of Alpine Research - Revue de Géographie Alpine*, Vol. 95 No. 4, pp. 43 - 56.

Woolcock, M. (1998). Social capital and economic development: toward a theoretical synthesis and policy framework. *Theory and Society*, Vol. 27 No. 2, pp. 151 - 208.

Woolcock, M. and Narayan, D. (2000), "Social Capital: Implications for Development Theory, Research, and Policy", *The World Bank Research Observer*, Vol. 15 No. 2, pp. 225 - 249.

Appendices

Appendix 1

Logarithm and Inverse hyperbolic sine transformation

(1) Logarithm transformation of x: ln(x).

Consider the model $\ln(y) = \beta_0 + \beta_1.\ln(x) + \beta_2 X + \varepsilon$

$\Rightarrow \frac{\partial y}{\partial x} = \frac{\partial y}{\partial \ln(y)}.\frac{\partial \ln(y)}{\partial \ln(x)}.\frac{\partial \ln(x)}{\partial x} = y.\hat{\beta}_1.\frac{1}{x}$

$\Rightarrow$ The elasticity of y in respect with x: $e_{yx} = \frac{\partial y}{\partial x}.\frac{x}{y} = y.\hat{\beta}_1.\frac{1}{x}.\frac{x}{y} = \hat{\beta}_1$

(2) Inverse hyperbolic sine transformation of x: $IHS(x) = \ln(x+\sqrt{x^2+1})$

$\Rightarrow \frac{\partial IHS(x)}{\partial x} = \frac{1}{\sqrt{x^2+1}}$

Consider the model $\ln(y) = \beta_0 + \beta_1.IHS(x) + \beta_2 X + \varepsilon$

$\Rightarrow \frac{\partial y/y}{\partial x} = \frac{\partial y}{\partial \ln(y)}.\frac{\partial \ln(y)}{\partial IHS(x)}.\frac{\partial IHS(x)}{\partial x}.\frac{1}{y} = \frac{\widehat{\beta}_1}{\sqrt{x^2+1}}$

$\Rightarrow$ The elasticity of y in respect with x:

$e_{yx} = \frac{\partial y/y}{\partial x/x} = \frac{\widehat{\beta}_1}{\sqrt{x^2+1}}.x = \hat{\beta}_1 \frac{1}{\sqrt{1+\frac{1}{x^2}}} \approx \hat{\beta}_1$ (with $x \geq 10$)

Appendix 2

This appendix tests the hypothesis that the impact of Farmers association to household's total income is group effect. For example, being a member of an organization have its own utility cost since the member must follow the organization of discipline or regulation besides the financial responsibility of contributing fee. When the negative group effect is greater than the positive effect of collectively embedded resources within the group, the net impact of engaging in the social organization might be negative. Namely, the number of memberships itself does not significantly affect the household's total income, but having a connection with the group generates an impact.

Table A. 1. Models with "in-group" dummy variables

	Number connections		Dummy ingroup variable		Households with membership only	
	2012	**2014**	**2012**	**2014**	**2012**	**2014**
Farmers Association	-0.0538*	-0.0788***			0.00146	0.00693
Ingroup 2012			-0.0685**			
Ingroup 2014				-0.0891***		
Observation	2600	2600	2600	2600	1351	1322
Adjusted R^2	0.453	0.452	0.453	0.452	0.422	0.412

Source: Authors' estimation from VARHS 2012-2014

To test this hypothesis, instead of the number of connections, the OLS models are re-run with the dummy variable ingroup, which equals to 1 if the household has a family member in the Farmer Association in the year 2012 and 2014, respectively. Then, the OLS models are re-run to estimate the impact of the number of connections to the Farmers association within the household membership. With the full sample, the OLS results present a statistically significantly negative impact of having membership in the Farmers association. The coefficients of having membership (-0.0685 and -0.0891) are a little bit greater than the coefficients of the number of connections (-0.0538 and -0.0788). Within the members of the Farmer association, the number of connections has no impact on total income: the coefficients are very close and not statistically significantly different from zero.

This evidence supports the hypothesis that the Famer association has a group effect. Engaging in the Farmer association has a negative impact on household income. More connections might help to facilitate this negative impact, but it is not statistically significant. In the 2012 sample, 1351 or 52% of the household has membership in the farmer association. Among them, 217 or 16.1% will leave the farmer association in 2014.