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Social capital and household vulnerability

New evidence from rural Vietnam

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Abstract: Using the Vietnam Access to Resources Household Survey (VARHS) with a panel of households present from 2008 to 2016, the study investigates the impact of social capital on household vulnerability. The empirical results indicate that both commune shocks and household shocks are associated with the higher likelihood of having state-run group memberships, except for the case of the political party. Group membership is also strongly influenced by a number of household characteristics. Most importantly, participation in local organizations could reduce both households' probability of being poor and the utility loss caused by covariate risks. In addition, social capital shows its influence on some intermediate factors, which in turn contribute to the lower vulnerability at the household level. While participation in the Women Union or the Farmer Union reinforces the households' ability to overcome negative shocks, the memberships of the Communist Party and the Farmer Union are associated with a higher level of saving. Members of the Communist Party are more likely to possess insurance, and members of the Women Union and the Farmer Union have better access to general information. The findings imply that poverty reduction policies in rural Vietnam should consider the role of social capital, especially in the forms of group participation, as an e ffective informal coping strategy.

Keywords: fixed effects, social capital, vulnerability, VARHS, Vietnam
JEL classification: C26, D10, D30, 010, R20

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All tables and figures are placed at the end of the paper.

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1 Introduction

In recent years, the concept and empirical analysis of vulnerability have emerged in the development literature as the importance of the shift from a static to a dynamic poverty and from a certain to an uncertain frame is increasingly recognized. While poverty measurement is based on fixed standards such as income or expenditure during a short period, vulnerability broadens the poverty notion by including the potential risk of adverse shocks such as income loss, bad health, and natural disasters. Since vulnerability represents households' exposure to risks, a number of studies have investigated the impacts of factors such as microfinance, remittances, and health insurance on household vulnerability. From the development perspective, these factors take one or more forms of informal insurance or precautionary measures against risks. In fact, these factors would help households maintain their consumption before and after any negative shocks. Inspired by that research flow, this study contributes to the literature by investigating the potential impact of social capital as a coping strategy on household vulnerability.

Social capital is another prominent concept in the literature on development although it is defined and measured in various ways in different contexts. Both theoretical and empirical studies on social capital have confirmed its significant contributions toward household welfare as well as the economic development. According to Narayan and Pritchett (1999), there are five channels through which social capital influences different aspects of society. First, greater social capital is believed to help monitoring the performance and activities of the government better, both directly and indirectly. Second, enriching social capital in a community enables greater cooperation among individuals in that area. Even though this could be independent with the government, the cooperation in the community is revealed to be essential in solving problems relating to "common poverty". Third, social capital is also found to associate with stronger connections of individuals, which lead to the diffusion of innovations. Furthermore, a person who actively invests in social capital is likely to have more association activities, which then helps him to approach "less imperfect information" sources. This is also the fourth mechanism impact of social capital. Finally, increasing social capital creates an informal safety net as it enhances the sharing of risks and opportunities among people in the community. Surprisingly, since social capital is viewed as a coping strategy, there is currently no research on the interaction between social capital and household vulnerability.

Using the Viet Nam Access to Resources Household Survey (VARHS) with a panel of households present from 2008 to 2016, the study firstly investigates whether shocks and household characteristics affect household social capital accumulation through participation in local groups. The most important question is that whether social capital explains variations in household vulnerability. In addition, to examine the intermediate path leading to vulnerability, the study analyses the impact of social capital on saving, transfer, ability to cope with shocks, insurance, and access to information. In this study, households' social capital is measured by local group membership of the Communist Party, the Women Union, and the Farmer Union. Vulnerability is estimated by two popular measures: vulnerability as expected poverty and vulnerability as low expected utility. We choose Viet Nam as our empirical context because the country has attained remarkable progress in reducing poverty over the last two decades and becomes one of the great examples of poverty reduction in Asia (World Bank 2011, 2013).

The empirical results indicate that participation in local organizations could reduce both households' probability of being poor and the utility loss caused by covariate risks. Additionally, social capital shows its influence on some intermediate factors, which in turn contribute to the lower vulnerability at household level. While participation in the Women Union or the Farmer Union reinforce the households' ability to overcome negative shocks, the memberships of these organizations also encourage the households' saving. Members of the Communist Party of Viet Nam are more likely to possess insurance, and members of the Women Union and the Farmer Union are able to access information better.

The findings imply that poverty reduction policies in rural Viet Nam should consider the role of social capital, especially in the forms of group participation, as an effective informal coping strategy.

The rest of the paper follows this structure: Section 2 provides a literature review on vulnerability and social capital. Section 3 describes the background of social capital in Viet Nam with information on participation in social associations, as well as the context of Viet Nam society. Data and variables used are characterized in Section 4, while Section 5 summarizes the analytical framework and methodology employed in the paper. Section 6 shows descriptive statistics and empirical results. Section 7 presents further discussion from the results. The conclusion and policy implications are presented in the final section.

2 Literature review

2.1 Vulnerability to poverty

The static poverty estimation focuses on those who were (or are currently) poor and provides only *ex post* information on household welfare. Such an approach allows us to identify whose poverty needs to be alleviated or to measure the impacts of past public interventions on the extent of poverty. However, results do not predict the trend of poverty, and therefore do not reveal whether a poor household will escape from poverty or will remain poor in the near future. The measure of who is currently poor is not sufficient for effective forward-looking anti-poverty interventions due to the fact that households move out of or into poverty from one year to the next. From the policy perspective, governments and policymakers are more interested in the impact of their policies in the future. For this reason, it would be valuable to be able to identify those who are expected to be poor *ex ante* (that is, in the future). Such households are considered as vulnerable to poverty.

The concept of vulnerability is interpreted in various ways in different contexts. In economics, the vulnerability's definition emerges from the concept of poverty. For example, from the traditional view of poverty reflected in World Development Report 1990, the notion of poverty consists of material deprivation and low attainment in education and health (World Bank 1990). Later, the term 'vulnerability' is mentioned when examining the relationship between poverty and uncertainty of income (Morduch 1994). Since then, the term 'vulnerability' is often used to extend the traditional concept of poverty. While poverty measurement is based on fixed standards such as income or expenditure during a short period, vulnerability broadens the poverty notion by including the potential risk of adverse shocks such as income loss, bad health (idiosyncratic risks), and natural disasters (covariate risks). For example, in the work of Glewwe and Hall (1998) and Cunningham and Maloney (2000), vulnerability is defined as exposure to negative shocks that impact on welfare. It is also defined as "the probability or risk today of being in poverty or to fall into deeper poverty in the future" (World Bank 2001) or "the ex-ante risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty" (Chaudhuri 2003).

Since the concept of vulnerability is strongly connected to concepts of poverty, a number of studies have conceptualized and empirically investigated vulnerability to poverty. Among early studies are the work of Pritchett, Suryahadi, and Sumarto (2000), Christiaensen and Boisvert (2000), and Chaudhuri (2003). In these papers, vulnerability is defined as the probability of falling below the poverty line in the future, and household consumption is used to reflect household welfare. The time period varies from one to three consecutive years in the future. Later papers of Kamanou and Gamanou (2002), Ligon and Schechter (2003) and Christiaensen and Subbarao (2005) modify this framework to take into

account the depth of the loss. Based on these works, Calvo and Dercon (2005) propose a new measure of vulnerability that is sensitive to the size of the loss.

Regardless of how vulnerability is interpreted and what measures are used, most empirical studies attempt to address vulnerability in developing countries, especially in rural areas where household income suddenly fluctuates due to various downside risks such as changes in weather, floods, food prices, illness, and so on (Dercon, Hoddinott, and Woldehanna 2005; Christiaensen and Subbarao 2005; Gaiha and Imai 2008; Azam and Imai 2009; Novignon 2010; Jha, Kang, Nagarajan, and Pradhan 2012).

There are a number of studies exploring both poverty dynamics and vulnerability in Viet Nam. One of the interesting papers is Giang and Pfau (2009). They compare household average per capita expenditure to the poverty line and then use the probit model to determine factors that affect the probability of being poor for Vietnamese elderly. However, in this paper, the influence of living arrangements and household head characteristics is insignificant. While the measure in this paper is fit for the cross-section data from Viet Nam Household Living Standard Survey (VHLSS) 2004, it is an *ex post* measure rather than an *ex ante* measure which is more appropriate for the vulnerability concepts. Imai, Gaiha, and Kang (2011) apply the vulnerability as expected poverty (VEP) measure proposed by Chaudhuri, Jalan, and Suryahadi (2002) and Chaudhuri (2003) for panel data constructed from the Viet Nam Household Living Standard Survey (VHLSS) in 2002 and 2004. However, by using only VEP measure, the authors cannot distinguish covariate risks from household idiosyncratic risks. Later, Vo (2018) contributes to the literature by adopting the reference line proposed by Dutta, Foster, and Mishra (2011) instead of the poverty line to estimate vulnerability to poverty in Viet Nam.

An outstanding effort to explore vulnerability in Viet Nam comes from the project “Impact of Shocks on the Vulnerability to Poverty: Consequences for Development of Emerging Southeast Asian Economies" by the German Research Foundation with its many contributing authors Klasen and Waibel (2010). This project carried out a panel survey of about 4,400 households in three provinces in Thailand and Viet Nam in 2007 and 2008 Hardeweg and Waibel (2009). A number of papers have been written using this data set (Hardeweg, Wagener, and Waibel 2013; Povel 2015). One disadvantage of these studies lies in the coverage of the data set. In Viet Nam, data is collected in three provinces located in central Viet Nam where households’ living conditions are completely different to the North and the South. Therefore, the results of these studies cannot be generalized to over sixty provinces in Viet Nam.

2.2 Social capital

The work of Putnam, Leonardi, and Nanetti (1993) is probably one of the most popular studies which first defines social capital and sets a foundation for future research to develop on this topic. Putnam et al. (1993) define social capital as the characteristics of social organizations that promote cooperation for mutual benefits, these features of social organizations could be social networks, norms or social trust. Later, Narayan and Pritchett (1999) propose three dimensions of social capital, including the membership in voluntary organizations, the existence of social norms as well as its role in society, and the degree of trust, which represents the attitudes of individuals toward others. Since then, empirical research defines social capital based on the context of the study and the availability of data. For instance, Dasgupta (2005) gives a short definition of social capital as nothing more than “interpersonal networks” so that it could not prejudge the quality of the asset. Meanwhile, other studies consider social capital as valuable assets which can be used to gain benefits. Particularly, Newman, Tarp, and Van Den Broeck (2014) describe that social capital is the act of sharing information through membership in the Women’s Union in the case of Viet Nam, while Fukuyama (2001) implies it as a social pattern that encourages the cooperation between individuals. Social capital, along with its added values, is also supposed to

change the way people cooperate with each other and facilitate "productive relationships" in the working environment and other informal forms of organizations (Bowen 2009).

Social capital and poverty

A number of empirical studies highlight the impact of social capital on household welfare. For example, Narayan (1997) finds that village-level social capital and the participation in groups were found to alter household welfare remarkably. A study of Narayan and Pritchett (1999) indicates that each standard deviation growing in the social capital of a small town increases the household income by 20 to 30 per cent, and that the effect of social capital is triple that of the education level on income. In other studies, social capital helps to reduce poverty in different aspects. Results of Grootaert and van Bastelaer (2001) indicate that social capital makes rural development projects more efficient by boosting the productivity of agriculture and the partnership between farmers, as well as making trading in countrysides more beneficial. Again with rural areas, Grootaert and Narayan (2004) show that social capital, determined by the enrollment in agrarian federations and other associations, not only alleviates poverty but also improves the prosperity of households. The impact of social capital on lives of the poor is even greater than that of other factors in the study.

However, investigating the correlation of social capital and household welfare in South Africa from 1993 to 1998, Maluccio, Haddad, and May (2000) find no effect of social capital in 1993, yet a noticeable positive impact was then discovered in the year 1998. In addition, although social capital could help the poor increase their income, impoverished households in remote regions are still having trouble joining community associations (Tenzin, Otsuka, and Natsuda 2015).

Social capital, microfinance and saving

Social capital can facilitate access to microcredits. Geleta (2014) identifies that social position and power structures, which represent the social capital of a certain person, is likely to help people in the process of getting advantages from credit access. However, it is partly true for the whole society. Because despite the fact that the creation of group–based microfinance does encourage cooperation and development as a whole, the system is not as friendly for the poor as it is supposed to be. Geleta (2014) argues that the poor, especially those who are among the poorest, do not always get associated and connected to one another. As a result, they are ruled out to have access to credit from microfinance institutions. By contrast, Amin, Rai, and Topa (2003) found a testimony showing how microcredit actually reached the poor in Northern Bangladesh from 1991–1992, but similarly to Geleta (2014)'s conclusion, the micro credit programs did not reach the vulnerable poor as strongly.

Furthermore, Dufhues, Buchenrieder, and Quoc (2012)'s findings indicate that social capital has an impact on the performance of loan repayment. Maclean (2010) proposes that financial institutions' intervention which takes advantages of women's social capital to raise income generation could work out differently in distinct places. While networks of women in town are likely to encourage the loan repayments, that of women in hamlets could conversely lead to further debts borrowed from people in their social networks, namely friends and family. Thus, when it comes to identifying the role of social capital in economic development in general and financial issues in particular, the structures of social capital is significantly important and should be considered carefully (Maclean 2010). Similarly, Newman et al. (2014) find a relationship between social capital and saving. Nevertheless, by combining the membership in local organizations, heterogeneity of networks, and degree of trust as three key dimensions to measure social capital index, Akram and Routray (2013) discover an opposite result from most stud-

ies. The findings reveal that the social capital index has no critical influence on the participation of households in microfinance.

Social capital, coping strategies, and consumption

Social capital has an influence on how households and communities cope with various risks. As for households, Carter and Maluccio (2003) point out that social capital is not only an influential determinant of households' welfare, but it also helps them to overcome losses, including negative economic events such as job loss, property losses, or government's cut–offs. The research also indicates that households in communities that have bigger social capital are more likely to be able to absorb idiosyncratic shocks. Likewise, according to Moser (1996), the capability of communities to cope with economic difficulties is remarkably affected by their social capital, which combines trust, connections, and social networks of the community. However, social capital could be easily influenced by macroeconomic negative changes such as the economic crisis in two different ways. On the one hand, changes in the economy strengthen networks of individuals as that is the time when they need support the most. On the other hand, crisis time witnesses the community trust breaking down, and social capital is eroded as a result (Moser 1996). Skoufias (2003) notes that households in Bangladesh were found to borrow more money, while South African's depended on the support of local networks to face their crisis after the 1998 floods. Social capital is also believed to help immigrants a great deal in adapting to a new environment (Hasanah 2015). Additionally, Grootaert (1999), by analysing the participation in local organizations of households in Indonesia, informs that social capital of households relates positively to expenditure. Moreover, households with a higher level of social capital are likely to have more savings, assets, and improved access to credit.

3 Background of social capital in Viet Nam

Social capital of individuals in Viet Nam takes a variety of forms: the relationship with family, relatives, or the social networks in communities and official social associations (the Communist Party of Viet Nam, Government and union organizations, etc.); and other social networks, such as political or organizational networks (Chien 2013). Among that, the family is believed to have a central role in the social life of most Vietnamese. R. Dalton, Hac, Nghi, and Ong (2002) find that 59% of Vietnamese spend time with the family or relatives every week, while 32% socialize with colleagues and only 17% hang out with friends weekly. Furthermore, the difference between family and other social networks' activities in Viet Nam is greater than that in other Asian countries, particularly China, Japan and the Philippines, even though they also have family as the most important network themselves. Specifically, Japanese, Filipinos and especially Chinese highly appreciate networks relating to work, 62% of the Chinese would spend time with their colleagues weekly, while the figures of the Philippines and Japan are 34% and 21% respectively. R. Dalton et al. (2002) show that Vietnamese are likely to take friendships for granted since they meet up with friends just half as much as Chinese and Filipinos do.

However, as the economy in Viet Nam is growing remarkably, society has also changed and modernized considerably. Consequently, networks relating to work are becoming more important now to a lot of people in Viet Nam. In addition, Vietnamese are also paying more attention to institutionalized social networks, for instance, community groups, sport or culture groups (R. Dalton et al. 2002), groups fighting for development/human rights, political or professional, and voluntary health groups (R. J. Dalton and Ong 2004). Particularly, at least 20% of the population were exposed to have membership in such associations. Also, every typical Vietnamese is a member of 2.33 groups; the number is higher than that of Chinese (0.91), Japanese (1.41), and Filipinos (1.93).

Similarly, empirical research of Norlund (2005) indicates that modernization seems to weaken or replace traditional networks by new networks. This point of view is also shared in the study of R. Dalton et al. (2002), who suppose that social modernization is changing social networks, in a way that broadens more social relations. These new networks, in turn, may include official ones involving the Government. In other words, bonding and bridging relationships are likely to be replaced by linking social capital (Norlund 2005). In Viet Nam, some of the largest national organizations with a considerable amount of participation are the Vietnamese Women's Association, the Ho Chi Minh Youth Union, the Viet Nam Farmers Association, and the Vietnamese Confederation of Labor. Moreover, R. Dalton et al. (2002) suggest that members of the Youth Union seem to be more encouraged in advanced careers and such groups for younger population could grow more in the future.

Studies for the case of Viet Nam confirm that social networks play a positive role in improving the livelihoods of the population through different channels. Firstly, it is the relationships among family members, neighbours, friends and colleagues that connect people in the society. In Viet Nam, the reliability of individuals on other people is rather high, contacts between relatives, friends and acquaintances happen frequently. Especially, Vietnamese are likely to depend massively on their close relationships, such as family, relatives, and close friends (Shimane 2013). Secondly, by socializing or participating in a social organization, a person can have advanced access to different sources of information. Such information includes information about new job offers, opportunities for studying, or public services. Thirdly, during illness and injury time, help from close relationships like family and relatives is very important to a typical Vietnamese (Shimane 2013).

There have been quite a few studies investigating the association between social capital and poverty for the case of Viet Nam. These papers focus on various aspects, such as the impact of social capital on loan repayment performance (Dufhues et al. 2012), on saving behaviour (Newman, Tarp, and Broeck 2011), or on the ability to cope with climate change (Nam 2011). Another study combines social capital with political capital and tests their clout on household income in rural areas (Markussen 2015). Most research is likely to take place in rural areas of Viet Nam (Carlsson, Johansson-Stenman, and Nam 2014; Newman et al. 2014; Markussen 2015) and uses data from the Viet Nam Access to Resources Household Survey (VARHS) (Newman et al. 2014; Markussen 2015).

4 Data

Data for this empirical analysis is extracted from five rounds of Viet Nam Access to Household Resources Survey (VARHS) implemented biannually from 2008 to 2016, which is conducted and supported since 2002 by the University of Copenhagen (Denmark) in collaboration with the Centre Institute of Economic Management (CIEM), the Institute for Labor Studies and Social Affairs (ILSSA) and the Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD). The purpose of the survey is to gather data associated with Vietnamese rural households' access to resources and the constraints that these households face in managing their livelihoods. Along with detailed demographic information for each household member, the surveys also include sections on household assets, saving, credit (both formal and informal), formal insurance, shock and risk coping, informal safety nets and social capital related information (Wainwright and Newman 2011). Besides the household level survey, the VARHS include a commune level survey conducted at every commune where the households reside as well. The final result is a commune level dataset with information on commune demographics, infrastructure, and local economic conditions.

The first pilot survey was conducted in the 2001-2002 period, since then, the number of households included in the survey gradually increases throughout the rounds. In 2008, the total surveyed households were expended to more than 2,300 households, covering 12 provinces – Dak Lak, Dak Nong, Dien Bien,

Ha Tay, Khanh Hoa, Lai Chau, Lam Dong, Lao Cai, Long An, Nghe An, Phu Tho, and Quang Nam – in the Red River Delta, Northern Mountain, the Centre Coast and Mekong River Delta. Field survey for each round was concluded within a three–month period to ensure consistency and facilitate reasonable comparison across time. More on sampling technique, sample attrition and comparison between VARHS and VHLSS can be found at Brandt and Tarp (2015).

The final balanced dataset contains 1,822 households in 410 communes for each year from 2008 to 2016, which makes 9,110 observations in total (see Table A1). About 200 observations were dropped from the original panel data due to mismatch of commune code between household dataset and commune dataset.

5 Analytical framework and methodology

Measuring social capital

There are numerous ways to measure social capital and its effect on health, income, consumption, poverty, loan and saving. One could create a social capital index by combining several social capital measurements into an index using various statistical methods, i.e. principal component analysis or factor analysis (Lee, Jeong, and Chae 2011; Akram and Routray 2013; Atemnkeng and Vukenkeng 2016), or consider only single-item indicators as proxies for social capital. Thus, measuring social capital is a challenging task, especially when social capital is a concept which has no agreement on its definition (Edwards 2004). Social capital measurements range from the most basic, which is bridging and bonding social capital, to a much comprehensive approach, which consists of multi-dimensions in both micro (individual) and macro (community, country) level, as listed by Engbers, Thompson, and Slaper (2016): trust, formal membership and participation, altruism and political engagement, informal interaction, shared norms.

In section 10 of each VARHS survey, there are questions about group membership, group participation, the benefit of joining groups, trust in a commune, social relationship and activities, as well as the household's political connections. In this study, the analysis only focuses on group membership (as used by Maluccio et al. (2000); Lee et al. (2011); van Beuningen and Schmeets (2012); Newman et al. (2014)) with some modifications.

Trust indicators were used widely by some researchers in social capital research (Johannes 2009; Lee et al. 2011; Nam 2011; van Beuningen and Schmeets 2012; Engbers et al. 2016), but because the questions on trust are no longer included in the VARHS survey as of 2016, the indicators were not considered for analysis. Additionally, the usage of trust questions in a survey to measure social capital is also a matter of concern for Glaeser, Laibson, Scheinkman, and Soutter (2000) due to its uncertainty effect. Trust may or may not gain benefit for the trustee, but will almost always benefit the trustee, as argued by Glaeser, Laibson, and Sacerdote (2002).

Group membership is regarded as if any members in the household currently is a member of any of the fourteen most common organizations in Vietnam. These include the current Communist Party of Viet Nam (CPV) – the ruling and sole political party in Viet Nam, plus social–political organizations or mass organizations, which are Youth Union (YU), Women Union (WU), and Farmer Union (FU).

Despite being an active and strong organization, YU's role is only limited within schools, universities, and government agency. The ultimate goal for one to join and participate in the YU is to be recommended by the YU to join the CPV. There is also an age limit, members of the YU can only be between

14-35 years old (Communist Youth Union Charter 2012; Communist Youth Union Charter Guild 2012), thus being a member of the YU does not offer much but a pathway to the CPV if one can stay active within the YU long enough to be considered by higher–ranking members to join the CPV. Hence in this study, only members of the CPV, WU, and FU are considered for analysis due to its tie to the political environment of Viet Nam. To join or to have connections with any of these three organizations could lead to better access to public services. For example, easier to participate in state credit program (Newman et al. 2011), better access to health, education facilities, and acquire financial support from the state, especially support for the poor and near–poor[1].

Following Newman et al. (2014), the score of participation in a group is measured by the aggregate number of active members of each organization in each household. Active means that a member must almost always participate in meetings with his/her organization[2]. This aggregation assumes that households with the higher participating score for a state–sponsored group will have more access to valuable information and a stronger tie with that group, which facilitates access to public services, thus could reduce the vulnerability and raise the benefit of the household itself.

Determinants of group participation

At first, we investigate if household characteristics and shocks influence the household's participation in local groups. For that purpose, the multivariate probit model is utilized due to the fact that households can participate in more than one group simultaneously in order to seek help after they confront shocks. This model allows for a correlation among different group participation.

According to Cappellari and Jenkins (2003), the multivariate probit model can be described as below:

$$R^*_{im} = \beta_m \cdot X_{im} + \varepsilon_{im} \tag{1}$$

Where ε_{im}, $m = 1,...,M$ are error terms distributed as multivariate normal, each with a mean zero, and variance-covariance matrix V, where V has values of 1 on the leading diagonal and correlations $\rho_{jk} = \rho_{kj}$ as off–diagonal elements (Cappellari and Jenkins 2003). Next, R_{im} represents outcomes for M different choices of groups at the same point in time. Thus, $R_{im} = 1$ if $R^*_{im} > 0$, and 0 otherwise. X_{im} represents both household's characteristics and the poverty rate of the commune.

Note that the decision of group participation depends not only on household characteristics but also on the adverse risks which a household encounters. Therefore, the model includes the number of total nature shocks in a commune and the number of total shocks in a household.

Vulnerability as expected poverty (VEP)

Vulnerability as expected poverty is a vulnerability measure which was first proposed and applied to Indonesian household data by Chaudhuri (2003). This household vulnerability is defined as the likelihood that a household will fall into poverty in the next period. VEP can be estimated through the following procedures, beginning with the consumption function:

$$\ln c_i = \alpha + \beta \cdot X_i + e_i \tag{2}$$

[1] According to Circular 04/2007/TT-BLDTBXH (2007); Circular 25/2008/TT-BLDTBXH (2008), the FU, and the WU are in charge of screening and identifying poor and non-poor household in the commune for receiving state support.

[2] This membership measure takes into account the intensity of participation, but not the size of the network within an organization.

where c_i is per capita consumption expenditure for household i, X_i represents a vector of observable household characteristics (head age, marital status, highest education qualification of household head, female ratio, dependent ratio[3], whether the household is purely agricultural) and commune characteristics (total households in the commune, whether the commune receives special support from the government, commune poverty rate[4], and infrastructure information), β is a vector of parameters to be estimated, and e_i is a mean-zero disturbance term that captures idiosyncratic shocks that lead to different levels of per capita consumption.

With cross-sectional data, Chaudhuri (2003) suggests using the three-step Feasible Generalized Least Squares (FGLS) technique to have the predicted household consumption. This estimator accounts for the possibility of unobserved heterogeneity. In this study, we have a panel data; then we can control for unobserved household–level effects. Therefore, the fixed effect model is employed to estimate expected log consumption, $\widehat{\mathrm{E}}[\ln c_i|X_i]$, and the variance of log consumption, $\widehat{\mathrm{Var}}[\ln c_i|X_i]$. Assuming that $\ln c_i$ is normally distributed, then the estimated probability that a household will be poor in the future (for example, at time $t+1$) is given by:

$$\widehat{v}_{i,\text{Chaudhuri}} = \widehat{\Pr}(\ln c_i < \ln z|X_i) = \Phi\left(\frac{\ln z - \widehat{\mathrm{E}}[\ln c_i|X_i]}{\sqrt{\widehat{\mathrm{Var}}\left[\ln c_i|X_i\right]}}\right), \tag{3}$$

Where $\Phi(.)$ is the cumulative function of the standard normal and z is the actual poverty line. Unfortunately, household consumption expenditure is not available in the VARHS. As a result, we decide to use total income as a substitution for household consumption. The poverty lines used in this study are the national poverty line generated from household income by MOLISA[5]. Then the vulnerability index is the probability of falling into poverty according to the national standard.

Vulnerability as low expected utility (VEU)

Ligon and Schechter (2003) define vulnerability as the variation between the utility derived from a certainty-equivalent consumption (z_{ce}) at and above which the household would not be considered vulnerable and the expected utility of consumption. This certainty-equivalent consumption is similar to the poverty line. Consumption of household (c_i) has a distribution that illustrates different states of the world, so the form of vulnerability measure is given below:

$$\mathrm{V}_i = \mathrm{U}_i(z_{ce}) - \mathrm{EU}_i(c_i) \tag{4}$$

where U_i is a weakly concave, strictly increasing function. The proposed form for utility is:

$$\mathrm{U}(c) = \frac{c^{1-\gamma}}{1-\gamma} \tag{5}$$

Where γ is household coefficient on relative risk aversion or household sensitivity to risk and inequality. From the empirical literature, $\gamma = 2$ is a good approximation of this measure.

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[3] A household member is classified as a dependent if he or she is under 15 or over 65.

[4] The commune poverty rate is calculated by dividing the total poor households according to MOLISA standard by the total households in the commune. Information on these variables is provided in the commune dataset for each year.

[5] There are two parallel approaches to poverty measurement in Viet Nam using national poverty lines. The first approach developed and led by the Ministry of Labor, Invalids, and Social Affairs (MOLISA), is based on income and is used primarily for targeting social programs. The second was developed by the General Statistical Office and the World Bank, is based on consumption and is used chiefly for monitoring poverty over time.

Equation (4) can be decomposed as shown below:

$$\begin{aligned} \mathrm{V}_i = & [\mathrm{U}_i(z_{ce}) - \mathrm{U}_i(\mathrm{E}c_i)] && \text{[Poverty or inequality]} \\ & + [\mathrm{U}_i(\mathrm{E}c_i) - \mathrm{EU}_i(\mathrm{E}(c_i|x_t))] && \text{[Covariate or aggregate risk]} \\ & + [\mathrm{EU}_i(\mathrm{E}(c_i|x_t)) - \mathrm{EU}_i(c_i|x_t, x_{it})] && \text{[Idiosyncratic risk]} \\ & + [\mathrm{EU}_i(c_i|x_t, x_{it}) - \mathrm{EU}_i(c_i)] && \text{[Unexplained risk and measurement error]} \end{aligned} \tag{6}$$

This VEU approach is useful because it reveals the contribution of each major factor on household vulnerability to poverty. The first term measures poverty where $\mathrm{E}c_i$ can be estimated by:

$$\mathrm{E}c_i = \frac{1}{T}\sum_{t=1}^{T} c_{it} \tag{7}$$

Ligon and Schechter (2003) normalize the expenditure and income per capita so that the average expenditure and income per capita over all households in all periods become unity, and therefore z in the above equation equals one. Therefore, the first term measures inequality as well.

The second and third terms measure covariate risk and idiosyncratic risk, respectively, where $\mathrm{EU}_i(\mathrm{E}(c_i|x_t))$ and $\mathrm{E}(c_i|x_t, x_{it})$ can be estimated by:

$$\mathrm{E}(c_i|\bar{X}_t) = \alpha_i + \eta_t \tag{8}$$

$$\mathrm{E}(c_i|\bar{X}_t, X_{it}) = \alpha_i + \eta_t + \beta \cdot X_{it} \tag{9}$$

In the Equation 9, α_i capture the effect of household fixed characteristics; η_t capture the impact of changes in covariates or aggregates which are the same across households; and β reflects effects of household characteristics or other observable factors on consumption.

The last term measures unexplained risk or measurement error obtained by subtracting the first three terms from VEU.

In Equation 9, the income variable may be endogenous if it is treated as an explanatory variable for consumption because there may be a feedback relationship between income and consumption. Therefore, we employ the instrumental variable (IV) estimation for Equation 9 in which income is perceived as an endogenous variable.

Impact estimation with Fixed–effects model (FE)

After having VEP and VEU, the impact of social capital on household vulnerability to poverty can be addressed by adopting various estimators for a panel data set. The first technique is the fixed–effects estimator which eliminates the bias from time–invariant unobservable variables. The standard fixed–effects model is estimated as:

$$V_{it} = \alpha + \beta \cdot SC_{it} + \gamma \cdot IH_{it} + \lambda \cdot CS_{it} + \mu \cdot X_{it} + C_t + \varepsilon_{it} \tag{10}$$

where: V_{it} denotes the vulnerability level which is estimated by vulnerability as expected poverty (VEP) or vulnerability as low expected utility (VEU); i refers to the household; t denotes the time when data was collected.

SC_{it} represents the level of social capital of each household. β reflects the impact of social capital on vulnerability. Following the approach of (Newman et al. 2014; Markussen and Tarp 2014; Markussen 2015), in this study, the proxies of social capital are the participating score - the total number of active member in the household - in the Communist Party, Women's Union and Farmers' Union.

IS_{it} is used to control for the impact of idiosyncratic shocks that a household experienced. Include Health-shock, which is represented by the number of shocks household had faced since in the last preceding two years.

CS_{it} is used to control for the impact of covariate shocks that a household experienced in the past two years. These include total shocks that affected the commune as a whole.

X_{it} is the vector of baseline characteristics of households at the time of interview. They include household per capita income, head age, marital status, female share, dependent share, education, agricultural job.

C_t represents any commune impact. This includes a total number of households in the commune, whether the commune receives special support from the government, poverty rate, distance to the regular market, having a secondary school or not, distance to the bus station.

Impact estimation with Fixed effect model and PSM (FE–PSM)

There is concern that initial household characteristics and pre–existing social–economic attributes might influence the decision to participate in an organization and the subsequent vulnerability of households. Then there are potential sources of selection bias. To correct for these sources of bias, we should control for the initial conditions as well as time–varying factors that might influence the group membership. One possible way is to employ PSM approach to choose appropriate counterfactuals from the sampled non–membership (Ravallion and Chen 2007; Chen, Mu, and Ravallion 2008). The matching method will create the non–membership groups that possess similar characteristics except for the group membership. With this approach, our sample for analysis will exclude non–membership households with propensity scores that do not overlap with those for the membership group.

In this case, the measure treats membership of an individual or individuals in the same group as single group membership for the household, and this implicitly assumes that having more than one member in a group does not increase social capital (Maluccio et al. 2000). First, we carry out PSM for each round and match the constant membership households for five rounds with non-membership households in each round. Then we drop out all the households that do not match or distribute outside the common support region. The fixed effect model is applied to the reconstructed panel data in which membership households have been matched with non–membership households (Imai and Azam 2012).

Impact estimation with Instrumental variables for group participation

Another concern is that the FE models could include the potential endogeneity bias due to possible reverse causality of vulnerability and households' social capital. Group participation may help households reduce vulnerability or exposure to risks, but if members of vulnerable households tend to join groups for anticipated benefits, then actual impacts would be underestimated, and the estimated coefficients will be downward biased. Under this circumstance, the IV estimates of the effect of social capital would be larger.

To serve as valid instruments for group participation, the instruments (e.g., z) must be exogenous (i.e., Cov(z, ε)=0), and they must be correlated with group participation variable (i.e., Cov(z, β) $\neq$ 0). In this study, we follow Maluccio et al. (2000) to instrument for the social capital rendered in the group memberships using four variables: 1) lagged household level social capital; 2–4) interactions of the total number of active organizations in the community with head age, head age squared, and household highest qualification. An organization is considered active in the community when there is more then one person in the sample is a member of that organization.

Social capital and coping strategies

We extend the analysis by examining the influence of group participation on various coping activities of households such as saving, informal transfer, ability to cope with shocks, insurance, and access to information. The fixed effect model is employed for this task. The model specification is identical to the model estimating the influence of social capital on vulnerability. However, at this stage, we replace the VEP and VEU by coping activities.

6 Empirical results

Descriptive statistics

Table A1 indicates the distribution of households in our sample across provinces over the period 2008 to 2016. As can be seen from the table, there is a total of 9,110 households spreading throughout twelve provinces, ranging from the North (Ha Tay, Lao Cai, Phu Tho, Lai Chau, Dien Bien) to the Center (Nghe An, Quan Nam, Khanh Hoa), the Central Highlands (Dak Lak, Dak Nong, Lam Dong) and the South (Long An). The number of households in every province remains the same during the study period. Two provinces in the North (Ha Tay and Phu Tho) account for the largest share of the total sample, 24% and 13% respectively. Three provinces in the Central Coast comprise the second largest proportion (totally 24%), while provinces in the Northern mountain, the Central Highland, and the South take nearly equal share, about 12–13% for each. Due to the enrollment rules, participation rates in the WU and the FU are much higher than that in the CPV. Notably, participation rates in the Northern region, where the central government is located, are rather higher than that of the rest of country. Households in Long An, a province situated next to Ho Chi Minh City–the most dynamic city, are least interested in local groups.

Figure 2 illustrates the average expenditure of households in social activities before and after joining the three formal organizations. Overall, spending on social activities increases over the period, and for most cases, money spent on those activities after joining groups is much higher than before getting involved. First, the cost for hosting parties of households after participating in the CPV is significantly higher than before they join the group, while that for households in the WU and the FU only changes slightly. The second and third sub–figures show the expenditure of households on parties, which changes most remarkably for households in the WU. In the period 2012–2014, before evolving in the WU, households spend an average of under 5 VND million per year for attaining parties, after that, the figure increases to almost 30 VND million. Next, spending on alcohol fluctuates a lot. From 2008–2012, households spend more on alcohol after joining groups, regardless of which. The figure decreases in the next period and then increases again. However, the changes, especially for households in the FU, are inconsiderable. The last two groups of social–activity cost present almost the same pattern. Except for the food cost after 2014, spending on food and Tet (the Lunar new year) grow dramatically over the years. For example,

before having the membership in the CPV, a typical household spent approximately 15 VND million on food in 2010–2012, after joining the group, the family would spend almost 33 VND million on the same category. The changes for spending in Tet holiday after joining an organization are also most prominent among household in the CPV.

Participation in the CPV, the WU, the FU by years and by income quintiles is illustrated in Figure 1. As can be seen from Figure 2(a), the number of households participating in the CPV increases gradually in the period from 2008 to 2016. By contrast, the amount of households with membership in the WU and FU goes up from 2008 and reaches the peak in 2012 before falling slightly until the end of the period. Figure 2(b) presents membership of households divided by four groups of income. Households with higher income are more likely to involve in the CPV. However, households in the richest quintiles (group IV) are less likely to take part in the FU while the first three quintiles (group I, II, and III) show almost no difference in joining the WU and the FU.

Determinants of group participation

Table A3 reports the results for the multivariate probit model used to investigate the choice of participation in three major organizations in rural Viet Nam. The coefficients of the age of household head are significant, showing positive impacts on the chance of joining all three organizations. Each one–year increase in age increases the odds of being members of the CPV by 4.3%, the WU by 1.9%, and the FU 4.2%. The negative signs of age squared indicate that the relationship between age and group involvement is non–linear. In fact, older people have been found to engage more in civic activities (Putnam 1995). Other variables that also positively influence the motivation to take part in the groups are being married, and the poverty rate of the commune. The results are in line with previous findings in the literature, as married people are argued to have higher social capital while single individuals are less trusting and less engaged in civic activities (Putnam 1995).

While better education and higher income are strongly associated with a higher probability of being involved in the CPV, they are negatively correlated with the decision to join the VU and the FU. As education has always been the key determinant of individuals' behaviours (Rupasingha, Goetz, and Freshwater 2006), it is regarded as the "strongest correlate" with social capital (Putnam 1995). Regarding incomes, the results are comprehensible, as descriptive statistics show that wealthier households are more involved in the CPV (see Figure 1). However, this result should be interpreted with caution since we have not captured the feedback relationship between the CPV and household income. Rupasingha et al. (2006) argue that income households tend to work more hours, thus, are less devoted to social activities. However, in the case of WU and FU, high–income households might not be interested in the benefits of these organizations. Therefore, they are less willing to enroll.

By contrast, households with the higher uneducated ratio, female ratio, and dependent ratio seem to be the ones that are less involved in these organizations. For example, the uneducated ratio decreases the chances of joining the CPV, the WU and the FU by approximately 9.3%, 9.6%, and 4.2%. Nonetheless, households with higher female proportion are found to engage more in the WU, which is understandable.

Last and most importantly, both commune shocks and household shocks significantly correlate with the higher likelihood of having group memberships. This could be interpreted as households who often encounter shocks are more likely to seek support from official organizations, and the first step is to join them. As formal engagements in grassroots organizations are believed to offer good support to the poor (Mitlin 2003). However, this is not the case of the political party since it is the unique party in Viet Nam and the party establishes strict criteria for its membership.

Vulnerability estimations

The first column of Table A4 illustrates the estimation of the logarithm of income per capita, one basic step to calculate the predicted income and its variance for the VEP estimation. The estimated coefficients of both age and education are significant and positive, indicating that a household with a higher level of education or with an older head is more likely to have a higher per capita income. Agricultural households are likely to have higher income in comparison with others. This could be explained by the fact that all of the households surveyed in our data locate in rural areas. Another factor assumed to positively influence the welfare of Vietnamese rural households is the existence of secondary schools within the commune. As shown in the table, households in communes that have secondary schools may earn more money than those in communes without schools. This reassures the constructive significance of education on income in general. By contrast, being married or living in households with high un-educated and dependent rate negatively affect income. Besides, households in communes that have higher poverty rate or being subsidied by the Government seem to have lower income. In rural Viet Nam, communes with a high poverty rate are most likely to have access to promoted programs of the Government. Therefore, the results above are understandable. In addition, there is no clear evidence presenting that the proportion of female members in households, the distance to bus station, the population and the operation of markets in communes have any correlation with income per capita in rural families.

From the estimates of income and the variance of disturbance term in the first column of Table A4, we adopt Chaudhuri's measure to calculate each household's vulnerability using Equation 3. Assuming that the log income has a normal distribution, we estimate the likelihood that a household's future income is lower than the poverty line. A summary of VEP from 2008 to 2016 is presented in the first row of Table A2. From the table, VEP of rural households in Viet Nam increased gradually in the period from 2008 to 2012, where it reached the peak of 0.262 before falling slightly to 0.255 in 2014 and 0.237 in the next two years. This could also be interpreted as Vietnamese rural households had 16.5% probability of falling into poverty in the year of 2008, the rate continually rose to 26.2% in 2012 and then declined to under a quarter in 2016.

The last three columns of Table A4 is for the VEU estimation. The next two columns of the table show empirical results of the 2SLS regression used to predict the household expected value of food consumption as addressed in Equation 9. The first stage uses total land area and total productive assets[6] of households as instruments variables to estimate the normalized per capita income[7], which is then applied in estimating food expenditure of households. Results from the first stage show a significant positive relationship between the total land of households and their income. This is totally comprehensible since our study focuses on rural areas where most of the households' incomes come from agricultural jobs. Furthermore, not only the quantity, as indicated in our results but also the quality of land is found to influence income of households remarkably (Narayan and Pritchett 1999; Jiao, Smith-Hall, and Theilade 2015). By contrast, the coefficient of total productive assets shows insignificant correlation with income. Other control variables that also have productive impacts on income are the age of household head, the state of being married of household's representative, and the highest qualification of the household head. Regarding characteristics of communes, those with a higher population, subsidies from the Government, regular markets, as well as secondary schools seem to have higher income. Conversely, households with the higher uneducated ratio, female ratio and dependent ratio are discussed to have a lower level of

[6] Total productive assets of households include feed grinding machine, rice milling machine, grain harvesting machine, tractor, and plough.

[7] These instrument variables have been used in the studies of Gaiha and Imai (2008), Jha, Dang, and Tashrifov (2010) and Jha, Kang, Nagarajan, and Pradhan (2013), and are argued to be reasonable, as they firstly affect income, and then indirectly affect consumption of households.

income. Unlike results from VEP regressions with fixed effect estimator, distance to the nearest bus station appears to have a negative influence on the income of households.

The second stage shows a significant positive coefficient of income, implying that household income largely determines food consumption in rural areas. Other variables have similar impacts on household food consumption as how they affect household income. For example, age and education of household's head, purely agricultural household, as well as the total number of households in commune all have positive impacts on income and food expenditure. Meanwhile, higher uneducated ratio and dependent ratio, or being located in commune with higher poverty rate seems to affect both income and food consumption of households negatively. However, in the second stage, female ratio, distance to bus station, the existence of regular markets and secondary schools turn out to have no significant influence on food spending. Households in the communes with support from the Government are more likely to experience a lower level of food consumption.

The results obtained from Equation 8 and Equation 9 are used to derive $E(c_{it}|\bar{X}_t)$ and $E(c_{it}|\bar{X}_t, X_{it})$. We then calculate the mean of normalized food consumption to obtain Ec_{it} as shown in Equation 7. Finally, we use the utility function 5 to estimate four components of Equation 6. A household's VEU is the sum of four separate components. The aggregate VEU and its components are presented in Table A2. The VEU remained the same at 0.732 throughout the years. This means, from 2008 to 2016, the utility of the average household in rural Viet Nam is 73.2% less than the hypothetical situation without any risk or inequality in consumption. This level of utility vulnerability is slightly lower than the estimation of Gaiha and Imai (2008) which is 0.7476 but much higher than the estimation of Jha et al. (2013) which is around 0.3016. While poverty risk remained the same over the years at 0.188 due to the estimation strategy, covariate risks fluctuated, idiosyncratic risks declined gradually, and unexplained risks kept rising from 2008 to 2016. The negative sign of the covariate risks component indicates that the economic growth mitigates the negative effects of household shocks and even reduce vulnerability.

The correlation between income per capita of households and VEP during 2008 and 2016 is displayed in the Figure 4(a), 4(b), and 4(c). From the these plots, the relationship between income per capita and VEP of households appears to follow a certain trend in which households with higher income are more likely to have lower VEP. The Figure 4(d) indicates that the active membership of the Communist Party is asscociated with lower level of both VEP and VEU. However, the trend is unclear for the case of Women's Union and Farmer's Union. The VEP and VEU are even slightly higher for the most active members of WU. Notably, the highest VEU is observed in the most active members of FU.

Impact of social capital on VEP and VEU

We first investigate the impact of social capital on households' vulnerability by the standard fixed-effect model, of which results are presented in Table A5. Empirical results indicate that joining the official associations do not have any significant influence in reducing households' vulnerability. In particular, whether a household takes part in the CPV, the WU, or the FU does not make any difference in their VEP, and the two components of VEU. However, joining the Farmers' Union appears to reduce the utility loss from risks in combination form.

Then we employ the PSM approach to control for potential sources of selection bias, and then apply the FE model with a smaller sample. The results of PSM–FE model are presented in the last three columns of Table A6. Most of the results of regression with PSM matching are found to be in line with the standard FE regression. For example, the negative signs in the results on VEP indicate that involvement in the CPV and FU may have positive impacts on households' vulnerability, though the statistical significance is not yet confirmed. As most of our sample are households working in agricultural sectors, joining the FU appears to have a significantly constructive impact on households' covariate risks. With this

approach, participation in the WU helps households reduce the utility loss from risks if we do not separate them.

As social capital is probably accumulated from the past group memberships, we use the participation score in the previous survey for our analysis and present the results in Table A7. Almost all estimated coefficients for lag variables are consistent in both the regression with only a lag variable and the regression combining a current variable with a lag variable. Joining the CPV is more likely to have lower VEP and lower covariate risk while the active membership of the WU is associated with the lower covariate risk and the membership of the FU records the lower idiosyncratic risk. The significantly positive coefficients for the relationship between joining the FU and VEP suggest that joining the FU tends to increase the probability of being poor. However, as illustrated in the Figure 4(d), there is a possibility that members of vulnerable households tend to join groups for anticipated benefits, especially for the case of WU and FU which impose no costs for the membership. Consequently, the actual impacts would be underestimated, and the estimated coefficients will be downward biased. Therefore, the causal relationship between joining WU or FU and vulnerability is inconclusive.

Since the standard FE and FE–PSM models might have the endogeneity problem due to the reverse causality between vulnerability and group participation. Then the estimated coefficients can no longer be interpreted as the effect of group participation on vulnerability. In this study, the robust Durbin–Wu–Hausman test of endogeneity shows that all variables represented participation in the WU, the FU are endogenous[8]. This issue has been addressed in previous studies on social capital (Maluccio et al. 2000). The IV approach provides a solution, and we begin with the test of instrument validity. Table A8 present the Kleibergen-Paap rank LM statistic used to test whether our model is under-identified. The statistics for joining the CPV, the WU and the FU are respectively 29.68, 111.1, and 65.59. They imply that the instruments are relevant for the memberships of all groups. We follow Staiger and Stock (1997) to test the assumption of weak instruments using the Cragg-Donald Wald F statistic. The critical values proposed by Stock and Yogo (2005) are used as the cutoff values. The null hypothesis of Stock and Yogo (2005) is that the instruments are weak against the alternative that they are strong. We can reject the null hypotheses if the F statistic is greater than Stock and Yogo (2005)'s critical values. The F statistic for WU and FU exceed the critical values at 15% while the F statistic for CPV is lower than the critical value. Therefore, the applied instruments in our study are acceptable for the memberships of WU and FU[9].

Results of the IV estimation is provided in the Table A9. From the table, the insignificant negative coefficient implies that involvement in the WU seems not to make any significant effect on reducing VEP and VEU. The results indicate that rurual households who join the FU is associated with 6.2 percentage points higher utility loss caused by idiosyncratic risks. Nonetheless, the FU membership would lower the probability of being poor by 2.6 percentage points and the utility loss from covariate risks by 8.1 percentage points.

Social capital and coping activities

Table A10 and A11 jointly report the fixed–effects regression results, showing whether group participation affects saving, ability to cope with shocks, the number of assistance received from relatives or friends, borrowing ability, insurance, and access to information. The results show that enrollment in the CPV and FU appears to motivate more precautionary saving in rural households. To some extent,

[8] Not shown in the result table

[9] The validity test shows the instruments for the CPV's membership are weak. Therefore, we do not interpret the IV results for joining the CPV.

joining the WU or FU is a strategy to prepare for *ex-ante* shocks of rural households in Viet Nam. The WU and the FU are helping households overcome from adverse effects of shocks more quickly since their members have less number of shocks still facing at the time of interview in comparison with non–members. The membership of WU is more likely to receive support from NGOs and the CPV's members are associated with less bank loans. While members of the CPV have more chance to own insurance, the memberships of WU and FU are associated with less insurance. However, members of the WU and the FU can access general information better.

When the IV is taken into account, the current memberships of WU anf FU tend to buy more insurance. Also, the IV resuls confirm the impact of group participation on information access in the case of WU and FU. Other impacts on saving, shock–coping ability and borrowing ability become statiscally insignificant.

7 Discussion

Although the empirical approach indicates that group participations would be beneficial for rural households, our findings should be interpreted with cautions for a number of reasons. First, the weak IV test results show that the instruments used in our model for the CPV membership is not strong enough, and therefore, we suggest not to interpret the estimated coefficients from the IV model for the CPV. This is resonable since the political party chooses their members carefully with a set of strict criteria, and then there is less concern of the endogeneity problem. Second, social capital in our study is represented by participation in the three major associations in Viet Nam. Nonetheless, these groups are somewhat different in nature. While the WU and the FU are open for the poor or the vulnerable who are interested in their potential benefits, the CPV chooses its members by talent and social contribution. The candidates have to prove themselves before being granted membership of the CPV. Participation in the CPV then become the first step on the political ladder. As a result, the impacts of joining the CPV on household welfare are somewhat different from that of involving the WU and the FU. As argued by Wakefield and Poland (2005), the different impacts of different groups could be explained by group identity. While social organizations usually attempt to minimize the distinction among members within the group, they unintentionally widen the gap of differences between organizations, especially ones that have unique characteristics like women's organizations.

Furthermore, it takes careful consideration in the economic and social context of a particular country at the time to thoroughly understand the accurate effect of social capital on household welfare. For instance, the study of Maluccio et al. (2000) shows a significant influence of social capital in South Africa in 1998 but an insignificant impact in 1993. (Maluccio et al. 2000) also highlight that social capital may not have a positive impact on household income, as Coleman (1988) puts it, 'a given form of social capital that is valuable in facilitating certain actions may be useless or even harmful for other'. Narayan and Pritchett (1999) discuss that social capital could make a positive impact on communities, however, there is no clear evidence on such thing when it comes to individuals and households. This partly explains why our study shows contrast impacts of group participation on the utility loss from covariates risks and idiosyncratic risks.

In addition, Cleaver (2005) states that household with lower income usually counts on their close networks to overcome shocks, such as ill health. A bonding that is extremely important for most Vietnamese, regardless of their level income, is family and relatives. However, according to Cleaver (2005), such close kinship could exclude individuals from other networks, which provides a great source of information on job and service opportunities. This makes our findings, which show a negative impact of social capital in reducing idiosyncratic risks, comprehensible. Nonetheless, the positive impacts of

social capital on covariate risks found in this paper are in line with other studies in the literature (e.g. Moser (1996), Grootaert (1999), Carter and Maluccio (2003), Grootaert and Narayan (2004)).

The mass organizations of Viet Nam, including the Women Union and the Farmer Union, are believed to link with the state closely, or even involved in the decision-making process of the Government (Markussen 2015). Vietnamese microfinance institutions, especially the Viet Nam Bank for Social Policy (VBSP) and Viet Nam Bank for Agricultural and Rural Development (VBARD), usually cooperate with mass organizations to provide microfinancial services and subsidizes (Lebovics, Hermes, and Hudon 2014). For instance, the Women Union, which is often considered as one of the most active organizations in this sector, is not only able to pilot a majority of microfinance programs nationally, but also be the representative of the VBSP and monitor the loan use as well as collect interests. The WU and the FU are also supposed to be the main channels that subsidized loans are delivered through (Luan and Bauer 2016). Furthermore, lenders in Viet Nam prefer to giving money to people in their social networks, especially whom they know well, and consider it less risky. However, the impacts of group participation on the ability to access the financial institutions, both formal and informal, are not found in our study. Joining the WU and the FU does not change the ability of rural households to access financial sources as expected, except that the FU membership encourage households' saving and the WU's members is more likely to receive support from the NGOs. The memberships of WU and FU do improve the ability to access information and probability of having insurance. Therefore, the impact of participation in these groups on households' vulnerability is mainly going through channels such as information and insurance, but not from financial supports.

8 Conclusion and policy implications

The concepts and empirical analysis of vulnerability have emerged in the development literature in recent years due to the shift from static poverty to dynamic poverty, or from a certain to uncertain framework of well–being. Since vulnerability represents households' exposure to risks, a number of studies have investigated the impacts of factors such as microfinance, remittances, and health insurance on household vulnerability. From the development perspective, these factors take one or more forms of informal insurance or precautionary measures against risks. In fact, these factors would help households maintain their consumption before and after any negative shocks. This study contributes to the literature by estimating the influence of social capital on household vulnerability. In this study, households' social capital is measured by the local group memberships. Vulnerability is estimated by two popular measures: vulnerability as expected poverty and vulnerability as low expected utility.

Using the Viet Nam Access to Resources Household Survey (VARHS) with a panel of households present from 2008 to 2016, the study first investigates whether shocks and household characteristics affect household social capital accumulation through participation in local groups or not. The most important question is that whether social capital explains variations in household vulnerability or not. In addition, to examine the intermediate path leading to vulnerability, the study analyses the impact of social capital on saving, transfer, ability to cope with shocks, insurance, and access to information.

The empirical results indicate that participation in local organizations could reduce both households' probability of being poor and the utility loss caused by covariate risks. Additionally, social capital shows its influence on some intermediate factors, which in turn contribute to the lower vulnerability at the household level. While participations in the Women Union or the Farmer Union reinforce the households' ability to overcome negative shocks, the memberships of the Communist Party and the Farmer Union are associated with higher level of saving. Members of the Communist Party of Viet Nam are more likely to possess insurance, and members of the Women Union and the Farmer Union are able to access general information better.

The findings imply that poverty reduction policies in rural Vietnam should consider the role of social capital, especially in the forms of group participation as an effective informal coping strategy. The activity and quality of not only the political group but also local organizations such as the Women Union and the Farmer Union should be maintained and encouraged for the economic welfare of rural households.

Appendix

Table A1: Number of households, communes and household membership in organizations

Province	Household		Commune		Household with Membership of						Region
					Communist Party		Women's Union		Farmer's Union		
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	
Ha Tay (n=2,185)	437	24%	66	16%	47	11%	322	74%	161	37%	Northern delta
Phu Tho (n=1,220)	244	13%	35	9%	49	20%	217	89%	155	63%	Northern delta
Lai Chau (n=470)	94	5%	26	6%	18	19%	53	57%	40	43%	Northern mountain
Lao Cai (n=400)	80	4%	23	6%	3	4%	52	66%	65	82%	Northern mountain
Dien Bien (n=380)	76	4%	24	6%	18	23%	64	84%	50	66%	Northern mountain
Quang Nam (n=1,195)	239	13%	39	10%	22	9%	220	92%	155	65%	Central coast
Nghe An (n=820)	164	9%	62	15%	25	15%	151	92%	117	71%	Central coast
Khanh Hoa (n=150)	30	2%	14	3%	4	13%	36	21%	24	81%	Central coast
Dak Lak (n=580)	116	6%	37	9%	8	7%	85	73%	73	62%	Central highland
Dak Nong (n=390)	78	4%	26	6%	15	19%	72	92%	54	68%	Central highland
Lam Dong (n=245)	49	3%	19	5%	5	11%	41	83%	31	63%	Central highland
Long An (n=1,075)	215	12%	39	10%	22	10%	97	45%	50	23%	Southern delta
Total (n=9,110)	1,830	100%	410	100%	236	—	1,410	—	972	—	

Notes: Base location is 2008. Ha Tay is now a part of Ha Noi. Total households with membership in each province is mean of 2008-2016.

Source: Author's calculation from VARHS 2008-2016.

Table A2: Summary statistics of VEP and VEU

	2008		2010		2012		2014		2016	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Vul. as Expt. Poverty	0.165	0.159	0.194	0.139	0.262	0.158	0.255	0.140	0.237	0.124
Vul. as Expt. Utility	0.732	0.995	0.732	0.995	0.732	0.995	0.732	0.995	0.732	0.995
Poverty risk	0.188	0.598	0.188	0.598	0.188	0.598	0.188	0.598	0.188	0.598
Covariate risk	-0.049	0.611	-0.172	0.562	-0.107	0.573	-0.206	0.570	-0.273	0.564
Idiosyncratic risk	0.181	0.357	0.085	0.279	0.018	0.298	0.010	0.260	0.004	0.217
Unexplained risk	0.412	0.853	0.632	0.847	0.633	0.833	0.740	0.860	0.814	0.885
Observations	1,706		1,706		1,706		1,706		1,706	

Source: Author's calculation base on VARHS 2008-2016.

Table A3: Multivariate regression for group membership

	Member of		
	Communist Party	Women's Union	Farmer's Union
Age	0.0432^{***}	0.0189^{**}	0.0423^{***}
	(0.013)	(0.0090)	(0.0094)
Age squared	-0.000203^{*}	-0.000326^{***}	-0.000411^{***}
	(0.00011)	(0.000079)	(0.000083)
Marital status	0.311^{***}	0.155^{***}	0.460^{***}
	(0.063)	(0.040)	(0.042)
Highest Qualification	0.318^{***}	-0.0312^{**}	-0.102^{***}
	(0.016)	(0.015)	(0.016)
Log total per cap income	0.260^{***}	-0.0318^{*}	-0.0665^{***}
	(0.026)	(0.018)	(0.018)
Uneducated ratio	-0.931^{***}	-0.956^{***}	-0.422^{***}
	(0.21)	(0.096)	(0.096)
Female ratio	-0.319^{***}	0.337^{***}	-0.191^{**}
	(0.12)	(0.080)	(0.082)
Dependent ratio	-0.0852	-0.617^{***}	-0.492^{***}
	(0.093)	(0.066)	(0.068)
Poverty rate	1.173^{***}	0.0117	0.639^{***}
	(0.19)	(0.14)	(0.13)
Total shocks in household	-0.0193	0.0540^{***}	0.0821^{***}
	(0.025)	(0.017)	(0.017)
Total nature shocks in commune	-0.0127	0.0544^{***}	0.0802^{***}
	(0.011)	(0.0081)	(0.0079)
Constant	-6.247^{***}	0.350	-0.886^{***}
	(0.47)	(0.31)	(0.32)
N	8,530	8,530	8,530

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$

Source: Author's calculation based on VARHS 2008-2016.

Table A4: Vulnerability estimations

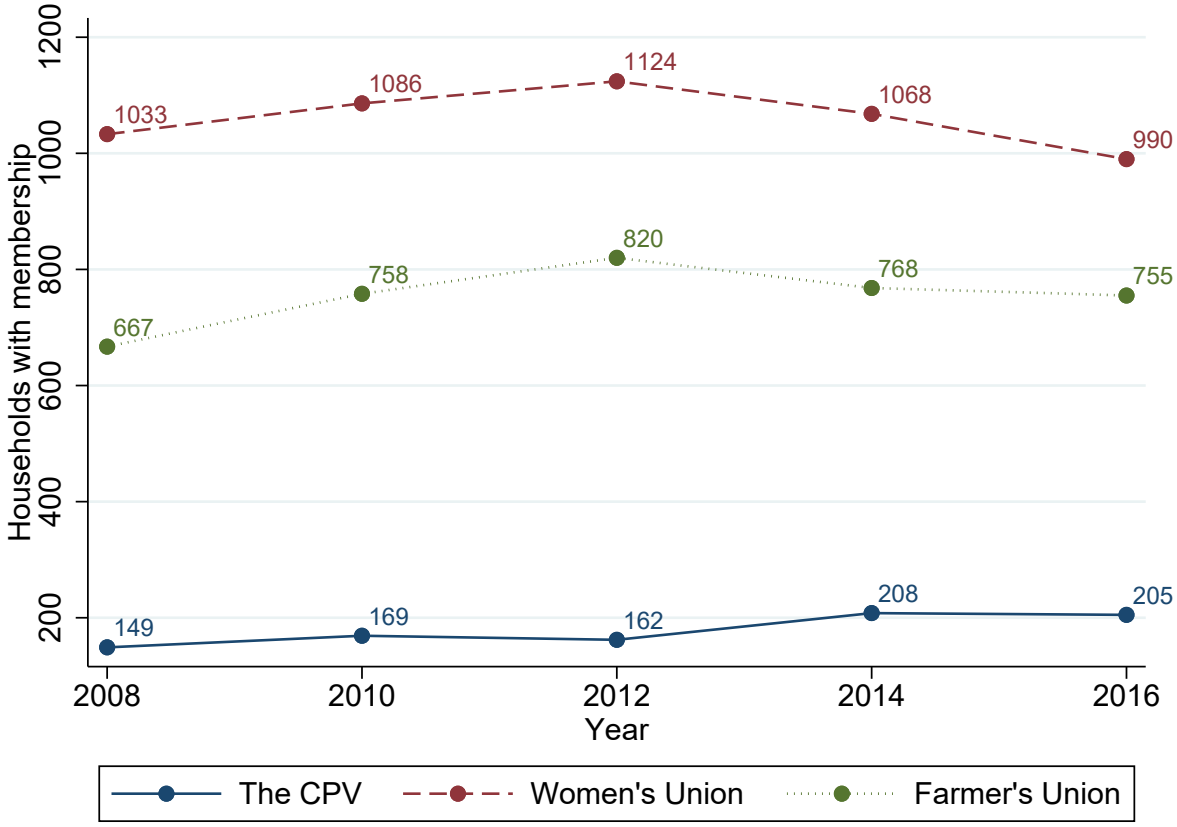
	Estimation for			
	VEP	$E(c_i\|\bar{X}_t, X_{it})$ (1st stage)	$E(c_i\|\bar{X}_t, X_{it})$ (2nd stage)	$E(c_i\|\bar{X}_t)$
	Logarithm Per capita Income	Normalized Per capita Income	Normalized Per capita Consumption	Normalized Per capita Consumption
Total area		0.109		
		$(0.023)^{***}$		
Total productive assets		0.227		
		(0.15)		
Normalized percap. Income			0.214	
			$(0.059)^{***}$	
Age	0.0783	0.0324	0.0129	
	$(0.015)^{***}$	$(0.0072)^{***}$	$(0.0049)^{***}$	
Age squared	−0.000444	−0.000239	−0.0000726	
	$(0.00012)^{***}$	$(0.000067)^{***}$	$(0.000042)^{*}$	
Marital status	−0.198	−0.0280	−0.0611	
	$(0.052)^{***}$	(0.042)	$(0.025)^{**}$	
Highest Qualification	0.124	0.170	0.0918	
	$(0.015)^{***}$	$(0.030)^{***}$	$(0.015)^{***}$	
Uneducated ratio	−0.170	−0.186	−0.227	
	$(0.067)^{**}$	$(0.041)^{***}$	$(0.037)^{***}$	
Female ratio	−0.0440	−0.295	−0.0596	
	(0.097)	$(0.093)^{***}$	(0.052)	
Dependent ratio	−0.557	−0.595	−0.273	
	$(0.061)^{***}$	$(0.064)^{***}$	$(0.052)^{***}$	
Is a agricultural hh.	0.0737	0.140	0.119	
	$(0.022)^{***}$	$(0.035)^{***}$	$(0.022)^{***}$	
Total households in comm.	0.0000494	0.0000527	0.0000244	0.0000579
	(0.000039)	$(0.00002)^{***}$	$(0.00001)^{**}$	$(0.000025)^{**}$
Comm. has govt. support	−0.0854	0.0146	−0.0696	−0.0896
	$(0.034)^{**}$	(0.027)	$(0.016)^{***}$	$(0.018)^{***}$
Poverty rate	−1.878	−1.649	−0.729	−1.283
	$(0.21)^{***}$	$(0.099)^{***}$	$(0.11)^{***}$	$(0.11)^{***}$
Comm. has periodic market	0.0901	0.0908	0.00936	0.0998
	(0.059)	$(0.034)^{***}$	(0.019)	$(0.033)^{***}$
Comm. has 2nd school	0.146	0.137	0.0153	0.151
	$(0.061)^{**}$	$(0.049)^{***}$	(0.031)	$(0.057)^{***}$
Distance nearest bus station	0.000134	−0.0000821	0.000301	0.000775
	(0.00028)	(0.00069)	(0.00023)	$(0.00025)^{***}$
Constant	6.934	−0.0445	0.408	0.945
	$(0.46)^{***}$	(0.23)	$(0.15)^{***}$	$(0.074)^{***}$
N	9,110	9,110	9,110	9,110
Under identification:				
Kleibergen-Paap rk LM statistic		20.002	*p*-value: 0	
Weak identification:				
Cragg-Donald Wald F statistic		78.906		
Kleibergen-Paap rk Wald F statistic		15.317		
Over identification:				
Hansen J statistic		0.341	*p*-value: 0.559	

Stock-Yogo weak ID test critical values: 10% maximal IV size 19.93, 15% maximal IV size 11.59, 20% maximal IV size 8.75, 25% maximal IV size 7.25.

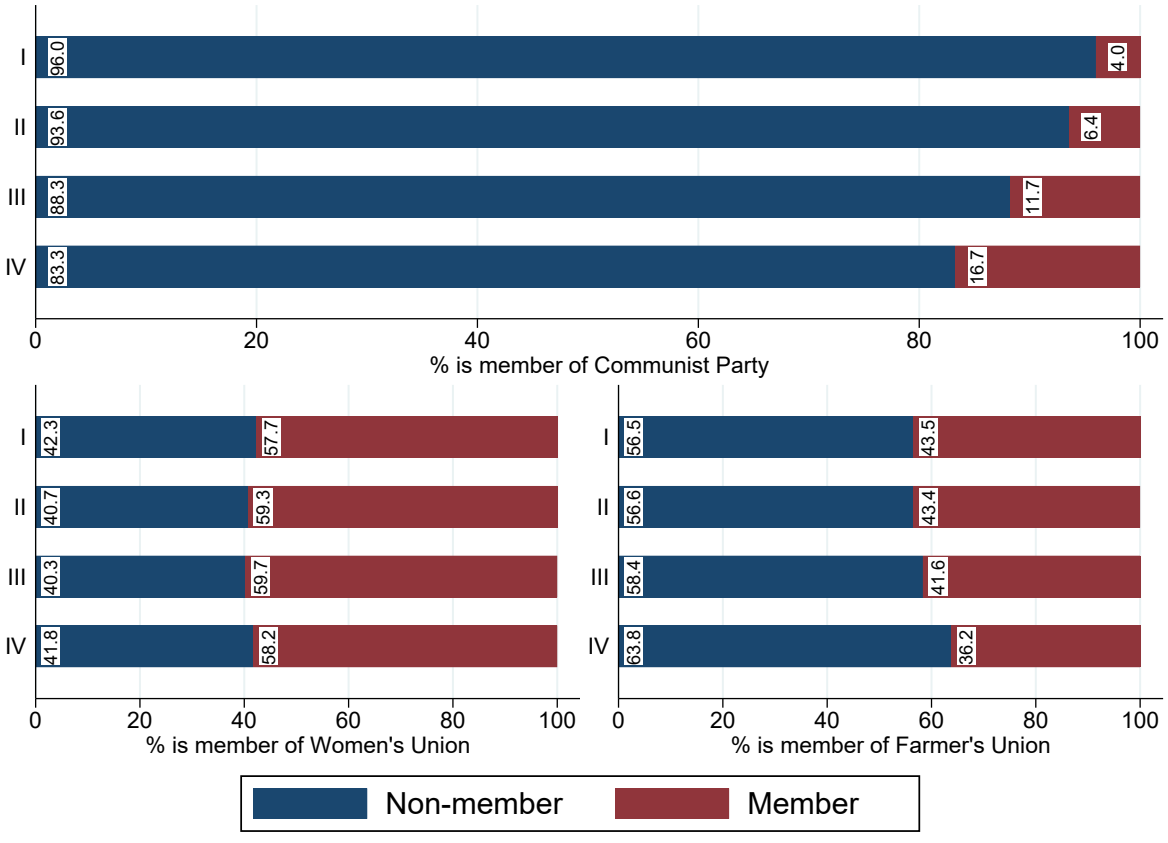
Standard errors in parentheses. $^{*}\ p < .1$, $^{**}\ p < .05$, $^{***}\ p < .01$

Source: Author's calculation based on VARHS 2008-2016.

Figure 1: Group participation by years and income quintiles



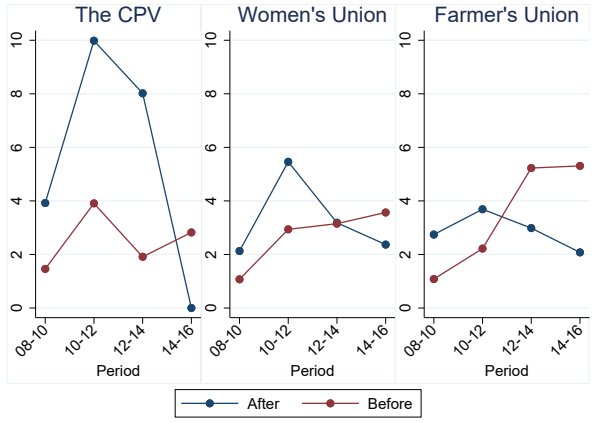
(a) Group participation by years



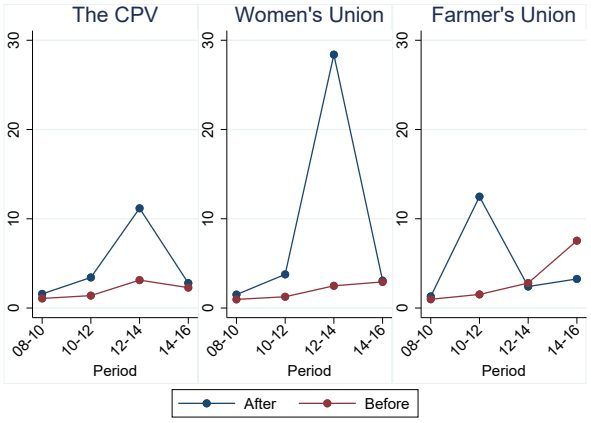
(b) Groups participation by income per capita quintiles

Source: Author's illustration based on VARHS 2008-2016.

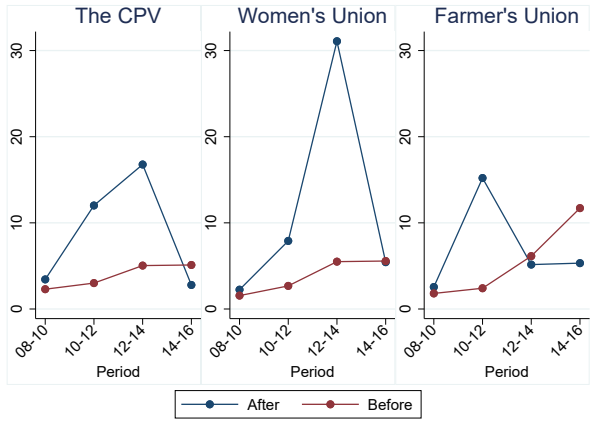
Figure 2: Essential cost for social activities by group membership and before, after joining an organization



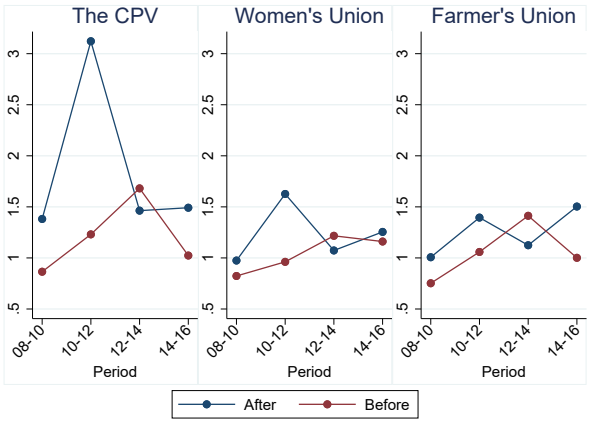
(a) Cost for hosting parties



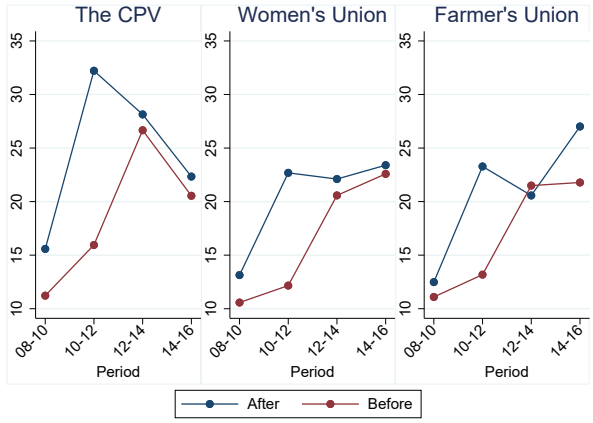
(b) Cost for attaining parties



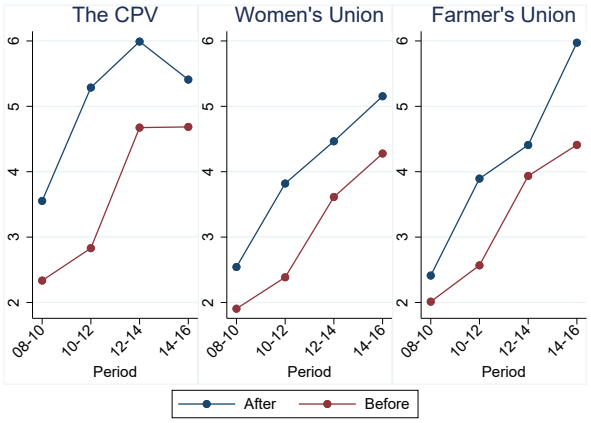
(c) Total cost for parties



(d) Cost for alcohol



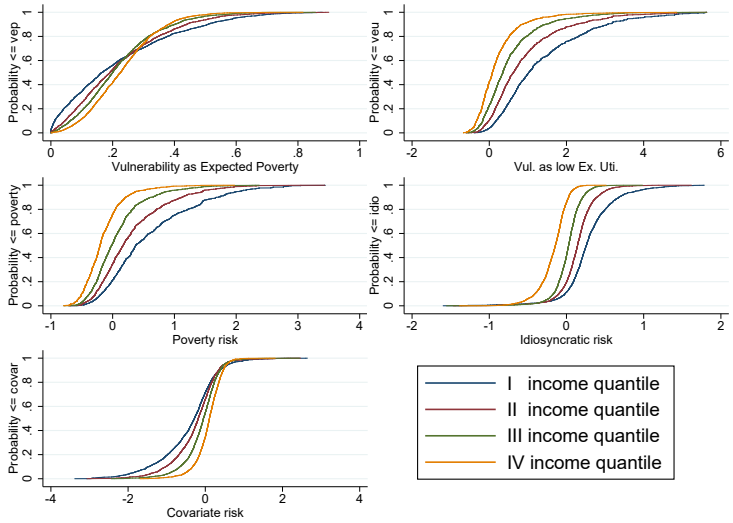
(e) Cost for food



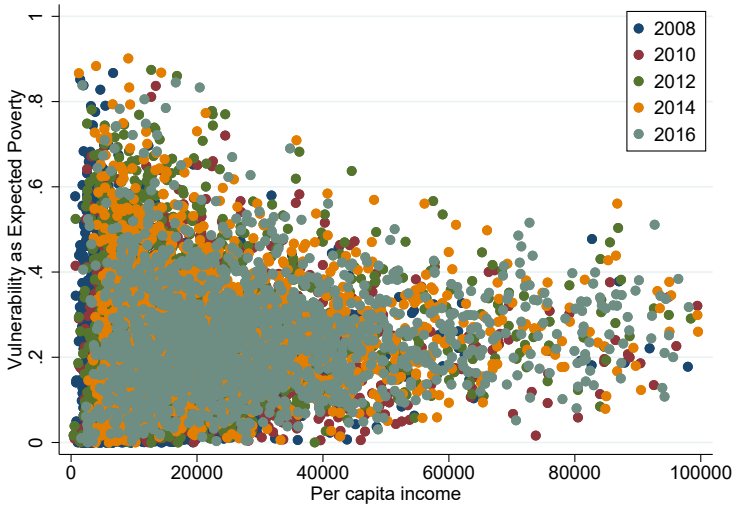
(f) Cost for Tet festival

Source: Author's calculation based on VARHS 2008-2016.

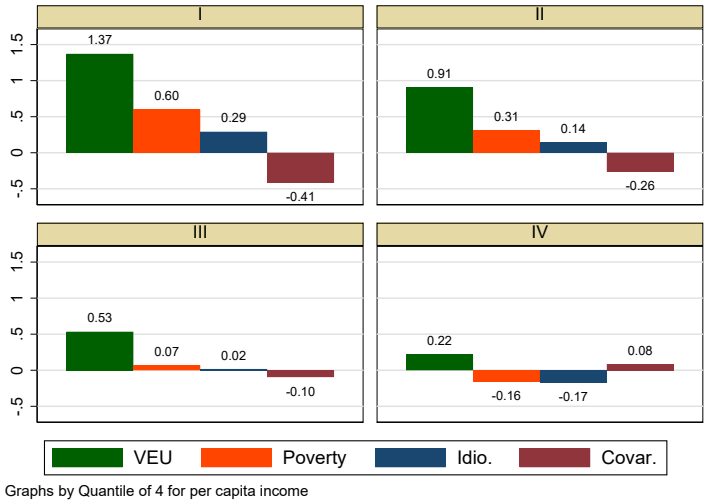
Figure 3: Vulnerability by income and group participation



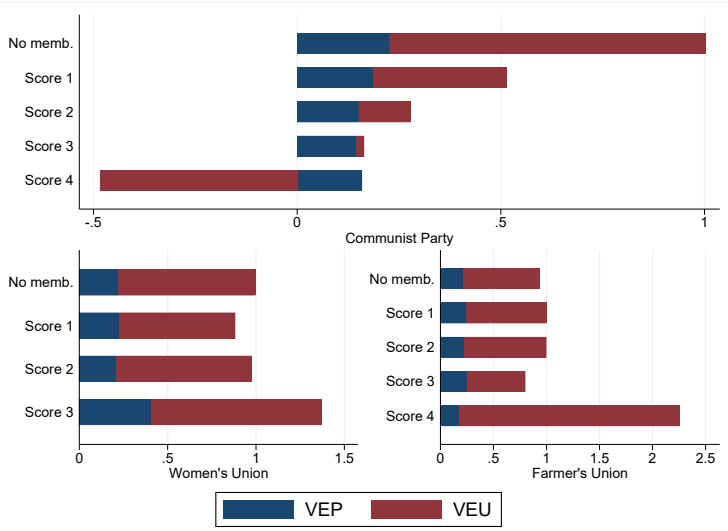
(a) Distribution plot of VEP, VEU and risks by income quintiles



(b) Scatter plot of Vulnerability as Expected Poverty and per capita income



(c) Barplot of VEP, VEU and risks mean value by income per capita quintiles



(d) Barplot of VEP, VEU and risks mean value by groups participation

Source: Author's illustration based on VARHS 2008-2016.

Table A5: Standard fixed effects regression

	Standard FE		
Part. score in CPV	−0.000788		
	(0.0018)		
Part. score in WU		0.000359	
		(0.0010)	
Part. score in FU			0.00132
			(0.0010)
Part. score in CPV	0.00408		
	(0.0068)		
Part. score in WU		−0.00295	
		(0.0033)	
Part. score in FU			−0.00578
			(0.037)
Part. score in CPV	0.00480		
	(0.0079)		
Part. score in WU		0.00144	
		(0.0036)	
Part. score in FU			−0.00454
			(0.0033)
Part. score in CPV	0.00887		
	(0.0063)		
Part. score in WU		−0.00151	
		(0.0038)	
Part. score in FU			−0.00780***
			(0.0037)
N	8,530	8,530	8,530

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Control variables are suppressed from the table.

Source: Author's calculation based on VARHS 2008-2016.

Table A6: Fixed effect with PSM matching

	PSM–FE		
	Vulnerability as Expt. Poverty		
CPV member	−0.00137		
	(0.0026)		
WU member		0.000129	
		(0.0013)	
FU member			0.000256
			(0.0013)
	Idiosyncratic risk		
CPV member	0.000879		
	(0.0083)		
WU member		−0.00176	
		(0.0047)	
FU member			0.00377
			(0.0047)
	Covariate risk		
CPV member	0.00309		
	(0.0098)		
WU member		−0.00615	
		(0.0044)	
FU member			−0.00758*
			(0.0043)
	Idiosyncratic *plus* Covariate risk		
CPV member	0.00397		
	(0.0078)		
WU member		−0.00791*	
		(0.0046)	
FU member			−0.00382
			(0.0047)
N	6,550	8,310	8,185

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Control variables are suppressed from the table.

Source: Author's calculation based on VARHS 2008-2016.

Table A7: Fixed effect regression with lag and PSM matching.

	With current and one lag			With only one lag		
	Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty		
Parti. score in CPV	0.00405**					
	(0.0019)					
Parti. score in $CPV_{(t-1)}$	−0.00408**			−0.00385**		
	(0.0019)			(0.0019)		
Parti. score in WU		−0.000329				
		(0.0012)				
Parti. score in $WU_{(t-1)}$		−0.00000451			0.0000535	
		(0.0012)			(0.0012)	
Parti. score in FU			−0.000176			
			(0.0012)			
Parti. score in $FU_{(t-1)}$			0.00200*			0.00203*
			(0.0011)			(0.0011)
	Idiosyncratic risk			Idiosyncratic risk		
Parti. score in CPV	−0.00211					
	(0.0060)					
Parti. score in $CPV_{(t-1)}$	0.00778			0.00765		
	(0.0050)			(0.0051)		
Parti. score in WU		−0.00187				
		(0.0035)				
Parti. score in $WU_{(t-1)}$		0.00234			0.00267	
		(0.0035)			(0.0034)	
Parti. score in FU			−0.00442			
			(0.0037)			
Parti. score in $FU_{(t-1)}$			−0.00753**			−0.00679*
			(0.0036)			(0.0035)
	Covariate risk			Covariate risk		
Parti. score in CPV	0.00244					
	(0.0065)					
Parti. score in $CPV_{(t-1)}$	−0.0124**			−0.0123**		
	(0.0052)			(0.0052)		
Parti. score in WU		0.000280				
		(0.0031)				
Parti. score in $WU_{(t-1)}$		−0.00919***			−0.00924***	
		(0.0029)			(0.0029)	
Parti. score in FU			−0.00262			
			(0.0031)			
Parti. score in $FU_{(t-1)}$			−0.000142			0.000296
			(0.0033)			(0.0032)
	Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk		
Parti. score in CPV	0.000321					
	(0.0048)					
Parti. score in $CPV_{(t-1)}$	−0.00467			−0.00466		
	(0.0049)			(0.0050)		
Parti. score in WU		−0.00159				
		(0.0038)				
Parti. score in $WU_{(t-1)}$		−0.00685*			−0.00657*	
		(0.0035)			(0.0034)	
Parti. score in FU			−0.00704*			
			(0.0039)			
Parti. score in $FU_{(t-1)}$			−0.00767*			−0.00649
			(0.0042)			(0.0040)
N	4,964	6,548	6,600	4,964	6,548	6,600

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Control variables are suppressed from the table.

Source: Author's calculation based on VARHS 2008-2016.

Table A8: First stage regression with IV for participation score.

	Current Participation Score In		
	Communist Party	Women's Union	Farmer's Union
Parti. score in CPV_{t-1}	0.0581^{*}		
	(0.035)		
Parti. score in WU_{t-1}		-0.176^{***}	
		(0.014)	
Parti. score in FU_{t-1}			-0.165^{***}
			(0.016)
Interaction			
# of Org. $\times$ Age	0.000270	0.000241	0.000296
	(0.00037)	(0.00057)	(0.00054)
# of Org. $\times$ Age Squared	0.000000329	-0.00000264	0
	(0.0000053)	(0.0000082)	(0.0000077)
# of Org. $\times$ Highest Qualification	0.00598	-0.00116	-0.00416
	(0.0066)	(0.0051)	(0.0045)
Age	-0.0122	0.00599	0.00495
	(0.010)	(0.0100)	(0.0084)
Age squared	0.0000972	-0.0000765	-0.0000582
	(0.000092)	(0.000095)	(0.000082)
Marital status	-0.00110	0.0650^{*}	0.0664^{*}
	(0.026)	(0.035)	(0.034)
Highest Qualification	-0.0163	0.00503	0.0366
	(0.037)	(0.028)	(0.025)
Log total net per cap income	0.00510	-0.00892	-0.00332
	(0.0068)	(0.012)	(0.012)
Uneducated ratio	-0.0394	0.00544	-0.0121
	(0.064)	(0.058)	(0.062)
Female ratio	-0.0122	0.174^{***}	0.154^{**}
	(0.054)	(0.063)	(0.063)
Dependent ratio	-0.0150	-0.0282	-0.126^{**}
	(0.031)	(0.047)	(0.052)
Year			
2012	-0.0203^{*}	-0.0389^{**}	-0.0196
	(0.011)	(0.016)	(0.016)
2014	0.0253^{*}	-0.0569^{***}	-0.0493^{***}
	(0.014)	(0.018)	(0.019)
2016	0.0268	-0.0504^{**}	-0.0384^{*}
	(0.017)	(0.020)	(0.021)
Constant	0.359	0.359	0.138
	(0.29)	(0.30)	(0.26)
N	4,964	6,548	6,600
Under identification test:			
Kleibergen-Paap rk LM statistic	29.68	111.1	65.59
p-value	0	0	0
Weak identification test:			
Kleibergen-Paap rk Wald F statistic	7.963	30.11	18.41

Stock-Yogo weak ID test critical values: 10% maximal IV size 24.58, 15% maximal IV size 13.96, 20% maximal IV size 10.26, 25% maximal IV size 8.31.

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

Control variables are suppressed from the table. Instrument variables are lagged participation score and interaction set.

Source: Author's calculation based on VARHS 2008-2016.

Table A9: Second stage regression with IV for participation score

	Vulnerability as Expt. Poverty		
Parti. score in CPV	-0.0539^{**}		
	(0.024)		
Parti. score in WU		-0.00764	
		(0.010)	
Parti. score in FU			-0.0260^{**}
			(0.011)
	Idiosyncratic risk		
Parti. score in CPV	0.0960^{*}		
	(0.052)		
Parti. score in WU		-0.00160	
		(0.020)	
Parti. score in FU			0.0616^{***}
			(0.022)
	Covariate risk		
Parti. score in CPV	-0.192^{***}		
	(0.064)		
Parti. score in WU		-0.00102	
		(0.028)	
Parti. score in FU			-0.0810^{**}
			(0.034)
	Idiosyncratic *plus* Covariate risk		
Parti. score in CPV	-0.0956^{*}		
	(0.050)		
Parti. score in WU		-0.00262	
		(0.024)	
Parti. score in FU			-0.0194
			(0.031)
N	4,964	6,548	6,600

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Control variables are suppressed from the table.

Source: Author's calculation based on VARHS 2008-2016.

Table A10: Effect of group participation on household saving, supports, shocks, insurance and information sources (continue on next page)

	With IV			Standard FE - PSM		
	Log total saving			Log total saving		
Parti. score in CPV	−3.188*			0.426*		
	(1.82)			(0.22)		
Parti. score in CPV_{t-1}				−0.0759		
				(0.21)		
Parti. score in WU		−0.570			0.143	
		(0.62)			(0.11)	
Parti. score in WU_{t-1}					0.102	
					(0.11)	
Parti. score in FU			−0.174			0.277***
			(0.67)			(0.11)
Parti. score in FU_{t-1}						−0.00833
						(0.11)
	# of shocks still facing			# of shocks still facing		
Parti. score in CPV	0.326**			−0.0105		
	(0.14)			(0.015)		
Parti. score in CPV_{t-1}				0.0272		
				(0.018)		
Parti. score in WU		0.0321			−0.0343***	
		(0.056)			(0.0097)	
Parti. score in WU_{t-1}					−0.00979	
					(0.0099)	
Parti. score in FU			−0.0103			−0.0355***
			(0.064)			(0.011)
Parti. score in FU_{t-1}						0.000507
						(0.011)
	Support from relatives			Support from relatives		
Parti. score in CPV	0.0610			−0.00803		
	(0.15)			(0.013)		
Parti. score in CPV_{t-1}				0.0249		
				(0.016)		
Parti. score in WU		−0.0593			0.00825	
		(0.041)			(0.0071)	
Parti. score in WU_{t-1}					0.0115	
					(0.0073)	
Parti. score in FU			0.0330			−0.00972
			(0.040)			(0.0071)
Parti. score in FU_{t-1}						−0.00901
						(0.0069)
	Support from NGOs			Support from NGOs		
Parti. score in CPV	0.0348*			−0.00109		
	(0.020)			(0.0013)		
Parti. score in CPV_{t-1}				0.00214		
				(0.0020)		
Parti. score in WU		−0.00921			0.000610	
		(0.0057)			(0.0011)	
Parti. score in WU_{t-1}					0.00190*	
					(0.0011)	
Parti. score in FU			−0.00491			0.00150
			(0.0057)			(0.0013)
Parti. score in FU_{t-1}						0.00135
						(0.00090)
N	4,964	6,547	6,599	4,964	6,547	6,599

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Control variables are suppressed from the table.

Source: Author's calculation based on VARHS 2008-2016.

Table A11: Effect of group participation on household saving, supports, shocks, insurance and information sources (continued)

	With IV			Standard FE - PSM		
	Borrow from bank			Borrow from bank		
Parti. score in CPV	0.0635			−0.0148*		
	(0.075)			(0.0081)		
Parti. score in CPV_{t-1}				0.000673		
				(0.0069)		
Parti. score in WU		0.00781			0.000420	
		(0.029)			(0.0051)	
Parti. score in WU_{t-1}					−0.00140	
					(0.0051)	
Parti. score in FU			0.00581			0.00419
			(0.042)			(0.0073)
Parti. score in FU_{t-1}						0.000517
						(0.0073)
	Borrow from other sources			Borrow from other sources		
Parti. score in CPV	0.132			0.00787		
	(0.090)			(0.0078)		
Parti. score in CPV_{t-1}				0.00217		
				(0.0065)		
Parti. score in WU		−0.00957			0.000723	
		(0.028)			(0.0050)	
Parti. score in WU_{t-1}					0.00245	
					(0.0048)	
Parti. score in FU			0.00347			−0.00371
			(0.030)			(0.0064)
Parti. score in FU_{t-1}						−0.000572
						(0.0049)
	Total insurances			Total insurances		
Parti. score in CPV	0.805***			0.144***		
	(0.29)			(0.039)		
Parti. score in CPV_{t-1}				0.0326		
				(0.036)		
Parti. score in WU		0.214**			0.0130	
		(0.093)			(0.017)	
Parti. score in WU_{t-1}					−0.0331**	
					(0.017)	
Parti. score in FU			0.165*			−0.0234
			(0.088)			(0.017)
Parti. score in FU_{t-1}						−0.0262*
						(0.015)
	Total information sources			Total information sources		
Parti. score in CPV	−0.414			−0.110		
	(1.54)			(0.20)		
Parti. score in CPV_{t-1}				0.185		
				(0.17)		
Parti. score in WU		1.315***			0.487***	
		(0.46)			(0.088)	
Parti. score in WU_{t-1}					−0.155*	
					(0.083)	
Parti. score in FU			0.412			0.457***
			(0.49)			(0.080)
Parti. score in FU_{t-1}						−0.0188
						(0.083)
	Total unique information sources			Total unique information sources		
Parti. score in CPV	1.478*			−0.113		
	(0.90)			(0.11)		
Parti. score in CPV_{t-1}				0.123		
				(0.096)		
Parti. score in WU		0.719**			0.0707	
		(0.29)			(0.052)	
Parti. score in WU_{t-1}					−0.110**	
					(0.051)	
Parti. score in FU			0.745**			0.0938*
			(0.29)			(0.051)
Parti. score in FU_{t-1}						−0.101**
						(0.050)
N	4,964	6,547	6,599	4,964	6,547	6,599

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.
Control variables are suppressed from the table.

Source: Author's calculation based on VARHS 2008-2016.

Table A12: Fixed–effects regression for the participation score by income distribution.

	I Quantile - Poorest			II Quantile - Poor			III Quantile - Rich			IV Quantile - Richest			Idiosyncratic > 0		
	Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty		
Parti. score in CPV	−0.0376			0.00154			0.00471			−0.00400			0.00399		
	(0.036)			(0.020)			(0.0086)			(0.0054)			(0.0057)		
Parti. score in CPV_{t-1}	0.00864			−0.0135			0.00104			−0.00677			−0.00172		
	(0.051)			(0.020)			(0.0059)			(0.0046)			(0.0065)		
Parti. score in WU		−0.00932			−0.00472			0.00439			−0.000821			−0.00243	
		(0.011)			(0.0053)			(0.0034)			(0.0029)			(0.0028)	
Parti. score in WU_{t-1}		0.00142			−0.00759			0.00184			0.00532*			0.00271	
		(0.012)			(0.0064)			(0.0033)			(0.0029)			(0.0029)	
Parti. score in FU			0.00111			0.00275			0.00490			0.000200			0.00180
			(0.010)			(0.0050)			(0.0042)			(0.0028)			(0.0026)
Parti. score in FU_{t-1}			0.00378			0.0102*			0.00143			0.00490			0.00410
			(0.0097)			(0.0057)			(0.0037)			(0.0032)			(0.0026)
	Idiosyncratic risk			Idiosyncratic risk			Idiosyncratic risk			Idiosyncratic risk			Idiosyncratic risk		
Parti. score in CPV	0.122***			−0.0906*			0.0271			0.0190*			−0.00280		
	(0.045)			(0.047)			(0.021)			(0.011)			(0.0082)		
Parti. score in CPV_{t-1}	0.0727			0.0643*			0.00295			0.0179*			−0.00807		
	(0.047)			(0.036)			(0.014)			(0.010)			(0.0069)		
Parti. score in WU		0.0443**			−0.00627			−0.00867			0.0103			−0.000705	
		(0.022)			(0.0095)			(0.0064)			(0.0066)			(0.0050)	
Parti. score in WU_{t-1}		0.0156			0.0321***			−0.00431			0.00308			−0.000631	
		(0.025)			(0.011)			(0.0065)			(0.0066)			(0.0047)	
Parti. score in FU			−0.0231			0.00193			−0.0141**			−0.00633			−0.00934**
			(0.024)			(0.010)			(0.0069)			(0.0064)			(0.0043)
Parti. score in FU_{t-1}			−0.0585**			0.00771			−0.0130**			−0.00925			−0.00455
			(0.024)			(0.012)			(0.0051)			(0.0062)			(0.0047)
	Covariate risk			Covariate risk			Covariate risk			Covariate risk			Covariate risk		
Parti. score in CPV	−0.140			0.0361			−0.0131			−0.0202			−0.00554		
	(0.12)			(0.077)			(0.028)			(0.014)			(0.012)		
Parti. score in CPV_{t-1}	−0.0490			−0.0879			0.00255			−0.0253**			−0.000963		
	(0.16)			(0.070)			(0.018)			(0.013)			(0.014)		
Parti. score in WU		−0.0609			−0.00543			0.0180**			−0.00674			−0.00323	
		(0.041)			(0.017)			(0.0082)			(0.0078)			(0.0070)	
Parti. score in WU_{t-1}		−0.0201			−0.0411**			0.00195			0.00243			0.00388	
		(0.035)			(0.021)			(0.0081)			(0.0079)			(0.0064)	
Parti. score in FU			−0.0214			0.00959			0.0171*			0.00544			0.00326
			(0.037)			(0.019)			(0.010)			(0.0073)			(0.0075)
Parti. score in FU_{t-1}			0.0365			0.0100			0.00979			0.0152*			0.00551
			(0.038)			(0.021)			(0.0078)			(0.0081)			(0.0075)
	Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk		
Parti. score in CPV	−0.0177			−0.0545			0.0140			−0.00116			−0.00834		
	(0.11)			(0.057)			(0.012)			(0.0060)			(0.013)		
Parti. score in CPV_{t-1}	0.0237			−0.0236			0.00551			−0.00734			−0.00903		
	(0.13)			(0.040)			(0.0097)			(0.0058)			(0.014)		
Parti. score in WU		−0.0166			−0.0117			0.00936*			0.00352			−0.00394	
		(0.040)			(0.013)			(0.0053)			(0.0037)			(0.0087)	
Parti. score in WU_{t-1}		−0.00444			−0.00904			−0.00236			0.00551			0.00324	
		(0.036)			(0.016)			(0.0053)			(0.0036)			(0.0081)	
Parti. score in FU			−0.0445			0.0115			0.00302			−0.000886			−0.00609
			(0.039)			(0.014)			(0.0066)			(0.0035)			(0.0086)
Parti. score in FU_{t-1}			−0.0220			0.0177			−0.00325			0.00595			0.000956
			(0.035)			(0.016)			(0.0061)			(0.0042)			(0.0091)
N	479	919	946	1,113	1,614	1,632	1,527	1,945	1,955	1,845	2,070	2,067	3,238	4,793	4,868

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. Control variables are suppressed from the table.
Source: Author's calculation based on VARHS 2008-2016.

Table A13: IV regression for the participation score by income distribution.

	I Quantile - Poorest			II Quantile - Poor			III Quantile - Rich			IV Quantile - Richest			Idiosyncratic > 0		
	Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty			Vulnerability as Expt. Poverty		
Parti. score in CPV	−0.239			−0.162*			0.0532			−0.0438			−0.0716		
	(0.27)			(0.093)			(0.049)			(0.040)			(0.044)		
Parti. score in WU		−0.0362			0.0343			−0.00368			−0.0309*			−0.0200	
		(0.053)			(0.035)			(0.019)			(0.016)			(0.016)	
Parti. score in FU			−0.0322			−0.0701**			−0.00176			−0.0272			−0.0279*
			(0.051)			(0.033)			(0.020)			(0.018)			(0.016)
	Idiosyncratic risk			Idiosyncratic risk			Idiosyncratic risk			Idiosyncratic risk			Idiosyncratic risk		
Parti. score in CPV	0.979**			0.366**			−0.0170			0.120			0.134**		
	(0.39)			(0.17)			(0.11)			(0.082)			(0.066)		
Parti. score in WU		0.0283			−0.190***			0.0120			−0.00926			0.00249	
		(0.14)			(0.057)			(0.036)		(0.036)			(0.026)		
Parti. score in FU			0.366***			−0.0362			0.0570*			0.0418			0.0226
			(0.14)			(0.069)			(0.031)			(0.035)			(0.027)
	Covariate risk			Covariate risk			Covariate risk			Covariate risk			Covariate risk		
Parti. score in CPV	−1.515*			−0.451*			0.110			−0.154			−0.204**		
	(0.86)			(0.27)			(0.12)			(0.10)			(0.10)		
Parti. score in WU		−0.0553			0.219**			0.0136			−0.0214			−0.0337	
		(0.16)			(0.11)			(0.047)			(0.043)			(0.035)	
Parti. score in FU			−0.297			−0.0773			−0.0355			−0.0772*			−0.0502
			(0.22)			(0.12)			(0.045)			(0.046)			(0.045)
	Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk			Idiosyncratic *plus* Covariate risk		
Parti. score in CPV	−0.536			−0.0849			0.0929			−0.0335			−0.0699		
	(0.66)			(0.20)			(0.078)			(0.049)			(0.11)		
Parti. score in WU		−0.0270			0.0290			0.0255			−0.0307			−0.0312	
		(0.17)			(0.089)			(0.030)			(0.020)			(0.044)	
Parti. score in FU			0.0686			−0.114U			0.0214			−0.0354			−0.0275
			(0.19			(0.089)			(0.033)			(0.024)			(0.053)
N	479	919	946	1,113	1,614	1,632	1,527	1,945	1,955	1,845	2,070	2,067	2,365	3,578	3,640

Standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. Control variables are suppressed from the table.
Source: Author's calculation based on VARHS 2008-2016.

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