

SOCIAL CAPITAL, NETWORK EFFECTS, AND SAVINGS IN RURAL VIETNAM

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Information failures are a major barrier to formal financial saving in low-income countries. We explore the extent to which social capital in rural Vietnam plays a role in increasing formal savings where knowledge gaps exist. Social capital is defined as information sharing and the elimination of information asymmetries through active participation in the Women's Union. We consider high- and low-quality networks in terms of the quality of information transmitted. We find that membership of high-quality networks leads to higher levels of saving in formal financial institutions and saving for productive investments. Our results support a role for social capital in facilitating savings and suggest that transmitting financial information through the branches of the Women's Union could be effective in increasing formal savings at grassroots level. We also conclude that it is important to ensure that the information disseminated is accurate given that behavioral effects are also found in networks with low-quality information.

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1. INTRODUCTION

In this study we examine the role that social capital can play in correcting for financial market failures in rural communities in Vietnam. Such failures may lead to sub-optimal behavior as households choose either not to save or to save in a low-yielding form, for example, cash held at home. In line with Coleman (1988)

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and Putnam (1993), we define social capital as the existence of a social structure which leads to the formation of social networks through which information can be disseminated or shared. This, in turn, informs individual financial behavior.

We are motivated by two separate considerations. First, household savings are an important determinant of welfare. They help households to smooth consumption when faced with negative income shocks (see, for example, Deaton, 1992; Wainwright and Newman, 2011). Second, a key challenge for developing countries is to increase the share of savings that is held formally given the importance of accumulating capital for productive investment purposes (Dupas and Robinson, 2009). Yet, for low-income households there are many barriers to accessing savings accounts in formal financial institutions. Poor households are therefore more likely to save informally and often keep money as cash held at home (Banerjee and Duflo, 2007).

Arguably, one of the most difficult challenges in increasing formal savings is correcting for information failures.¹ In some cases, these can be effectively eliminated at local level rather than requiring costly state-wide policies. It is well established in the literature that risk-sharing among social groups through a system of transfers and loans is an important mechanism for risk coping among the rural poor (Coate and Ravallion, 1993; Townsend, 1994; Udry, 1994; Foster and Rosenzweig, 2001; Ligon *et al.*, 2002). Informal risk-sharing of this kind usually takes the form of informal savings and credit groups that directly substitute for the formal market. The potential role of social capital in transmitting information on, for example, the merits of formal saving or the process involved in setting up a savings account, through existing social structures is much less understood in this context.

In this study, we propose, in line with much of the literature, that social networks can act as a substitute for formal institutions where the latter are weak (see Fafchamps, 2006, for an overview). Bowles and Gintis (2002) highlight the fact that communities possess private information, which neither the market nor the state has access to, that may allow them to correct more effectively for local market failures through existing social structures. In particular, they can facilitate information sharing, and eliminate information asymmetries through establishing social norms. This is the concept of social capital that we apply in this study and we establish its role in influencing savings behavior.

This definition is consistent with much of the wider literature concerned with defining and conceptualizing social capital. Coleman (1988) identifies three forms of social capital that can act as a resource in improving outcomes for individual actors, namely, information sharing, obligation and trust, and social norms. Similarly, Putnam (1993) identifies social norms and social trust as the core characteristics of social organizations that facilitate coordination and cooperation among members but places particular emphasis as well on the role of social networks. Social capital is also defined by the social structures that allow interpersonal

¹Physical distance to savings institutions is another important barrier. For example, Rosenzweig (2001) finds that the proximity of formal financial institutions crowds out other informal insurance arrangements. Other barriers include high opening balance requirements and minimum deposit amounts, complicated and unclear procedures, costs associated with travelling to the institution, and impersonal or unfriendly service (ILO, 2007).

relationships to take place. In this context, social organizations play an important role in facilitating the transmission of social capital through the social network that they give rise to. Fafchamps (2006), for example, emphasizes the role of clubs and networks in the provision of public goods while Olken (2009) uses participation in social groups as a measure of social connectedness.

We consider two specific mechanisms through which social capital is transmitted through social networks. The first is the information channel where members of the social network share information with each other which leads them to behave in a similar fashion. This is consistent with the models of herd behavior proposed by Banerjee (1992) and Bikhchandani *et al.* (1992) whereby individuals behave as others do in the belief that they possess more information on the best course of action. Foster and Rosenzweig (1995) take this idea a step further in identifying “learning from neighbors” as an important source of productivity improvements in the adoption of a new technology in India. The second mechanism is through the existence of social norms, where an individual’s preferences are influenced by an established set of norms that directly impact on individual tastes or affect preferences through social pressures. Social norms are identified by Coleman (1988) and Putnam (1993) as a form of social capital, and evidence of a role for social norms in economic decision making has been provided in many different contexts. For example, Akerlof (1980) provides a theoretical model which identifies the pecuniary reasons why social customs prevail. Bertrand *et al.* (2000) empirically identify a link between social networks and welfare reciprocity which they explain through social norms that exist within the network. Stone *et al.* (2003) refer to social capital at work when they show how family-friends and civic ties relate to labor market outcomes in Australia. They also contribute a brief and illuminating discussion of the different dimensions of social capital in the various realms of the social sciences.

The empirical literature linking social capital to financial market behavior is limited, particularly in developing country contexts. There are some notable exceptions, including Cole *et al.* (2009) who find that trust and information are important in financial market participation, using a randomized field experiment in two rural regions of India. Experimental evidence that social learning improves individuals’ ability to solve life cycle precautionary savings models is provided by Ballinger *et al.* (2003). With an objective similar to this study but in a developed country setting, Guiso *et al.* (2004) measure social capital through a number of different indicators and find that in high social capital areas of Italy, households are more likely to invest in stock than in cash. Our study adds to this literature by providing evidence of a role for social capital in informing savings decisions in a developing country setting.

In this study, we also give consideration to the form of social organization itself. Stone *et al.* (2003) categorize social networks in three ways: informal ties, such as relationships with friends and family; generalized relationships which are community based; and societal or institutional relationships, which include ties with civic groups and the government. Bowles and Gintis (2002) suggest that for community governance to work effectively, a formal institutional structure that allows the state, markets, and communities to interact collectively is required. Vietnam provides a compelling case study for exploring the role of social capital in

correcting for information asymmetries in this context given the nature and significance of the role played by mass organizations at grassroots level.

In Vietnam, the state continues to play a dominant role in the functioning of the economy. Under the umbrella of the Communist Party, a variety of socio-political organizations exist that play an important role, both socially and economically, in local communities. These groups follow a hierarchical structure with official leaders at the central, province, district, and commune level, managing the activities of the organization and working with members. Since these groups operate under the umbrella of the state, their activities complement government strategies and policies. The Women's Union is one of the most prominent of these groups and, along with addressing many social issues locally, such as providing information on family planning and health, it is mandated to work toward facilitating savings and credit teams.²

The Women's Union was formed on the basis of socio-political ideals, and the duties and responsibilities of members range from fulfilling the duties of a citizen, actively participating in community meetings, supporting the work of the community, and the sharing of information. Active members regularly interact at meetings and so the Women's Union is likely to serve as an important vehicle for social relations that facilitate the sharing of information and the establishment of social norms (Coleman, 1988). Moreover, the nature of the organizational structure of the Women's Union suggests that members are likely to possess the information necessary to behave in an optimal way, particularly in the case of savings behavior. It is expected, however, that there will be heterogeneity in the quality of information possessed by different branches of the Women's Union and as a result the network of actors within these groups. While network quality is traditionally thought of in terms of the extent of trust and reciprocity between members (Coleman, 1988; Putnam, 1993), in this study, we define the quality of the network in terms of the quality of information it possesses.

In summary, we hypothesize that active membership of the Women's Union in rural Vietnam leads to the formation of a network that facilitates interpersonal relationships that allow members to share information on the merits of formal saving. Accordingly, we analyze the choice of different types of saving and how the composition of the portfolio is affected by union membership. We consider both high-quality and low-quality networks defined by the quality of the information that the branch of the Women's Union is observed to possess which differs across localities.

To test our hypothesis we use a unique and carefully developed dataset for Vietnam. We find that high levels of overall formal saving by Women's Union members induce other members to save formally and increase the likelihood that they save for productive purposes. We conclude that these groups serve as an important source of information on the merits of formal saving.

The theoretical framework is presented in Section 2, followed by the empirical approach in Section 3. The data are described in Section 4, and the empirical results in Section 5. Section 6 concludes.

²The Vietnamese Women's Federation has established agreements with the two main state banks in Vietnam to support savings and credit groups in local communities.

2. THEORETICAL FRAMEWORK

The theoretical motivations for household and individual savings have been extensively explored in the literature (see, for example, Gersovitz, 1988; Browning and Lusardi, 1996). Precautionary motives are particularly relevant in developing countries where income is volatile and other consumption smoothing mechanisms are limited. For example, Fafchamps and Pender (1997) find that while poor households save for both precautionary reasons and to finance investment, particularly where credit is not available, low returns on saving prevent them from investing in profitable investment, in particular, non-divisible larger investments. As such, in most cases precautionary motives prevail as households remain in a poverty trap. Our theoretical starting point for analyzing precautionary savings follows most of the literature modeling savings behavior under uncertainty using a standard inter-temporal allocation model, where in each time period the household must decide how much to consume and how much to invest in accumulating assets (including savings) which will act as a buffer against unexpected income shocks (see, for example, Deaton, 1991, 1992; Fafchamps *et al.*, 1998; Wainwright and Newman, 2011).

A household's discounted expected utility function is given by:

$$(1) \quad U_i = E_t \left[\sum_{t=1}^T \delta^t U_i(C_{it}) \right],$$

where δ is the rate of time preference, $U_i(C_{it})$ is the utility function, and T is the number of time periods. We assume that households are risk averse, i.e. $U_i''(C_{it}) < 0$, and have precautionary savings, i.e. $U_i'''(C_{it}) > 0$. The former assumption is required to ensure that the utility function is concave so households are risk averse, and the latter ensures that the marginal utility function is convex so uncertainty induces saving.

In each time period, each household randomly receives income $y_i(s_{it})$ which depends on the state of nature s_{it} facing the household in time period t . The state of nature includes all exogenous shocks to income that can affect the whole community (such as a natural disaster) or the individual households (such as the death of the main income earner). Since households are risk averse they accumulate liquid wealth (or precautionary savings) to act as a buffer against such income shocks. Total wealth (liquid) of the household at time t is given by A_{it} which yields a return r_{it} . The Bellman equation corresponding to the household's decision problem takes the usual form:

$$(2) \quad V_i(X_{it}, s_{it}) = \max_{A_{it+1}} U_i(X_{it} - A_{it+1}) + \delta_i EV_i[y_i(s_{it+1}) + (1+r_{it+1})A_{it+1} | s_{it+1}],$$

where $X_{it} = A_{it} + y_{it}$ is "cash-in-hand" of household i in time t and $A_{it+1} \geq 0$, i.e. no borrowing. This model allows for accumulating and selling of assets to act as a buffer against income shocks.

Following Fafchamps *et al.* (1998), the distribution of the returns to accumulating assets will depend on the level and composition of A_{it} . We assume that the only way households can insure against income losses due to such shocks is to accumulate savings. Since we are pursuing here the decision to save and not

the decision to choose savings over other forms of insurance against shocks, we assume that purchasing formal insurance, borrowing, or accumulating other liquid assets are not possible. We allow for savings of different forms and so the household's wealth portfolio can include cash, gold, and jewelry held at home, informal savings held with local rotating credit groups or money lenders, or formal savings held in state and private-owned banks.

For simplicity, we group together informal savings and cash held at home for the purpose of our theoretical model. We extend the model given in (2) to allow for two assets: informal savings/cash held at home (W_{it}) and formal savings in a financial institution (F_{it}). We assume that the return to holding savings informally and cash at home is negative ($-\theta$) given the risk of theft.³ For simplicity we assume that this risk is constant across all households. We assume that the perceived return to formal saving is a function of the information available to the household at time t , i.e. $\gamma(I_{it}) = \gamma_{it}$, where $\gamma'_i(I_{it}) > 0$. This will vary across households depending on how certain or uncertain they are regarding future returns. We assume that the level of certainty depends on how good the available information is. As discussed in Section 1, we assume that information can be transmitted to households through participation in the Women's Union that gives rise to social networks. Information can be transmitted through the sharing of information between members that regularly interact at meetings or through the demonstration of established social or group norms.

Formal saving comes at a cost, η , which is also a function of the information available to the household, i.e. $\eta(I_{it}) = \eta_{it}$ and $\eta'_i(I_{it}) < 0$. These costs include travel costs but could also include the cost of learning how to apply for a savings account or how different types of financial products work (for example, fixed term deposits vs. flexible term deposits). Women's Union membership could reduce these costs by providing households with the relevant information through the social network. The combined returns to holding savings informally or cash at home and formal savings are given by:

$$(3) \quad (1+r_{it+1})A_{it+1} = (1-\theta)(A_{it+1} - F_{it+1}) + (1+\gamma_{it+1})F_{it+1} - \eta_{it+1}F_{it+1}.$$

In this setting, formal saving is considered more costly than saving informally or at home if $\gamma_{it} - \eta_{it} < \theta$. As such, information can play an important role in changing the perceived relative risk associated with different forms of saving through providing information on the returns and in reducing the costs associated with saving formally.

The revised Bellman equation can be written as:

$$(4) \quad V_i(X_{it}, s_{it}) = \max_{F_{it+1}} U_i(X_{it} - W_{it+1} - F_{it+1}) + \delta_i E V_i [y_i(s_{it+1}) + (1-\theta)(A_{it+1} - F_{it+1}) + (1+\gamma_{it+1})F_{it+1} - \eta_{it+1}F_{it+1} \mid s_{it+1}].$$

As before no borrowing is allowed so $A_{it+1} \geq F_{it+1} \geq 0$.

³The real value of cash held at home can also potentially be eroded from one year to the next due to inflation, and potentially significantly so in typically high-inflation developing economies. However, since we also consider holding gold and jewelry as a form of household savings, and they are often held as a hedge against inflation, this is not likely to be the case for all forms of household savings considered.

We solve this optimization problem to derive an expression for the level of formal saving. Following Fafchamps *et al.* (1998), we assume a negative exponential utility function and a normal distribution for future consumption. We take a mean variance approximation of the expected value function, so households will choose F_{it+1} in order to (approximately):

$$(5) \quad \max_{F_{it+1}} \left\{ \begin{aligned} & \bar{y}_i(s_{it}) + (1 - \theta)W_{it+1} + (1 + \bar{\gamma}_i(I_{it}) - \bar{\eta}_i(I_{it}))F_{it+1} \\ & - \frac{1}{2}R_i \left[\begin{aligned} & \sigma_{y_i}^2(s_{it}) + \sigma_{F_i}^2(I_{it})F_{it+1}^2 \\ & + 2\rho_{y_i F}(s_{it})\sigma_{y_i}(s_{it})\sigma_{F_i}(I_{it})F_{it+1} \end{aligned} \right] \end{aligned} \right\},$$

where R_i is the Arrow–Pratt absolute risk aversion coefficient, which for the exponential utility function exhibits constant absolute risk aversion. That is, $R_i = -[U_i''(C_{it})/U_i'(C_{it})]$, which implies that as wealth increases households hold the same level of wealth in the form of risky (or in this case perceived to be risky) assets. We define the expected value of income as $E[y_i(s_{it+1} | s_{it})] = \bar{y}_i(s_{it})$, its variance as $V[y_i(s_{it+1} | s_{it})] = \sigma_{y_i}^2(s_{it})$, the expected value of returns to formal saving as $E[1 + \gamma_i(I_{it+1} | I_{it}) - \eta_i(I_{it+1} | I_{it})] = 1 + \bar{\gamma}_i(I_{it}) - \bar{\eta}_i(I_{it})$, and its variance as $V[1 + \gamma_i(I_{it+1} | I_{it})] = \sigma_{F_i}^2(I_{it})$, where $\sigma_{F_i}'(I_{it}) < 0$ implying that information reduces the perceived variance in the return to saving and assuming that the cost of saving does not affect the variance in returns. $\rho_{y_i F}(s_{it})$ is the correlation between income and the returns to saving. Assuming that returns are independent of income shocks this correlation will be zero.

Solving the optimization problem yields:

$$(6) \quad F_{it+1}^* = \frac{1 + \bar{\gamma}_i(I_{it}) - \bar{\eta}_i(I_{it})}{R_i \sigma_{F_i}^2(I_{it})}.$$

The model predicts that the level of formal saving, F_{it+1}^* , will be an increasing function of the return to saving, $\bar{\gamma}_i(I_{it})$ and a decreasing function of the cost of saving $\bar{\eta}_i(I_{it})$. F_{it+1}^* will also be a decreasing function of the variance in the return to saving $\sigma_{F_i}^2(I_{it})$ and the level of risk aversion R_i .⁴ In this model, information plays an important role in determining the level of formal saving. As outlined in Section 1, we hypothesize that the social network that results from Women’s Union membership transmits information on how to save formally and on the various ways in which households can save to yield a return, thus filling an information gap. According to our model, this information reduces the cost of saving in formal financial institutions, $\bar{\eta}_i(I_{it})$, increases the perceived return $\bar{\gamma}_i(I_{it})$, and reduces the perceived variance in returns $\sigma_{F_i}^2(I_{it})$. Each mechanism will lead to an increase in the level of formal saving.

⁴ R_i represents the coefficient of relative risk aversion and since the model is restricted by the assumption of a negative exponential utility function, the coefficient of relative risk aversion will be increasing in wealth. Moreover, given that we assume that returns to savings and shocks are uncorrelated so $\rho_{y_i F}(s_{it})$ equals zero, the expression $-R_i(\rho_{y_i F}(s_{it})\sigma_{y_i}(s_{it})\sigma_{F_i}(I_{it})F_{it+1})$ will also equal zero.

3. EMPIRICAL CONSIDERATIONS

Following from the theoretical model, the baseline, reduced form, savings equation is given by:

$$(7) \quad F_{it} = \alpha_i + \beta_1 FS_{it-1} + \beta_2 CS_{it-1} + \beta_3 Z_{it} + \beta_4 s_{it} + v_{it},$$

where F_{it} is the level of formal savings of household i at time t ; FS_{it-1} is the stock of formal savings at the beginning of the period; CS_{it-1} is a vector of different types of informal savings including cash held at home at the beginning of the period; Z_{it} is a vector of household and regional characteristics that proxy the cost of savings; s_{it} are losses to household income as a result of external shocks; α_i are household fixed effects to control for unobserved household heterogeneity; and v_{it} is the time varying unobserved error term.⁵ The stocks of savings variables are included as a measure of household wealth at the beginning of the period.

Information is transmitted through the social network formed by active participation in Women's Union meetings and we proxy the "quality" of the information transmitted through the network using the observed savings behavior of group members. We consider the networks with a greater level of formal savings to be higher quality branches and so extend the reduced form to include the average stock of formal savings of other members within the commune (computed excluding household i) and use two lags to ensure that this variable is exogenous to the behavior of members in period t ($FS_{n-i,t-2}$). Since it is also possible that branches contain poor quality information we also include the average stock of informal savings of members to proxy lower quality networks ($IS_{n-i,t-2}$). This does not imply that informal savings are undesirable but are sub-optimal from the perspective of encouraging formal financial participation, and this takes account of the fact that there will be heterogeneity in the quality of information that members of different local branches of the Women's Union possess. We consider the possibility that both good and bad information can be shared through the social network that results from active participation in Women's Union meetings.

The revised reduced form is given by equation (8):

$$(8) \quad F_{it} = \alpha_i + \lambda_1 FS_{n-i,t-2} + \lambda_2 IS_{n-i,t-2} + \beta_1 FS_{it-1} + \beta_2 CS_{it-1} + \beta_3 Z_{it} + \beta_4 s_{it} + v_{it}.$$

According to our theoretical predictions we would expect: $\lambda_1 > 0$ (members of high-quality networks have higher levels of formal savings), $\lambda_2 \leq 0$ (members of low-quality networks have lower levels of formal savings or are no different in terms of their level of formal savings), $\beta_1 > 0$ (households that already hold a high stock of formal saving will have greater certainty about the returns and so will save more in this form), $\beta_2 < 0$ (households with a greater stock of other savings types are more uncertain about formal savings and so will save less in this form).

The key challenge in estimating this model is controlling for omitted variables that are potentially correlated with the network effect as discussed by Manski (1993, 2000), Brock and Durlauf (2001), and Aizer and Currie (2004).

⁵The model is estimated using a fixed effects estimator with clustered standard errors at the household level.

First, there may be self-selection into the Women's Union. While membership of the Women's Union in Vietnam is based on signing up to a set of socio-political ideals rather than on availing of facilities offered by the group such as financial advice or savings facilities, it may still be that there are unobserved characteristics of members that are correlated with membership and savings behavior. The consequence for the empirical model would be that the unobserved factors that determine the household's level of formal savings may be the same as those that determine the probability that the household is an active member of the Women's Union. To control for these factors we use fixed effects estimation to eliminate any unobserved household specific effects that may influence both the level of formal savings and the probability that the household is an active Women's Union member. Moreover, since we are interested in the behavior of members and not selection into the Women's Union, we estimate the model for active members only and run tests for sample selection bias using Wooldridge's (1995) approach.

Second, there may be simultaneity between individual behavior and the behavior of Women's Union members, also referred to as Manski's (1993) reflection problem. We correct for reflexivity by defining the network variable as the average stock of formal savings by other group members at time $t - 2$, excluding the stock of saving held by household i , $FS_{n-i,t-2}$. Aizer and Currie (2004) use a similar approach.

Third, the network effect may be confounded with correlated effects such as behavioral changes due to common exogenous shocks. To control for these effects we include the average level of savings within the commune in period t (computed excluding the savings level of household i), the average stock of savings in the district at the beginning of period t , and other time varying commune characteristics such as the number of banks and the proportion of poor households.

A fourth and final consideration is the possibility that the network effect might be driven by the size of the local branch of the Women's Union and therefore the density of the resulting network. The size of the network may affect the degree of learning of network members. A measure of the density of the Women's Union is therefore included in the model to control for this possibility.

In addition to network effects and in accordance with our theoretical framework, we also consider how other factors may affect the level of formal savings. We include the stock of saving in different forms held at the beginning of each year as well as wealth quintiles constructed using information on the dwelling of the household. To control for income shocks we include household income and a variable capturing the number of natural disasters experienced within the commune. If savings are precautionary we expect households to dis-save in the event of a shock and it is also likely that they are not able to save in the immediate aftermath. Empirical evidence to support the hypothesis that households dis-save when confronted with a negative income shock is provided by, for example, Udry (1995), using a sample of 200 farm households in northern Nigeria, and Wainwright and Newman (2011) in the case of rural Vietnam. We also include household size and whether households receive transfers from children living outside of the home as controls.

4. DATA

Data are taken from the Vietnam Access to Resources Household Survey (VARHS) implemented in 2006, 2008, and 2010 in 12 provinces in Vietnam. The survey was developed in collaboration between the Development Economics Research Group (DERG), Department of Economics, University of Copenhagen, and the Central Institute of Economic Management (CIEM), the Institute for Labour Studies and Social Affairs (ILSSA), and the Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD), Hanoi, Vietnam. The full panel of 2200 households is spread over 456 communes and 131 districts. Along with detailed demographic information on household members, the survey includes sections on financial behavior, in particular in relation to savings and borrowing. Due to the absence of total expenditure data we cannot use the standard “income minus expenditure” measure of saving. Instead, we focus our investigation on self-reported levels of saving.

We recognize that misreporting of financial information is a common criticism of survey data of this kind. To ensure that the data collected are reliable, we ask households about their stock of saving at the beginning of the year, at the end of the year, and how much they saved during the year to check that they are providing consistent information. For income data we ask separately about income from different sources in different sections of the questionnaire and sum these up to get our measure of household income. It is possible, however, that some households’ financial information is measured with error. Measurement error in our dependent variable (formal savings) will only affect the econometric estimation if it is correlated with the regressors. Given that we control for household fixed effects, which absorbs any time invariant household specific measurement error, this will only be the case if the extent of misreporting for any given household varies across different financial variables (different forms of saving or income) or over time, which is unlikely. Moreover, it will not be correlated with the social capital measure, given that this is computed net of the information on the household in question.

The supply of institutional saving services for rural households is estimated to cover 65 percent of the poorest quarter of the population (ILO, 2007).⁶ This is also reflected in our data which cover the more rural and remote provinces in Vietnam. In 2006, 36 percent of communes included in the sample had a state bank located in their commune while 19 percent had access to other types of credit organizations including People’s Credit Funds and international organizations. However, 93 percent of the communes report having access to formal savings deposits through institutions located outside of the commune. Access within communes increased over the timeframe of our data, with 57 percent of communes having a state bank in 2008 and 67 percent in 2010.

Table 1 provides a description of the savings behavior of households in our sample. Total savings includes formal savings (i.e., postal savings, savings in state-owned commercial banks, private banks, and credit organizations) and two

⁶Saving services are offered by five state-owned commercial banks, one social policy bank, one post office savings company, 37 joint stock commercial banks, 31 foreign-owned bank branches, five joint venture banks, 934 People’s Credit Funds (PCFs), and 58 microfinance institutions (ILO, 2007, p. 85).

TABLE 1
HOUSEHOLD SAVINGS BEHAVIOR

	Total Savings (%)	Formal (%)	Informal (%)	Home (%)
% hhs who save (2006)	53.8	4.9	12.9	43.4
% hhs who save (2008)	43.0	4.0	5.3	36.7
% hhs who save (2010)	60.7	5.7	10.5	52.4
<i>For saving households:</i>	'000 VND	of which %:	of which %:	of which %:
Average (2006)	11,465	7.3	19.4	73.3
Average (2008)	17,062	8.0	10.2	81.8
Average (2010)	14,085	7.7	13.0	79.3
WOMEN'S UNION MEMBERSHIP AND SAVINGS				
	Total Savings (%)	Formal (%)	Informal (%)	Home (%)
% members who save (2006)	56.0	5.8	13.9	44.8
% members who save (2008)	46.9	3.7	5.1	40.7
% members who save (2010)	63.2	5.6	13.7	53.3
<i>For saving member households:</i>	'000 VND	of which %:	of which %:	of which %:
Average (2006)	12,437	8.5	19.8	71.7
Average (2008)	15,640	6.5	9.3	84.2
Average (2010)	12,989	6.8	16.5	76.6

Note: All value figures are adjusted for inflation and are expressed in 2010 VND.

Source: Authors' calculations.

types of informal savings—savings in rotating savings and credit associations or through private money lenders, and saving at home in the form of cash, gold, and jewelry. The dominant form of saving is cash, gold, and jewelry held at home (43 percent of households in 2006, 37 percent in 2008, and 52 percent in 2010). The proportion of households with savings in formal financial institutions is very small at around 5 percent each year, despite the extensive coverage of formal financial institutions in these rural areas.

We define the network on the basis of whether individuals within households are *active* members of Women's Union branches within communes. Active members are those that participate in meetings on a regular basis and they amount to approximately 50 percent of households in our sample in each year. Each household member was asked whether they are a member of any groups, organizations, or associations. They are then asked to specify the type of organization from a list which includes as an option the Women's Union. Individuals are then asked: "Do you participate in meetings: (1) Almost Always; (2) Sometimes; (3) Rarely/Never." Households in which individuals respond "Almost Always" to participation in Women's Union meetings are considered to be members of the network. Stone *et al.* (2003) combine many different measures of social capital to define an individual's social capital profile across multiple dimensions. In this study, we isolate one aspect of social capital: the institutional and societal relationships established through Women's Union membership. Our measure closely aligns with Stone *et al.*'s (2003) operationalization of this dimension of social capital—they use the number of group memberships an individual has and the breadth of institutional ties.

An active organization is present in almost all communes. Table 1 describes the savings behavior of active Women's Union members. Members are more

likely to save than other households in all years (see top panel of Table 1 for comparison), although the difference is not statistically significant. The composition of savings of members is, on average, different to that of non-members, suggesting that members and non-members do behave differently. These differences also vary over time, suggesting that the portfolio of savings of active members of the Women's Union is more changeable than the average behavior of households in the sample. For example, in 2006 formal savings make up a greater proportion of savings of members than for other households, while in 2008 and 2010 this proportion is slightly smaller for members than the average for all households.

A description of all variables included in the model is presented in the online Appendix, together with means and standard deviations.⁷ Since lags are required for the construction of the network variable, only data from 2008 and 2010 are used.⁸ The trends in the raw data reveal an increase in the level of savings of all types, particularly formal saving. The stock of formal savings of Women's Union members (the network variable) is higher in 2010 than in 2008, suggesting that the "quality" of the Women's Union network increased. Consistent with this we find that the stock of informal savings of Women's Union members declined between these years. The extent to which the savings behavior of Women's Union branches impacts on the savings behavior of its members is explored empirically in Section 5.

5. ECONOMETRIC RESULTS

5.1. *Empirical Results*

Our theoretical model demonstrates that one mechanism through which Women's Union membership can impact on the financial decision-making of households is through correcting for information asymmetries that prevent households from either accessing, or understanding the merits of depositing their savings with, formal financial institutions. Social norms may lead group members to behave in a similar way; however, we can not identify the exact mechanism through which information spillovers occur. In our empirical analysis both herd behavior or demonstration effects and actual learning are consistent with the information channel as we capture it. Regardless of which mechanism is at work, we hypothesize that the average behavior of members of a branch of the Women's Union will have an impact on the behavior of its active members. If so, there may be a role for disseminating information on formal savings through the Women's Union.

⁷There is a lot of variation in the levels of savings and income of households as revealed by the large standard deviations reported in the online Appendix. While there are a small number of outliers in the data, the results of our analysis are robust to their exclusion.

⁸Our data are collected at two-year intervals but include the stock of savings at the beginning and the end of each year. This means that in 2008, for example, the stock of wealth variable refers to the stock of savings at the beginning of the year (i.e., the stock of savings at the end of 2007 which constitutes one lag), and the network variable is computed using the stock of savings at the end of 2006 (we consider this two lags of the data). The first and second lags of the data are computed in a similar way for 2010. This means that the household fixed effects regression model is based on two time periods, 2008 and 2010.

We estimate the model given in equation (8) to ascertain the relationship between the “quality” of the network, in terms of its potential for disseminating information regarding (or demonstrating the advantages of) formal savings behavior, and the savings levels of its members. All variables expressed in Vietnamese Dong (VND) are scaled by 1,000 before inclusion in the model. The model is estimated by taking a within-transformation of the data to eliminate the time invariant household heterogeneity prior to the estimation of the model.⁹ Standard errors are clustered at the household level and are robust to heteroscedasticity.

As discussed in Sections 3 and 4, the network variables are measured as the average stock of formal savings (to capture high-quality networks), and informal savings (to capture low-quality networks), of active Women’s Union members within the commune two years previously. For each household member their own stock of savings is excluded from the computation of their average stock measure. As highlighted by Stone *et al.* (2003), the structure of networks may also be important and so we control for differences in the density of groups. We estimate the model for group members only. Results are presented in Table 2.

Column (1) reveals that being a member of a high-quality network has a positive and significant effect on the savings level of individual members. This result is robust to the inclusion of the interaction terms between the density of the group and the network variables (column (2)), although the magnitude and statistical significance of the result is somewhat reduced. In this model we control for household fixed effects, commune level characteristics, the average savings behavior in the commune, and time varying household characteristics.¹⁰ Moreover, given our focus on group members, the identification of the network effect comes from the variation within households, and consequently within groups, over time. This result therefore provides support for the hypothesis that the savings behavior of households is influenced by that of other group members. The coefficient of 0.19 implies that for every VND1 million increase in the stock of group formal savings (excluding household member *i*), savings of household member *i* increase by VND190,000 on average. We find no evidence that households in low-quality groups are induced to save less.

Disaggregating by type of saving we find that being in a high-quality group has a positive and significant effect on *formal* household savings (column (3)), further supporting our hypothesis.¹¹ In this case, however, the result is not robust to the inclusion of the interaction terms between group density and the network variables (column (4)). Once interaction terms are included, being in a low-quality

⁹We estimate the fixed effects model using the econometric software package Stata V.10 using the command *xtreg*.

¹⁰Results for the control variables are available on request.

¹¹The equations for formal, informal, and home savings are estimated independently including the same set of control variables in each equation. It is possible that the error terms are correlated across equations which could impact on the statistical significance of our results. To consider this possibility we estimate the three equations as a system of seemingly unrelated regression equations. While the Breusch–Pagan test for independence suggests that the three equations are not independent with p-values of less than 0.01, all of our core results and overall findings hold. Results are available on request.

TABLE 2
WOMEN'S UNION NETWORK EFFECTS ON LEVEL AND TYPE OF SAVINGS OF GROUP MEMBERS

Saving Form:	Total			Formal		Informal		Home	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Network (formal)	0.190** (0.086)	0.147* (0.084)	0.059** (0.030)	0.028 (0.028)	0.007 (0.007)	-0.028*** (0.010)	0.125* (0.073)	0.149** (0.069)	
Network (informal)	0.002 (0.171)	-0.087 (0.441)	-0.038 (0.056)	-0.266* (0.161)	-0.018 (0.017)	-0.025 (0.037)	0.059 (0.147)	0.205 (0.348)	
Density	-0.172 (0.166)	-0.350 (0.331)	-0.061 (0.135)	-0.200 (0.268)	-0.118* (0.070)	-0.262*** (0.072)	0.214 (0.105)	0.113 (0.174)	
Network (formal) · Density		0.002 (0.003)		0.002 (0.002)		0.002*** (0.001)		-0.001 (0.001)	
Network (informal) · Density		0.006 (0.020)		0.015* (0.008)		0.001 (0.002)		-0.010 (0.017)	
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
R ² within	0.128	0.130	0.122	0.126	0.123	0.157	0.171	0.173	
R ² between	0.087	0.085	0.021	0.017	0.130	0.128	0.124	0.125	
R ² overall	0.111	0.109	0.046	0.043	0.117	0.117	0.140	0.141	
Households	1564	1564	1564	1564	1564	1564	1564	1564	
Observations	2350	2350	2350	2350	2350	2350	2350	2350	

Notes: Standard errors are clustered at the household level and are given in parentheses. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level. All baseline controls are included along with time dummies. The density variable is scaled by 100 for ease of illustration.

Source: Authors' calculations.

group has a significant negative effect on formal saving. This suggests that network effects matter for households' choice of savings but also that the quality of the network is an important factor.

While we are less concerned here about the influence that networks have on informal savings and home savings, column (6) implies a negative marginal effect of high-quality networks on informal saving at the mean (-0.003).¹² Although small in magnitude, this suggests that in high-quality networks households save less informally (as one might expect), particularly in networks with fewer members. This provides further support for the hypothesis that good information on the merits of formal savings or good behavior can be transmitted through high-quality networks. In columns (7) and (8), however, we find that members of high-quality networks also save more in the form of cash held at home. This suggests that the transmission of good information through the network could also impact on less desirable forms of saving, such as cash saving. Alternatively, there may be complementarities in saving types for those who save more formally as they might also choose to save more cash.

Overall, we find that in high-quality networks members save more formally. Another indicator of how productive savings are is what the household is actually saving for. As a check on the validity of our results we consider the extent to which the behavior of the network impacts on households' reported reasons for saving.

In the VARHS, households report two reasons for saving. The options given are: 1. Protection against bad harvest and other natural disasters; 2. Healthcare expenses; 3. Cost of education; 4. Purchase of agricultural inputs; 5. Provision for old age; 6. Accumulation for other big expenditures; 7. Profit-making investment; 8. Other. These are condensed into five categories for the purpose of our analysis: risk coping, investment, education, retirement, and consumption. We estimate fixed effects linear probability models for each category for group members, including the same set of variables as in our core model. Results are presented in Table 3.

The quality of the network is not found to have any effect on household savings for risk-coping, education, or retirement, suggesting that precautionary and lifecycle savings are not influenced by the behavior of groups. We find, however, that members of high-quality networks are more likely to save for productive investment purposes. This provides further support for our hypothesis that informed group behavior can have a positive effect on the behavior of group members, encouraging them to save formally and for productive purposes.

5.2. *Robustness Checks*

Given the empirical challenges in identifying the network effects (see discussion in Section 3), we perform a range of robustness checks. First, we check that the result is not driven by sample selection into group membership, that is, the possibility that it is the characteristics of group membership that drive the positive

¹²The marginal effect takes into account the network effect and its interaction with the density of the network. The average density of the network is 12.405 for the sample included in the estimation of this model.

TABLE 3
WOMEN'S UNION NETWORK EFFECTS ON SAVINGS PURPOSE OF GROUP MEMBERS

	Risk (1)	Invst (2)	Ed. (3)	Retire. (4)	Cons. (5)
Network (formal)	0.003 (0.002)	0.005*** (0.002)	0.001 (0.002)	-0.002 (0.002)	-0.002 (0.002)
Network (informal)	0.002 (0.008)	0.005 (0.007)	-0.002 (0.008)	-0.005 (0.005)	0.006 (0.010)
Density	0.006 (0.006)	0.0004 (0.005)	0.009** (0.004)	0.005 (0.003)	-0.012*** (0.004)
Network (formal) · Density	-0.0001** (0.00005)	-0.00004 (0.00004)	-0.00003 (0.00003)	-0.00003 (0.00003)	0.0001*** (0.00004)
Network (informal) · Density	-0.0001 (0.0004)	-0.0003 (0.0003)	0.0001 (0.0004)	0.0003 (0.0003)	0.0005 (0.0005)
Household fixed effects	Yes	Yes	Yes	Yes	Yes
R ² within	0.064	0.096	0.109	0.046	0.294
R ² between	0.014	0.023	0.021	0.001	0.098
R ² overall	0.019	0.040	0.034	0.004	0.137
Households	1433	1433	1433	1433	1433
Observations	2011	2011	2011	2011	2011

Notes: Standard errors are clustered at the household level and are given in parentheses. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level. All baseline controls are included along with time dummies. The density variable is scaled by 100 for ease of illustration.

Source: Authors' calculations.

relationship between formal group savings and household savings and not the flow of information and peer group effects.

Table 4 (columns (1) to (4)) presents the results of Wooldridge's (1995) sample selection test for use with panel data. In the first stage, probit models of group membership are estimated separately for 2008 and 2010, including all households that could potentially be active Women's Union members (i.e., all households that contain at least one adult female). The determinants of group membership include household characteristics, commune characteristics, and group characteristics. For identification we also include an indicator of whether or not the household has personal friends in office or in trusted positions within the commune. In both first stage models this variable is statistically significant. The estimates are used to construct an inverse Mills ratio for each observation in each year and this is included as an additional regressor in the fixed effects savings model.¹³ The inverse Mills ratio is not statistically significant in the second stage regression, implying that sample selection can be ruled out. Furthermore, our core results for total savings and formal savings hold.

A second empirical concern relates to Manski's (1993) reflection problem. To overcome this problem we measure the quality of the network as the average stock of savings two years prior to the year under consideration. This is computed excluding information on the household in question. However, as an additional robustness check we estimate the model for a reduced sample of households who became active Women's Union members in either 2008 or 2010 on the basis that

¹³Results for the first stage selection equations are available on request.

TABLE 4
ROBUSTNESS CHECKS PART I

Robustness Check: Saving Form:	Checking for Sample Selection Bias			Only Including Households Who Became Group Members Over the Sample Period						
	Total	(1)	(2)	(3)	(4)	(5)	Total	(6)	(7)	(8)
Inverse Mills ratio	-3.633 (5.799)	-6.315 (6.951)	-2.933 (2.413)	-4.770 (3.590)						
Network (formal)	0.199** (0.087)	0.143 (0.093)	0.064** (0.031)	0.023 (0.040)		0.181** (0.088)	0.138 (0.122)	0.131** (0.058)	0.125 (0.086)	
Network (informal)	0.002 (0.203)	-0.081 (0.536)	-0.035 (0.065)	-0.285 (0.185)		-0.340 (0.271)	-0.824 (0.672)	-0.162 (0.153)	-0.547 (0.383)	
Density	-0.215 (0.185)	-0.493 (0.406)	-0.098 (0.157)	-0.314 (0.338)		0.140 (0.306)	-0.016 (0.304)	0.093 (0.253)	0.004 (0.240)	
Network (formal) · Density		0.003 (0.003)		0.003 (0.003)			0.006 (0.011)		0.002 (0.008)	
Network (informal) · Density		0.006 (0.023)		0.015* (0.009)			0.039 (0.034)		0.031* (0.019)	
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ² within	0.131	0.134	0.127	0.132	0.132	0.450	0.452	0.579	0.580	0.580
R ² between	0.080	0.078	0.018	0.012	0.012	0.057	0.052	0.241	0.232	0.232
R ² overall	0.106	0.103	0.043	0.038	0.038	0.132	0.126	0.382	0.373	0.373
Households	1495	1495	1495	1495	1495	498	498	498	498	498
Observations	2251	2251	2251	2251	2251	690	690	690	690	690

Notes: Standard errors are clustered at the household level and are given in parentheses. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level. All baseline controls are included along with time dummies. The density variable is scaled by 100 for ease of illustration. First stage results for the sample selection models are available on request.

Source: Authors' calculations.

they could not have any influence on the group's behavior two years previously. Table 4 (columns (5) to (8)) reveals that the main result holds, even though the sample size is greatly reduced. Being in a higher-quality network impacts on overall savings levels (see column (5)) and the level of formal savings (see column (7)) and in the case of formal savings is of an even greater magnitude.¹⁴

Third, if the observed effect is truly a within group effect, then the quality of the local network should not have any effect on the savings behavior of non-members. We estimate the model for only non-member households, including households that could potentially be members (i.e., have at least one adult female member). The results are presented in Table 5 (columns (1) to (4)) and reveal that high-quality networks within a commune have no effect on the overall or formal savings behavior of non-member households. Moreover, in communes with low-quality networks (i.e., a greater level of informal savings), non-member households save less formally. This is not surprising given that informal savings arrangements between members of women's groups are unlikely to be exclusive within communes, which leads to higher levels of informal savings, and consequently lower levels of formal saving, in the commune as a whole.

Fourth, we examine the possibility that high-quality savings behavior within communes by non-members (i.e., higher levels of formal savings) could equally have an effect on the savings of network members. This is conducted to check the possibility that the network effect we observe is simply due to changes in general market conditions or other exogenous factors affecting all households that are not controlled for in the model. The quality of the non-member network is measured as the average stock of formal savings of non-members two years previous to the year of analysis. As revealed in Table 5 (columns (5) to (8)) there is no evidence to suggest that high-quality non-member networks have any influence on the savings behavior of member households. In contrast, we do find some spillover effects where non-member networks are of lower quality (i.e., are characterized by a higher stock of informal savings). This is consistent with our previous finding that informal savings networks are likely to extend beyond group boundaries.

6. CONCLUSION

Savings at the household level in rural communities in developing countries are hindered by the fact that financial markets are not particularly well developed and many households either do not possess the information required to set up formal deposit accounts or are uncertain about the returns to saving formally. As a result, households often opt to hold their savings in the form of cash held at home, an insecure form of saving that does not yield a return, or rely on other informal savings possibilities. This is sub-optimal; formal savings are an important means of financing productive investment.

In this study, we have explored the extent to which social networks formed by active membership of the Women's Union in rural Vietnam can play a role in

¹⁴This result is not robust to the inclusion of the interaction effects between the network variables and the density of the network (columns (6) and (8)). This is likely due to the fact that the inclusion of the interaction terms introduces multicollinearity into the model and the reduced sample does not contain enough information to accurately estimate the parameters.

TABLE 5
ROBUSTNESS CHECKS PART II

Robustness Check: Saving Form:	Women's Union Network Effects on Level and Type of Savings of Non-Group Members				Non-Member Network Effects on Level and Type of Savings of Group Members			
	Total		Formal		Total		Formal	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Network (formal)	-0.077 (0.075)	0.048 (0.165)	0.009 (0.058)	-0.026 (0.163)	0.100 (0.111)	-0.307 (0.440)	0.046 (0.081)	-0.228 (0.388)
Network (informal)	-0.010 (0.020)	-0.001 (0.044)	-0.029** (0.014)	-0.032 (0.031)	0.009 (0.088)	0.173 (0.350)	-0.073* (0.038)	-0.260 (0.158)
Density	0.043 (0.308)	0.266 (0.328)	0.243 (0.247)	0.181 (0.227)	-0.197 (0.398)	-0.467 (0.479)	0.190 (0.292)	0.003 (0.003)
Network (formal) · Density		-0.010 (0.010)		0.003 (0.010)		0.018 (0.018)		0.012 (0.017)
Network (informal) · Density		-0.002 (0.007)		0.0005 (0.005)		-0.006 (0.011)		0.007 (0.005)
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ² within	0.251	0.257	0.187	0.188	0.133	0.136	0.155	0.161
R ² between	0.345	0.345	0.253	0.255	0.008	0.003	0.140	0.108
R ² overall	0.335	0.334	0.236	0.236	0.030	0.021	0.042	0.037
Households	1123	1123	1123	1123	1278	1278	1278	1278
Observations	1538	1538	1538	1538	1804	1804	1804	1804

Notes: Standard errors are clustered at the household level and are given in parentheses. *** denotes significance at the 1% level, ** denotes significance at the 5% level, * denotes significance at the 10% level. All baseline controls are included along with time dummies. The density variable is scaled by 100 for ease of illustration.

Source: Authors' calculations.

increasing formal savings where potential knowledge gaps exist. Accordingly, our aim was to provide evidence of a potentially important impact of social capital in economic decision making where information failures prevent economic agents from behaving in an optimal way.

Our theoretical model predicts that by disseminating information through the social networks formed by active participation at meetings, or through members demonstrating good savings behavior, the Women's Union can fill an information gap on the merits of saving formally. This is achieved by reducing uncertainties about the riskiness of returns and reducing the costs associated with opening a savings account. The empirical evidence presented supports this prediction. In particular, our analysis revealed that membership of high-“quality” branches of the Women's Union leads to higher levels of formal savings and higher levels of savings for productive purposes. These findings are also robust to a range of alternative specifications, samples, and tests that address the various empirical issues which arise in identifying network effects. They include selection into group membership and reflexivity between household and group behavior, amongst others.

More generally, our results suggest the Women's Union can, at least to some extent, fill the role of formal institutions in enhancing the knowledge of individuals at local level. Targeting information on the benefits of saving in financial institutions through organizations of this kind would be effective in increasing formal savings at grassroots level. At the same time, ensuring that the information disseminated by the Women's Union is both accurate and desirable is important given that behavioral effects are also found in low-quality networks.

To conclude, we found strong evidence that network effects matter for household savings behavior and we made every effort in our analysis to control for unobserved factors that may influence the savings behavior of households and networks simultaneously. We acknowledge there may still be unobserved time varying factors that were not captured as is always the case with observational data. Moreover, with observational data we cannot uncover the mechanisms through which the network effect operates. Future research will address both of these issues through the use of a carefully designed experiment and randomized control trial techniques.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix: Description of Variables and Descriptive Statistics