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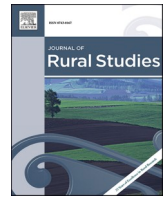
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# The impacts of social network on non-farm self-employment: Evidence from Vietnam

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## ABSTRACT

Non-farm self-employment serves as a critical safeguard for rural communities, by reducing income fluctuations due to unexpected shocks and contributing to the overall enhancement of household well-being for sustainable development. Several factors influence rural households' decisions to pursue non-farm self-employment. Past research has shown a positive relationship between social networks and the choice of non-farm self-employment, underscoring the importance of understanding how these networks affect the economic shift from agriculture-centric occupations to diversified non-farm roles. Our research employs a heteroscedasticity-based instrumental variable model to assess household decisions to transition between farming and non-farm self-employment. Our results confirm that social networks' size and quality significantly influence the choice of non-farm self-employment among households in rural Vietnam. Specifically, we find that social networks tend to deter the transition from farming to non-farm self-employment. Rather social networks promote the movement from non-farm activities to farm-based activities. Not surprisingly we find that social networks also provide better access to credit and higher income for those engaged in farm-based activities but do not significantly benefit households engaged in non-farm self-employment. These findings shed light on the impact of social networks on the economic choices of households in rural Vietnam, offering valuable insights for policymaking aimed at poverty reduction and enhancing the income-generating capacity of rural families, particularly in the context of rural Vietnam.

## 1. Introduction

Rural communities in developing countries are often vulnerable to various external shocks, such as natural disasters, diseases, and market volatility, which can significantly impact farmers' well-being (Anshah et al., 2020). In the absence of formal insurance systems, these shocks can push rural households into poverty and income instability. As a response, non-farm self-employment (NFSE) has emerged as a crucial livelihood strategy to diversify and stabilize income sources and reduce dependency on agriculture-based earnings (Merfeld, 2020). In many developing countries, rural communities face limited access to formal financial systems, employment opportunities, and markets, making them particularly vulnerable to economic shocks (Pomeroy et al., 2020). NFSE provides an alternative pathway for income diversification, which is crucial for enhancing economic resilience and reducing poverty in these areas.

The decision of households to shift towards NFSE have been found to be motivated by a complex interplay of factors, including economic incentives, and the need to mitigate external risks and adverse conditions. While some rural residents are drawn to non-farm activities by the promise of better remuneration, others are compelled to seek alternative income sources (Ellis, 2000). Among these various driving factors, social networks have emerged as a crucial element in the transition to NFSE as they provide better access to information, opportunities, and resources (Granovetter, 2018; Lanjouw and Lanjouw, 2001). Understanding how social networks influence the decision to engage in NFSE and the resulting economic outcomes is essential for gaining better insight into how social capital can be leveraged to support rural development.

Despite the recognized importance of social networks, there is limited empirical research on the types of social networks and how these networks affect the choice and success of NFSE in rural contexts (Saroj et al., 2022). A social network is a broad concept, and different types of

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social network may have varying impacts on the decision to engage in NFSE. Existing evidence suggests that being part of a larger network benefits rural households by providing them with better access to diverse information and resources (Hoang et al., 2006). Likewise, access to dense networks helps provide emotional support during times of hardship (Campbell and Pearlman, 2018).

In addition to the types of social networks, existing research highlights the possible channels through which social networks influence the decision to engage in NFSE. For instance, social networks that provide access to broader resources and diversified information can significantly enhance households' ability to secure formal credit. Improved access to formal credit reduces entry barriers and provides the necessary capital to pursue NFSE opportunities (Chung et al., 2020). Beyond financial and informational support, social network can also contribute to improve market access by helping farmers establish trust-based relationships with suppliers and other stakeholders, thereby enhancing the willingness of households to engage in NFSE (Scott and Richardson, 2021).

This study seeks to examine the role of social networks in shaping livelihood strategies in rural Vietnam, a country that is undergoing significant economic transformation. First, this study explores how social networks are structured within rural communities in Vietnam using a unique survey dataset of Vietnamese households. Following Phan et al. (2020), this study measures both the size and quality of social networks in Vietnam. Second, this study examines the likelihood of these social network indices affecting the decision to engage in NFSE. Finally, we explore the mechanisms through which these households formulate their livelihood decisions by investigating the impact of social network indices on the financial well-being of households, measured through household outcomes, such as income and access to credit.

Our research employs a heteroscedasticity-based instrumental variable model to analyse household decisions regarding the transition between farming and NFSE. This study finds that having high-quality and large social networks discourages the shift from agricultural livelihood to NFSE activities. However, NFSE households demonstrate a tendency to transition from non-farm activities to farming and other livelihood activities, despite the size and quality of their networks. Finally, we find that high-quality social networks provide better credit access and increased income for households involved in farming activities. By contrast, high-quality social networks do not provide significant financial benefits to NFSE households.

The remainder of this paper is organised as follows: Section 2 provides a review of the literature and develops the hypotheses for this study. Section 3 describes the data and outlines the study's empirical strategies. Section 4 presents the results of the analysis. Finally, Section 5 presents a discussion and concluding remarks.

## 2. Literature review and hypothesis development

### 2.1. Definition of social network

Social networks are crucial in various scientific theories as they facilitate connections and interactions between individuals, groups, and organizations (Contandriopoulos et al., 2018). Unlike social capital, which often emphasizes the resources and benefits derived from these connections, the concept of social network is more concerned with the structure and dynamics of relationships themselves. Social networks serve as the foundational framework that enables cooperation, communication, and the flow of information across different domains, including academia, practice, and policymaking (Kjellberg et al., 2016). These networks range from tightly knit family or kinship-based groups (bonding networks) to broader, loosely connected non-family-based networks of acquaintances (bridging networks) (Putnam, 1993).

From a sociological perspective, social networks are pivotal for understanding how individuals are connected and how these connections influence their social behaviour and outcomes. For example, the role of social networks in social control, family support, and access to

extrafamilial resources has been well-documented (Portes, 1998a,b). In political science, the concept of social networks is instrumental in analysing how individuals and groups organize, coordinate, and cooperate, often leading to enhanced productivity and civic engagement (Putnam, 1993). Economically, social networks are considered crucial conduits for accessing resources and opportunities through both direct and indirect ties (Woolcock, 1998). However, these networks can also contribute to the formation of isolated communities or interest groups, with both positive and negative economic implications (Portes and Landolt, 1996; Woolcock and Narayan, 2000).

The impact of social networks has been extensively researched, particularly in the context of rural economic development, where various classification approaches have been proposed. For instance, Leonardi et al. (2001) classified social networks into two types: horizontal (connecting individuals of equivalent status and power) and vertical (linking unequal agents in hierarchical relationships). Additionally, social networks can also be categorized by geographical boundaries (e.g., rural communes or villages), density (the proportion of people who know each other), and closure (the predominance of intra-versus inter-community links) (Halpern, 2005). These theoretical classifications provide a foundation for further empirical and quantitative research in recent studies.

There are arguments in favour of social network measuring attempts because network mechanisms are concrete and can be used to generate more reliable results. Many studies have been conducted to develop indices of social networks at the national or subnational level and to develop instruments that can be used as diagnostic tools at the community level and across countries. For example, Burt (2000) showed that rather than integrating all social network metaphors into empirical indicators, researchers focus more on the effects of network mechanisms. Later, to measure social networks by empirical evidence using tailored network surveys and interviews, Duffhues et al. (2012) suggested a measurement method using both the tie strength (bonding/bridging) and social distance (linking) between the responder and the members of their network to define social capital variables. At the same time, Poon et al. (2012) investigate social networks at two levels: the micro (family) and macro (institutional networks such as women's unions). Recently, there have been other attempts to calculate social networks from international and national statistics offices, such as the OECD program of work, to assess how the concept of social networks could enhance comparative policy analysis in member countries (Dasgupta and Serageldin, 2000).

### 2.2. Definition of non-farm self-employment

Rural households in developing countries do not depend solely on agricultural activities for their livelihood. For several decades, the importance of NFSE has been increasing among rural households in various countries (Hoang et al., 2006; Imai et al., 2015). Non-farm activities encompass a broad range of economic activities that occur outside the agricultural sector, providing rural households with alternative income sources beyond traditional farming (Duong et al., 2021; Lanjouw and Lanjouw, 2001; Losch et al., 2012). NFSE includes self-employment non-farm enterprises, wage and non-wage-based labour (including payments in-kind) (du Plessis, 2004; Duong et al., 2021; Haggblade et al., 2010; Lanjouw and Lanjouw, 2001; Losch et al., 2012). Notably, both farms and NFSE are essential sources of rural development. The scope and importance of these activities have been extensively discussed in the literature, reflecting their diverse nature and critical role in rural development.

### 2.3. Role of NFSE in rural development

In rural economies, particularly in developing countries, NFSE has emerged as a crucial driver of economic stability and growth. The limited availability of land per capita, challenges in securing credit

facilities, lack of advanced technology, and inherent risks associated with agricultural activities create significant barriers for rural households to maintain stable income streams (Reardon et al., 2001; Ellis, 2000). Consequently, an increasing share of rural income is now derived from NFSE activities, which contribute significantly to rural welfare and poverty reduction (Du et al., 2005; Imai et al., 2015).

The role of NFSE in rural development can be understood through several theoretical frameworks. The income diversification theory suggests that rural households engage in multiple economic activities to reduce income variability and economic vulnerability (Ellis, 2000). Income diversification through NFSE plays a pivotal role in enhancing rural household resilience and improving livelihoods. In agricultural economies, income is often subject to significant fluctuations due to factors such as weather shocks, pest invasions, and volatile market prices (Barrett et al., 2001). This diversification is vital for mitigating the risks associated with agriculture, such as fluctuating yields and prices, thus ensuring a more stable income flow (Haggblade et al., 2010). By participating in NFSE, households can reduce their dependency on agriculture and better withstand economic shocks.

Another relevant framework is the Sustainable Livelihoods Framework (SLF) which emphasizes how rural households proactively diversify their income sources to enhance resilience and improve living standards by leveraging and better managing their human, social, natural, physical, and financial capital (Scoones, 2015). These strategies are also influenced by external vulnerabilities such as external shocks and seasonality in returns, and are shaped by changing policies, and

dynamics in the economy. Engaging in NFSE activities not only buffers against agricultural income shocks but also allows households to invest more in human capital development and hence, gain overall economic security (Reardon et al., 2001). In summary, the livelihood strategy approach identifies NFSE as a vital component of rural households' efforts to achieve economic security, reduce vulnerability, and enhance living standards thereby, contributing to sustainable rural development.

2.4. Theoretical framework of Reasoned Action and social networks

Understanding the shift from agricultural to non-agricultural work in rural areas requires examining human behaviour and the factors that influence livelihood decisions. This study integrates the Theory of Reasoned Action (TRA) with the Sustainable Livelihood Framework (SLF) to provide a comprehensive perspective on household strategies in rural settings (Ashley and Carney, 1999; Fishbein and Ajzen, 2005).

The SLF proposed by Ashley and Carney (1999) views rural households as employing various strategies to earn income by leveraging their available resources. These resources include human capital (e.g., education), physical capital (e.g., land and assets), social networks, financial capital (e.g., savings), and natural resources. This framework helps contextualizing the decisions households make with regard to their livelihood, see Fig. 1.

The TRA developed by Fishbein and Ajzen (2005) provides insight into how these decisions are made by focusing on three types of beliefs: behavioural, normative, and control beliefs. Behavioural beliefs reflect

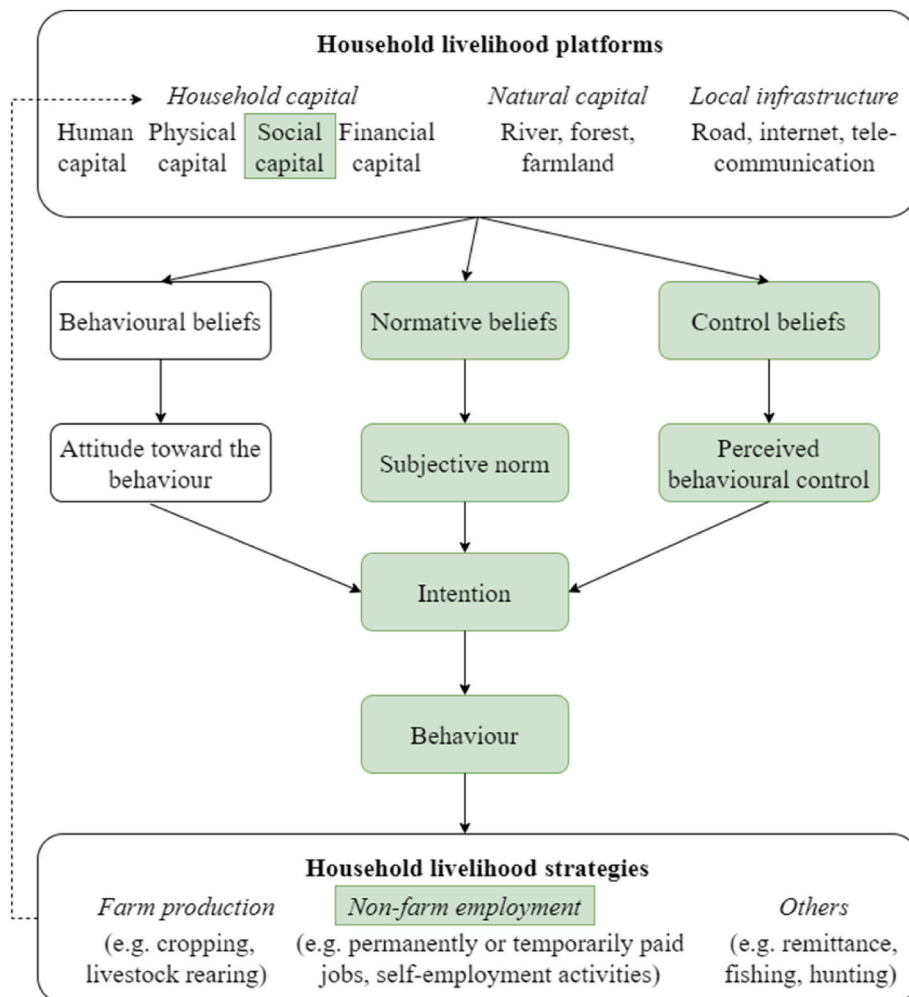


Fig. 1. Theoretical framework of household livelihood analysis and the Theory of Reasoned Action (adapted from Fishbein and Ajzen (2005) and Ashley and Carney (1999)).

the perceived outcomes of a decision, such as choosing NFSE for better income. Normative beliefs involve social pressures or expectations from the family and community, which can influence whether individuals pursue or avoid non-farm activities. Control beliefs refer to the perceived ease or difficulty of performing a behaviour, such as starting a new business, which is shaped by the resources and support available within social networks.

In rural environments, where social networks are particularly dense and influential, these beliefs are shaped by community norms and the availability of support systems. Social networks can facilitate non-farm pursuits either by providing resources, information and new income-earning opportunities or by creating barriers through societal expectations favouring traditional agricultural livelihoods (Ogunnaike et al., 2021).

This study examines how these interconnected factors, specifically social networks, influence the likelihood of rural residents engaging in NFSE after controlling for household and community characteristics. By analysing this interplay, we aim to understand the factors that enable and hinder the transition to non-farm livelihoods in rural Vietnam.

### 2.5. Role of social networks in NFSE

In rural economies, social networks are crucial in enabling households to transition from agricultural work to non-farm activities. Social networks have different dimensions such as size and quality. Network size indicates the breadth of a household's connections, whereas network quality reflects the depth and strength of these ties, capturing factors such as trust, reliability, and resource-sharing potential. Studies suggest that strong social networks often facilitate access to the resources essential for NFSE, such as knowledge, credit, and support networks, which are critical for initiating and sustaining NFSE ventures (Granovetter, 2018; Lanjouw and Lanjouw, 2001; Sun et al., 2021). Additionally, social networks have been shown to enhance household resilience by providing greater access to diversified livelihood strategies and information in response to socioeconomic and environmental shocks (Wang et al., 2021). In a recent study, Wang and Ruan (2024) highlight that communities with weaker social ties, particularly in culturally diverse contexts, may face significant barriers to NFSE due to information asymmetry.

However, the influence of social networks on NFSE is complex and can have both enabling and limiting effects. While strong social networks can facilitate transitions to NFSE by providing access to resources and support, they may also reinforce existing inequalities by making these resources available primarily to established, expansive networks. Households with limited social networks often lack the means to engage in higher-income non-farm activities, and consequently, may remain confined to low-productivity agricultural work (Barrett et al., 2001; Haggblade et al., 2010). Moreover, the obligations associated with social capital can sometimes tie individuals to traditional agricultural practices, limiting their ability to pursue profitable non-farm opportunities (A Portes, 1998a,b).

The studies quoted above provide insights into the role of social networks in non-farm activities, but none of them directly investigate how social networks affect the specific decision to engage in NFSE in rural areas. We do not find any previous evidence related to this context of Vietnam. Given the critical yet complex role of social networks in NFSE and the limited empirical research that connects social network characteristics directly to NFSE decisions, this study aims to bridge this gap. Our study also differs from previous studies in that we consider the impact of both social network size and quality. Examining both these aspects of a social network is essential because each can influence the decision to engage in NFSE in a unique way. Hence, this study provides novel insights that may be applicable to other developing regions with similar socio-economic conditions. Based on this we develop our first hypothesis to be tested.

**H1.** The size and quality of a household's social network significantly influence its decision to switch between farming and non-farm self-employment.

It is expected that households with larger and higher-quality social networks will be more likely to transition from farming to NFSE. A larger network provides access to diverse resources, shared knowledge, and exposure to non-farm opportunities, while high-quality networks offer reliable support, such as financial credit and mentorship, which reduce the risks associated with non-farm ventures (Sun et al., 2021). Both these network characteristics are anticipated to encourage entry into NFSE by enhancing resource access and reducing information asymmetry, aligning with research that highlights the role of social networks in supporting livelihood diversification and resilience (Wang and Ruan, 2024). Building on Hypothesis 1, which explores how social networks influence a household's decision to transition between farming and NFSE, we further examine the underlying mechanisms of this impact in Hypothesis 2. Here, we focus on investigating the impact of social networks on household income and credit access, both of which are critical for economic decision making. In rural areas with limited access to formal financial services, social networks often serve as vital support system that provide informal credit, shared resources, and access to the information necessary for income generation.

Income and credit access are key drivers that enable households to pursue or sustain new economic activities. A larger, high-quality social network can enhance a household's financial resilience by improving access to financial resources, insights into profitable ventures, and avenues to mitigate economic risks. Therefore, Hypothesis 2 seeks to understand how these dimensions of social networks affect household income and credit access, providing deeper insights into the ways in which social networks shape the broader economic outcomes of rural households. Therefore we develop our second Hypothesis.

**H2.** The size and quality of a household's social network significantly influence household income and increases access to credit borrowing opportunities.

For Hypothesis 2, we expect that households with larger and higher-quality social networks will have higher income levels and greater access to credit resources. Extensive social networks can provide access to information, support, and resources that enhance income-generating opportunities, whereas strong, reliable connections within high-quality networks facilitate borrowing from both formal and informal sources. This combination of higher income and expanded credit access allows households to manage financial risk more effectively and pursue diverse economic opportunities, aligning with prior research on the role of social networks in supporting financial resilience in rural communities.

In the next section, we provide a detailed explanation of the data, empirical strategies, and methods used to measure social networks in rural Vietnam.

## 3. Data and empirical strategies

### 3.1. The Vietnam Access to Resources Household Survey

This research utilizes data from the Vietnam Access to Resources Household Survey (VARHS), conducted in 12 provinces of Vietnam from 2008 to 2016 (see Fig. 2). The survey was carried out in collaboration between the Vietnamese authorities and the Department of Economics at the University of Copenhagen, Denmark (Brandt and Tarp, 2017).

A three-level stratified sampling design was used to acquire a representative sample of rural households across key provinces in Vietnam. First, primary commune units are chosen randomly. Second, three census enumeration locations are randomly selected from each commune. Third, the sample households are randomly chosen from each census enumeration location.



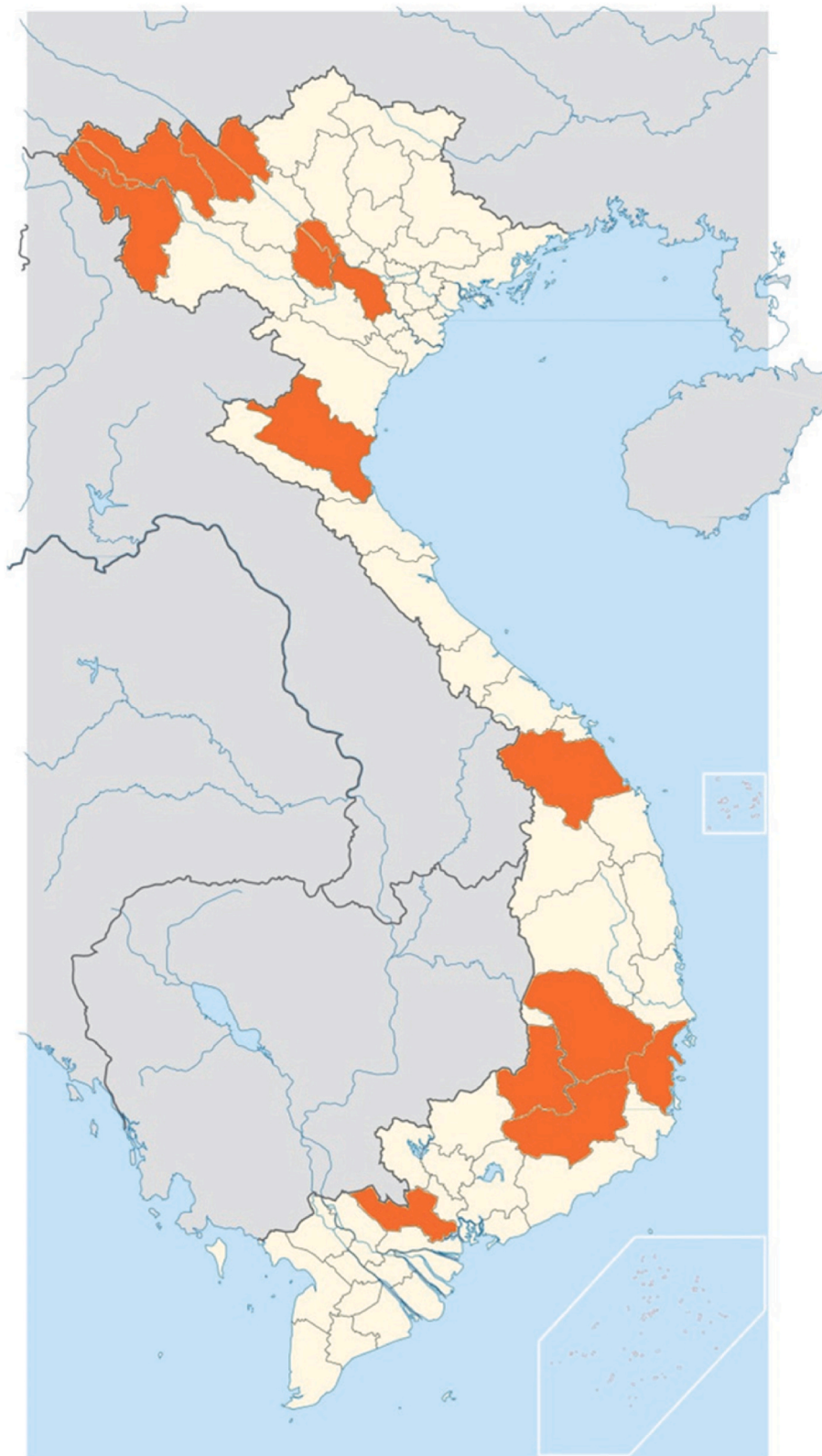


Fig. 2. VARHS study provinces.

Table 1 presents the sample size for the survey rounds conducted between 2008 and 2016. After expansion from earlier rounds, the number of households reached a stabilization point of approximately 3,500 and the collected information was standardized. To account for attrition, new households are included in each subsequent round. For

this study, we utilize panel data from the survey that results in a dataset of 10,370 households. Table 2 presents the descriptive statistics of the data used to answer the research question.

**Table 1**  
Sample size for the VARHS surveys.

Year	2008	2010	2012	2014	2016
Households	3,269	3,208	3,704	3,648	3,582
Individuals	15,844	14,904	16,585	16,206	15,665
New households	1,184	106	598	136	77
Attrition households	239	45	103	191	143

Source: Varhs, 2008–2016.

### 3.2. Empirical strategies

Our empirical strategy begins by assessing how social networks influence the decision to opt for NFSE. We employ indicators that denote the selection of NFSE as dependent variables in our analysis, allowing us to investigate the role of social networks in the initial decision making to select NFSE. Specifically, we focus on estimating the probability that a household will switch its livelihood strategy to engage in or leave NFSE. This choice is based on the theoretical framework suggesting that social networks can play a crucial role in this decision. This model reflects the binary nature of the dependent variable, whether a household engages in NFSE or not. The model assumes that social network indices, along with household characteristics, significantly influence this decision, and it addresses potential biases by controlling for various confounding factors in the vector of household characteristics.

We, therefore, estimate model 1 as follows.

$$Probit(NFSE_{it} = 1) = \phi_1(\alpha + \beta Social\_network_{it} + \theta X_{it} + \varepsilon_{it}) \tag{1}$$

where  $NFSE_{it}$  is the probability of household  $i$  switching their livelihood strategy to engage in non-farm activities (1 and 0 otherwise) in the year  $t$ .  $Social\_network$  is our measure of household investment in social network proxied by social network indices.  $X$  is a vector of household characteristics, stands for the error term ( $\varepsilon$ ) clustered at where,  $\alpha, \beta, \theta$  are estimated parameters of the model. Table 6 in section 4.1 summarises the results of this model and provides a discussion.

Furthermore, we explore the mechanisms through which these households formulate their livelihood decisions by examining the linkages between social networks, household income, and credit access. The second model assesses the economic impact of social networks on these

**Table 2**  
Descriptive statistics.

		N	Mean	SD	Min	Max
<b>Dependent variables</b>						
Livelihood_Shift	One if a household changes in livelihood strategies compare to the previous year, zero otherwise.	10,370	0.154	0.361	0	1
Income_per_capita	Income per capita (PPP US\$2008/year)	10,370	976.92	1,317	0	36,983
Credit_access	One if a household access credit, zero otherwise	10,370	0.3909	0.4879	0	1
Credit_borrowing_amount	Loan amount (PPP US\$2008/year)	10,370	1,346	7,065	0	272,770
<b>Independent variables</b>						
SS_scale	Social network size index - Scaled 0-100	10,370	34.9	13.2	0	100
SQ_scale	Social network quality index - Scaled 0-100	10,370	11.7	6.1	0	100
Δ SS_scale	Social network size index – First difference	8,296	-4.03	14.1	-73.5	58.5
Δ SQ_scale	Social network quality index – First difference	8,296	0.358	6.38	-57.8	75.7
<b>Control variables</b>						
<i>Household head characteristics</i>						
Head_grade_edu	Household head’s highest education year (year)	10,370	6.93	3.62	0	12
Head_literacy	One if a household head can either read or write, zero otherwise	10,370	0.152	0.359	0	1
Head_male	One if a household head is male, zero otherwise	10,370	0.774	0.418	0	1
Head_age	Household head age (years)	10,370	55.5	13.3	0	101
<i>Household characteristics</i>						
Hh_member	Household size (#)	10,370	4.29	1.8	1	14
Hh_depend_ratio	Household ’s dependency ratio (scaled 0–1)	10,370	0.287	0.289	0	1
Hh_land_ha	Household total area of land plot (hectare)	10,370	0.42	0.976	0	21
Hh_asset_ppp_log	Household assets (log PPP US\$2008)	10,370	0.435	0.496	0	1
Hh_saving_ppp_log	Household saving (log PPP US\$2008)	10,370	5.34	1.84	0	14.4
Hh_shock	One if a household suffers from an unexpected shock, zero otherwise	10,370	4.27	2.47	0	10.9

Source: Varhs, 2008–2016. Notes: Livelihood Strategy Shift: This variable indicates shifts in the primary livelihood strategies of households between consecutive years. A value of '1' signifies a change from farming to non-farm self-employment or vice versa between the previous and current year. A value of '0' denotes no change in the primary livelihood strategy, signifying consistent engagement in either farming or non-farm self-employment across both years.

financial outcomes. This model was selected because it allows for the estimation of continuous outcomes, such as income and credit borrowing amounts, and is well-suited to capture the variations in economic benefits that social networks might confer on households. The choice of this model is justified by its ability to manage potential endogeneity issues and to provide robust estimates of the influence of social networks on economic security.

For our second model, we estimate the following Equation (2).

$$Income|credit = \alpha + \beta Social\_network_{it} + \theta X_{it} + \varepsilon_{it} \tag{2}$$

$Income|credit$  stand for variables of interest such as household income per capita or credit borrowing amount. This model includes the same set of explanatory variables and error term as in Model 1. Table 7 in section 4.2 summarises the results of Model 2 and provides a discussion.

By employing these models, we aim to provide a comprehensive analysis of how social networks enhance economic security and contribute to the financial well-being of those engaged in NFSE. The assumptions and potential limitations of these models are carefully considered, and we believe that collectively they offer the most appropriate analytical framework for our study.

Equations (1) and (2) incorporate social networks as the explanatory variable, which is likely endogenous for several reasons. It is possible that individuals self-select to join more social networks based on their inherent characteristics or preferences related to NFSE. For example, individuals with higher entrepreneurial drive or skills may actively seek out and develop more robust social networks. This self-selection can lead to endogeneity because the social network is influenced by unobserved factors that are also correlated with the choice of NFSE. The relationship between social networks and NFSE choice can also be bidirectional. Social networks can influence the choice of NFSE; however, the choice of NFSE can also shape the composition and structure of social networks. This mutual influence creates endogeneity, and possible reverse causality can confound the impact of social networks on the choice of NFSE.

To tackle these concerns, we employ the heteroscedasticity-based instrumental variable (IV) method developed by Lewbel (2012). This involves first modelling the household’s decision to take NFSE under the assumption that:

$$Social\_network_{it} = \gamma + \delta Z_{it} + \xi_{it} \tag{3}$$

where  $\xi$  stands for the residuals and  $Z_{it}$  are exogenous household characteristics (household head's literacy, age, gender, education, and household dependent ratio, size, shock, asset, and land values). Following Lewbel (2012), we use  $[Z_{it} - E(Z_{it})] \widehat{\xi}_{it}$  as instrumental variables.

In general, instrumental variables are valid as soon as two assumptions are satisfied: (1)  $Cov(Z_{it}, \epsilon_{it} \xi_{it}) = 0$  and (2)  $Cov(Z_{it}, \xi_{it}^2) \neq 0$ . The first assumption is to ensure that the instrumental variables are uncorrelated with the error term in Equation (1). The latter assumption guarantees that the instrumental variables are correlated with  $Social\_network_{it}$  through  $\xi_{it}$ . We utilize the Pagan and Hall/Cook-Weisberg and Breusch-Pagan tests to formally test these assumptions, in line with the methodology of Baum and Lewbel (2019). Table 3 reports the results of the tests based on these two assumptions. The results indicate that both assumptions are met.

### 3.3. Measuring social network

Measuring the social network of rural Vietnamese households is crucial yet challenging because of its complex and multidimensional nature. Focusing on household-community interactions, we use Principal Component Analysis (PCA) to create an index that captures both the size and quality of these networks. Rural Vietnamese households engage in a variety of activities to build their social networks, including official community events and informal interactions with friends and neighbours.

In line with the framework proposed by Phan et al. (2020), our study differentiates social networks into two dimensions: size and quality. "Size" refers to the breadth of a household's social network, which includes the number of groups or associations a household is involved with, the duration of their participation, their attendance at social events, financial contributions, and the extent of their emergency support networks. This concept of size aligns with Bourdieu (2018) emphasis on the network's reach and number of individual connections.

On the other hand, "quality" captures the depth and intensity of these interactions within the network. This includes factors such as the frequency of participation in group meetings, the roles or positions held within these groups, the presence of political connections, and the regularity of interactions with non-household members who can provide emergency support. This approach also resonates with Burt (2000) focus on network models, which highlight the importance of contagion and prominence in understanding social capital. Tables 4 and 5 report all components for the social network size and quality index.

Additionally, PCA has been recommended for multivariate data analysis since Pearson's work in 1901 (Pearson, 1901) and simplifies the complex dimensions of social networks into more manageable components. We focus on reducing the initial variables (SS1-5 and SQ1-5) to a

**Table 3**  
Assumption tests for heteroskedasticity-based instrument models.

	Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity	Pagan-Hall test of heteroskedasticity for instrument variable estimation
Livelihood strategies shift	0.000	0.000
Income per capita (\$PPP, 2008)	0.000	0.000
Credit access (\$PPP, 2008)	0.000	0.000
Credit borrowing amount (\$PPP, 2008)	0.000	0.000

P-value in the table.

In Breusch-Pagan/Cook-Weisberg test, the null hypothesis (H0): Constant variance.

In Pagan and Hall test, the null hypothesis (H0): Disturbance is homoscedastic.

**Table 4**  
Social network index measurement.

Variables	Surveyed questions	Recode	Calculation	Unit
<b>Social network size</b>				
SS1	Are you a member of any groups, organizations, or associations?	Number of social groups that a household joined	Count	Number of groups
SS2	When did you become a member of this group?	Time of social group that a household joined	Average	years
SS3	How many times did an event (e.g. Wedding of a member of the household, wedding of a friend or another relative out of the household, birthday party of a household member) occur?	Number of social activities	Sum	Number of activities
SS4	1. How much is the membership fee (groups, organizations, or associations)? 2. What was the total value of receiving presents from other people for a social event? 3. What was the total value of giving presents to other people for a social event? 4. How much did you spend during the Tet holidays? 5. How much did you spend in total?	Total expenditure for social groups and activities	Sum	Total amount \$PPP 2008
SS5	How many people do you know whom you could ask for help with?	Number of people could be asked for cases of an emergency	Sum	Number of people
<b>Social network quality</b>				
SQ1	How often do you participate in social group meetings?	Frequency of a household participate in social group's meeting (aggregate scores: almost always = 3, sometimes = 2, rarely/never = 1)	Sum	Level of interaction
SQ2	What is your position within this group?	Highest position in the joined groups (aggregated scores: leader = 3, secretary = 2, member = 1)	Sum	Level of interaction
SQ3	1. Does any member of your household hold any office or other positions of public	Heterogeneity of political connections - (aggregated scores: 1. Yes = 3, No = 0, 2. Yes	Sum	Level of interaction

(continued on next page)



**Table 4** (continued)

Variables	Surveyed questions	Recode	Calculation	Unit
	responsibility in the commune, or higher levels of government? (yes/no)	= 2, No = 0, 3. Yes = 1, No = 0)		
	2. Do any of your relatives outside this household hold any office or other trusted positions in the commune, or higher levels of government? (yes/no)			
	3. Do any of your personal friends hold any office or other trusted positions in the commune, or higher levels of government? (yes/no)			
SQ4	Which position (any office or other positions of public responsibility in the commune, or higher levels of government) that any household members hold?	Household position in public sector (aggregate scores: district leaders = 6, district official = 5, commune leaders = 4, commune official = 3, mass organization leader = 2, other = 1)	Max	Level of interaction
SQ5	How often do you see relatives/friends? 1. Very often 2. Sometimes 3. Rarely	Frequency of a household see [people could be asked for cases of an emergency] (aggregated scores: 3 = very often, 2 = sometimes, rarely = 1)	Sum	Level of interaction

Source: Authors' summary.

few significant aspects, distinguishing meaningful data from 'noise' through variance analysis. The key to PCA is the utilization of eigenvalues and eigenvectors from the sample covariance matrix, as suggested by Anderson (1963) and Shlens (2014), to estimate the most likely characteristics of a normally distributed population.

**Table 5**

PCA for social network index by size and quality.

	Social network size			Social network quality		
	Eigenvalue	Proportion	Cumulative	Eigenvalue	Proportion	Cumulative
Comp1	1.354	0.308	0.308	1.686	0.337	0.337
Comp2	1.089	0.207	0.515	1.287	0.257	0.594
Comp3	0.898	0.185	0.7	0.958	0.191	0.786
Comp4	0.657	0.169	0.869	0.579	0.115	0.902
Comp5	0.655	0.131	1	0.487	0.097	1
N	10,370					
Bartlett test	p-value = 0.000			p-value = 0.000		
KMO test	KMO = 0.585			KMO = 0.534		

In Bartlett's test, the null hypothesis (H0): The variables are noncollinear/not intercorrelated.

In the KMO test, the magnitudes of the correlation coefficients will be applied; a result below 0.50 is unacceptable.

Before applying PCA, we conducted Bartlett's test for sphericity and the Kaiser-Meyer-Olkin test for sampling adequacy, following Box (1949); Cureton and D'Agostino (2013), to ensure the robustness of our measures. Upon passing these tests, PCA transforms the current components (SS1-5 and SQ1-5) into new dimensions that represent different aspects of the original data, as described by Vyas and Kumaranayake (2006). We select the new components for each SS and SQ index based on significant eigenvalues and a cumulative proportion that explained over 85 percent of the data. To standardize these indices for regression analysis and facilitate interpretation, we adopt the min-max normalization approach by Akram and Routray (2013), ensuring all data values range between 0 and 100.

### 3.4. Social network analysis

This study aims to elucidate the architecture of household social networks in Vietnam by evaluating two distinct social network indices across various socio-economic household categories, followed by a visualisation of these indices to facilitate a detailed discussion of the social network structure in the region. Comprehensive analysis reveals that both the size and quality indices display broadly analogous trends across all datasets, particularly when segmented by the age of the household head, ranging from 15 to 65 years (Fig. 3). Families that do not farm have slightly better social connections than those engaged in farm employment. As the heads of these families get older, their social connections tend to increase. This shows that people generally build and improve their social networks over time, using more resources. After turning 30, there is not much change in these social networks, showing that they become more stable. The social networks of individuals in middle to older age brackets show minimal fluctuations, particularly during pivotal phases where distinguishing between strategic social networks in early and later stages of adulthood becomes critical. Additionally, the data indicates that post-50 years of age, rural households tend to improve the quality of their social networks, while preserving the magnitude of their social network size achieved by that age.

When analysing data, it becomes apparent that higher educational levels of household heads are positively correlated with an increase in both the size and quality of their average social network indices (refer to Fig. 4 for illustration). Specifically, those household heads possessing a bachelor's degree exhibit scores that are substantially higher, exceeding two-thirds, compared to their counterparts with no formal educational background. This finding underscores the significance of educational attainment in enhancing the social networks of rural households, irrespective of their livelihood type, be it NFSE or other forms of economic engagement.

Furthermore, the analysis reveals that households actively engaged in agricultural activities, as well as in diverse business ventures beyond NFSE, tend to have larger social networks in both size and quality. This trend indicates a strategic inclination among households involved in farming to broaden their social networks. Conversely, individuals who are engaged in NFSE appear to place a relatively lower emphasis on

**Table 6**  
Impacts of social network on livelihoods transition.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Take-up NFSE	Leave NFSE	Take-up NFSE	Leave NFSE	Take-up NFSE	Leave NFSE	Take-up NFSE	Leave NFSE
SS_scale	-0.0741** (0.0338)	0.0184*** (0.0070)						
SQ_scale					-0.0454** (0.0191)	0.0483*** (0.0182)		
Δ SS_scale			-0.0030 (0.0413)	0.0144* (0.0079)				
Δ SQ_scale							-0.0476* (0.0271)	0.0203* (0.0120)
head_grade_edu	0.0429** (0.0172)	-0.0396*** (0.0117)	0.0054 (0.0081)	-0.0312*** (0.0112)	0.0184* (0.0095)	-0.0424*** (0.0121)	0.0071 (0.0079)	-0.0299*** (0.0113)
head_literacy	0.1063* (0.0591)	-0.0324 (0.1062)	0.0930 (0.0756)	-0.0111 (0.1058)	0.1002 (0.0712)	-0.0150 (0.1072)	0.0938 (0.0700)	-0.0070 (0.1069)
head_male	0.1132* (0.0656)	0.0748 (0.0760)	0.0083 (0.0579)	0.0847 (0.0756)	0.0236 (0.0571)	0.1018 (0.0772)	0.0098 (0.0555)	0.0857 (0.0771)
head_age	0.0102 (0.0095)	-0.0013 (0.0029)	-0.0072*** (0.0023)	0.0020 (0.0027)	-0.0015 (0.0031)	-0.0040 (0.0034)	-0.0059*** (0.0021)	0.0014 (0.0027)
hh_member	0.1332*** (0.0144)	-0.0417** (0.0194)	0.0788*** (0.0159)	-0.0241 (0.0181)	0.0935*** (0.0144)	-0.0416*** (0.0198)	0.0781*** (0.0129)	-0.0201 (0.0185)
hh_depend_ratio	-0.0641 (0.0705)	-0.0401 (0.1261)	-0.0353 (0.0930)	-0.0724 (0.1268)	0.0092 (0.0888)	-0.0812 (0.1261)	-0.0235 (0.0853)	-0.0757 (0.1274)
hh_land_ha	0.0037 (0.0241)	0.0220 (0.0253)	-0.0083 (0.0331)	0.0287 (0.0275)	-0.0121 (0.0329)	0.0238 (0.0261)	-0.0131 (0.0315)	0.0290 (0.0277)
hh_asset_ppp_log	0.0444 (0.0412)	0.1416** (0.0610)	0.0050 (0.0509)	0.1753*** (0.0602)	0.0465 (0.0490)	0.0939 (0.0674)	0.0297 (0.0469)	0.1562** (0.0612)
hh_saving_ppp_log	0.1627*** (0.0209)	-0.1798*** (0.0278)	0.1276*** (0.0252)	-0.1664*** (0.0280)	0.1493*** (0.0245)	-0.1824*** (0.0280)	0.1232*** (0.0241)	-0.1691*** (0.0280)
hh_shock	0.0387*** (0.0074)	-0.0506*** (0.0111)	0.0294*** (0.0091)	-0.0444*** (0.0111)	0.0376*** (0.0095)	-0.0570*** (0.0116)	0.0310*** (0.0087)	-0.0478*** (0.0111)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES	YES	YES	YES
No. of observations	6,070	2,226	6,070	2,226	6,070	2,226	6,070	2,226

Note: Significance levels indicated as \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1. Standard errors are in parentheses. The results obtained from probit model estimations utilizing the heteroscedasticity-based instrumental variable (IV) approach as formulated by Lewbel (2012). The coefficients in the table are marginal effects dy/dx at means.

cultivating extensive and more profound social connections.

In short, the complex structure of household social networks in Vietnam is explored, highlighting the influence of demographic, educational, and economic factors. Consistent with Ajrouch et al. (2005); Andersson (2018), this study finds that older household heads and members with higher levels of education exhibit larger, more stable social networks. This emphasizes the role of age and education in social network accumulation. Furthermore, Sen et al. (2021) report that agricultural households show a tendency to expand their social networks more than those in NFSE. Geographical disparities are also evident, with regions closer to Vietnam’s capital displaying stronger social networks, aligning with Luong (2018) findings on the impact of geographical factors. Overall, this analysis contributes to the understanding of how various factors shape social networks in rural Vietnamese contexts.

#### 4. Results

##### 4.1. Baseline results

To explore the influence of social networks on household livelihood dynamics, the study introduces a binary variable, "Livelihood Strategy Shift," representing changes in primary household livelihood strategies between two-year survey rounds. A value of one indicates a transition between other livelihoods and NFSE during these two-year intervals, while a value of zero denotes stability in livelihood strategy.<sup>1</sup> The analysis is conducted in two distinct sub-samples: households previously engaged in farming and those in NFSE. The specific two-year survey

rounds over which these transitions are measured and clearly defined in the corresponding table. The analysis incorporates both the levels and first differences in the social network index, providing a comprehensive view of how both static and dynamic aspects of social networks influence household livelihood strategies. This approach aims to understand the immediate and evolving roles of these networks in economic decision-making.

Table 6 presents the results obtained from probit model estimations. The columns numbered one, three, five, and seven present the findings pertinent to the sub-sample of households predominantly engaged in agricultural and related activities, as per the previous survey cycle. Conversely, columns two, four, six, and eight display the regression results for the alternate sub-sample, which primarily comprises households engaged in non-agricultural self-employment ventures over 2 years.

In rural Vietnam, the impact of social networks on livelihood choices, particularly the transition to NFSE, reveals distinct patterns across different household groups. For households primarily engaged in farming, the presence of larger and higher-quality social networks appears to discourage a shift towards NFSE. An increase in the size of social networks and the quality of these networks corresponds with a decreased likelihood of transitioning to NFSE at 7.41 and 4.54 percent, respectively. The negative coefficients for both the size and quality of social networks in this group suggest that enhanced social connections within farming communities reinforce the desirability and viability of farming. This indicates that in rural farming communities, social ties play a crucial role in maintaining agricultural livelihoods, possibly due to shared resources, collective knowledge, and a community-oriented approach to farming activities (Chaudhuri et al., 2021; Pratiwi and Suzuki, 2017).

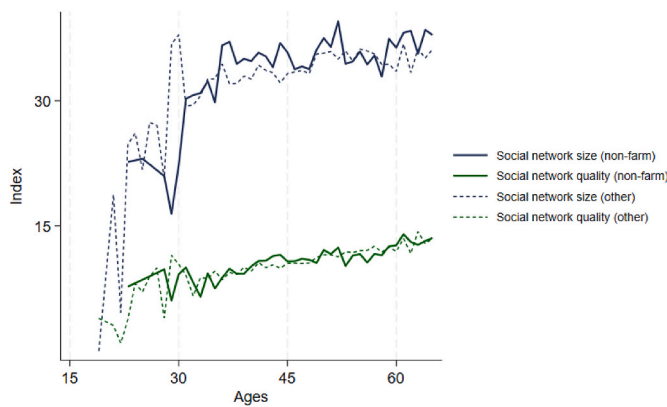
Conversely, households initially involved in NFSE exhibit an

<sup>1</sup> "Other Livelihoods" includes farming, wage-earning activities and other activities other than NFSE.

**Table 7**  
Social network, income, and credit borrowing.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Other Livelihoods*	Non-Farm Self-Employment	Other Livelihoods*	Non-Farm Self-Employment	Other Livelihoods*	Non-Farm Self-Employment	Other Livelihoods*	Non-Farm Self-Employment
Dependent variable: Income per capita (\$PPP, 2008)								
SS_scale	0.0453*** (0.0172)	-0.0107** (0.0044)						
SQ_scale					0.0523*** (0.0092)	0.0157* (0.0092)		
Δ SS_scale			0.0487*** (0.0158)	-0.0153*** (0.0048)				
Δ SQ_scale							0.0207** (0.0097)	-0.0009 (0.0062)
Dependent variable: Credit borrowing								
SS_scale	0.0174 (0.0306)	0.0018 (0.0074)						
SQ_scale					-0.0061 (0.0158)	-0.0269 (0.0191)		
Δ SS_scale			0.0091 (0.0225)	0.0073 (0.0079)				
Δ SQ_scale							-0.0008 (0.0254)	-0.0035 (0.0119)
Dependent variable: Amount of borrowing								
SS_scale	0.0013 (0.0077)	-0.0133 (0.0097)						
SQ_scale					0.0273** (0.0137)	0.0017 (0.0211)		
Δ SS_scale			0.0012 (0.0063)	-0.0133 (0.0093)				
Δ SQ_scale							0.0283** (0.0140)	0.0130 (0.0191)

Note: Significance levels indicated as \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1. Standard errors are in parentheses. "Other Livelihoods" includes farming, wage-earning activities and activities other than NFSE.



**Fig. 3.** Social network indexes by working age. Source: Authors’ calculations, “other” includes farming and other livelihood strategies rather than non-farm self-employment.

opposite trend. Particularly, large and high-quality social networks *increase* the likelihood of transitioning away from NFSE, potentially towards farming or other activities. The positive coefficients for social network size and quality in this group imply that broader and higher quality networks provide access to new information, opportunities, and support systems (Cofré-Bravo et al., 2019; He and Tang, 2023). This result diverges from Hypothesis 1, revealing a complex interaction between the type of employment and the role of social networks. Larger and more diverse social connections do not anchor households in NFSE but instead seem to foster exploration and economic fluidity. Enhanced network quality and diversity may expose these households to a broader spectrum of opportunities and resources beyond NFSE, increasing the likelihood of pivoting back to farming or other economic activities. This contrast underscores the differentiated roles that social networks play across sectors, shaping economic decisions based on the unique support structures and opportunities available within each occupational context.

4.2. Social network, income, and credit borrowing

To investigate the observed patterns, we test the Hypothesis 2 here. This hypothesis suggests that expanded social networks may not only offer a community-oriented support system but also enhance households’ economic stability and resilience by improving access to income-generating opportunities and financial resources. Testing this hypothesis could help to clarify how social network characteristics shape financial

outcomes and credit access, potentially explaining the divergent tendencies observed between farming and NFSE households.

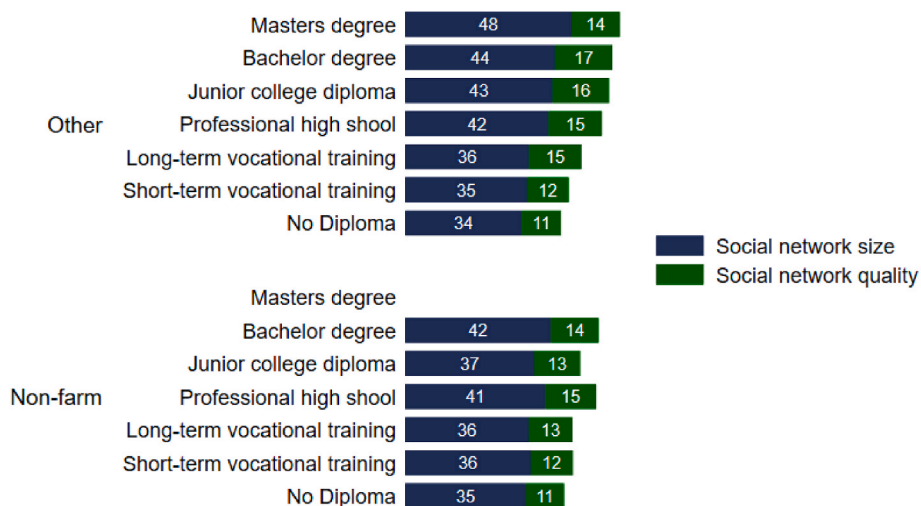
Table 7 reports the estimation results of model 2, which explores the extent to which social networks influence household income per capita, access to credit, and the amount of credit received. The findings provide conditional support for hypothesis 2 particularly for farmers and wage earners, where larger and higher-quality social networks are associated with higher levels of income per capita measured at the household level. This could be attributed to the fact that in farming and traditional wage-earning sectors, social networks provide critical support, information, and resources that directly enhance productivity and income.

In contrast, households involved in NFSE seem to experience a decrease in income with the expansion and improvement of their social networks. This counterintuitive finding could be attributed to various reasons. For instance, enlarging social networks in non-agricultural sectors may lead to increased competition or dispersal of attention from primary business operations (Hajderllari, 2015). Moreover, it may indicate a diversion of time and resources into sustaining these expanded networks, which may not directly enhance business development or profitability. This aligns with the initial analysis suggesting that rural households with larger and more effective social networks are more likely to adopt or continue farming or other livelihood strategies, as these networks tend to yield higher income for them (Huang et al., 2022).

In terms of accessing resources such as credit, this study does not find significant evidence that increased social network size or quality significantly improves access to resources like loans, as measured by the ability to obtain a loan. This suggests that contrary to common assumptions, social networks might not play a crucial role in facilitating access to formal financial resources for all rural households. However, an interesting exception is observed in the case of farmers, wage earners, and those who do not engage in NFSE. For this group, higher social network quality (though not necessarily size) positively influences the amount of money they can borrow. This could be due to the wage-based income source, which tends to be more stable and less risky and suggests that farmers, may often rely on community-based support and informal lending networks, high-quality networks might be more effective in garnering trust and mutual support, leading to more substantial financial backing when needed.

5. Discussion and conclusions

Our study sheds light on the complex role of social networks in shaping economic activities and decision-making among rural



**Fig. 4.** Social network indexes by education levels. Source: Authors’ calculations



Vietnamese households, particularly regarding NFSE. We find that social networks have significant, varied impacts on household economic choices, showing how network size and quality influence transitions between farming and non-farming activities.

For households engaged in non-farm activities, a larger, higher-quality social network correlates with a greater likelihood of transitioning away from NFSE, potentially moving back to farming or exploring other income-generating opportunities. This trend suggests that more diverse social connections may expose non-farm households to a broader range of resources, support, and opportunities, which can facilitate transitions back to farming or other pursuits (Bandiera and Rasul, 2006; Granovetter, 2018; Takahashi and Smutny, 2001). Conversely, farming households with strong social networks tend to remain within the agricultural sector. Enhanced networks in farming communities seem to strengthen ties to traditional practices, where community cohesion and shared values reinforce the appeal of farming as a stable, viable livelihood. These findings are consistent with research from rural Ghana and India, where diversification into non-traditional activities can conflict with community values and norms, limiting interest in pursuing NFSE as a primary occupation (Dapilah et al., 2020).

In relation to Hypothesis 2, our analysis reveals how larger social networks influence economic decisions differently for farming and NFSE households. For farming households, expanded networks strengthen ties within the sector, making farming a stable and appealing choice (Mwangi and Ouma, 2012; Wydick et al., 2011). This effect seems rooted in the structure of Vietnamese rural development, where farming communities are extensive, and social networks tend to concentrate resources, financial support, and opportunities in farming or other widely practiced livelihoods (Do and Iyer, 2008). These networks facilitate greater income and credit access, as observed in our findings, reinforcing farming as a viable occupation. In contrast, NFSE households do not benefit similarly from these network-driven resources, as the focus of community support is less aligned with NFSE (Kwon et al., 2013). Consequently, larger social networks seem to encourage NFSE households to transition back to farming, where more robust support and credit opportunities are accessible. This pattern highlights how, in Vietnamese rural settings, social networks play a critical role in reinforcing traditional occupations, leaving NFSE households relatively unsupported and more likely to shift toward farming.

To translate these findings into effective policies, we propose several targeted measures to support the sustainable development of NFSE in rural Vietnam by leveraging social networks. Our research shows that social networks strongly reinforce farming activities, often limiting NFSE households from accessing the resources they need to thrive independently of traditional farming. To address this, we recommend establishing rural networking hubs that specifically support NFSE, offering tailored resources for non-farm entrepreneurs while fostering selective integration with farming communities. These hubs should provide access to mentorship, skill development, and business resources focused on non-farming enterprises to diversify the support currently skewed toward agriculture.

Additionally, creating collaborative centres with both digital and physical platforms for non-farm entrepreneurs could help them build valuable networks outside farming. Such centres could facilitate knowledge exchange, financial literacy programs, and accessible credit resources explicitly designed for NFSE. By strengthening the networks and resources available to NFSE households, these initiatives would help foster a more balanced economic landscape, where non-farming activities are viewed as viable and supported alternatives within rural communities, empowering NFSE households to grow sustainably.

Our study has some limitations. First, using household-level data may obscure individual differences in livelihood strategies, as household members (e.g., by age or gender) may adapt differently to changing circumstances. Additionally, observed transitions between farming and NFSE might result more from income shocks than from shifts in social capital, suggesting short-term coping rather than long-term strategy

changes. Future research should aim to identify network index thresholds that trigger livelihood changes and examine the effects of specific economic and environmental shocks, helping distinguish between reactive and strategic shifts in livelihood decisions.

#### CRediT authorship contribution statement

**Chung Thanh Phan:** Writing – review & editing, Writing – original draft, Formal analysis. **Devkali Perera:** Formal analysis, Conceptualization. **Richard Ramsawak:** Writing – review & editing, Methodology. **Tra Pham:** Writing – review & editing, Conceptualization.

#### Declaration of competing interest

The authors declare that they have no competing interests.

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#### Data availability

Data will be made available on request.

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