Impact of Formal Credit on Rural Household Income in Vietnam

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ARTICLE INFO

Article history:

Received:

Dec. 29 2014

Received in revised form:

Jan. 30 2015

Accepted:

Mar. 26 2015

Keywords:

Formal credit, policy impact, household income, difference-in-differences method, panel data regression.

ABSTRACT

Many studies have been conducted to estimate effects of rural credit programs on household income in both Vietnam and foreign coutries. Some provided positive evidence of such programs' efficiency while others suggest that not all credit programs improved household income. Responding to the question of whether formal credit affects household income will contribute to directions determined to adjust allocation of resources for agriculture and rural development. In addition to the use of Difference-in-Differences (DD) method in connection with pooled OLS regression, this paper employs panel data from Vietnam Access to Resources Household Survey (VARHS) in the years 2006–2012, and finds that the formal credit does have effects on the rural household income. Additionally, the paper offers three groups of policies for promoting the role and improving efficiency of the formal credit programs on the household income in rural Vietnam.

1. Introduction

Access to agricultural credit is an especially important factor in the context of rural development in Vietnam. Capital on its own cannot flow from developed sectors to agricultural regions; thus, government must ensure credit resource allocation to compensate for the lack of financial resources in rural areas as well as to overcome the market failure in its access to people with low income. The development of Vietnam credit market was acknowledged after "Doi moi" in 1986 (Phan, 2012). According to DERG (2012), formal credit was provided for households in rural areas through the banking systems of the Vietnam Bank for Agriculture and Rural Development (AGRIBANK) and the Vietnam Bank for Social Policies (VBSP), which aims at agricultural development. Statistics from the State Bank (Ministry of Agriculture and Rural Development, 2010) show that the needs for agricultural credit increasingly rise. For example, credit balance in agricultural and rural areas was only VND34,000 billion at the end of 1998 whereas in 2008, this figure was nearly nine times as high and reached over VND292,919 billion. Moreover, until December 31, 2013 credit balance in these areas reached VND671,986 billion, accounting for nearly 20% of total credit balance.

Many studies in foreign countries as well as Vietnam have been conducted to estimate the impact of credit programs on household income. Some provided positive evidence of rural credit effects on the household income (Morduch & Haley, 2001; Barslund &Tarp, 2008; and DERG, 2012). However, the credit programs do not always improve rural household income. Diagne and Zeller (1998) find no statistically significant impact of microcredit programs on welfare in Malawi. Meanwhile, Coleman (1999) indicates that the microcredit programs have little impact on household's welfare in Thailand. Most studies have been implemented through cross data or panel data within a short time of two years. Thus, a heated debate erupted in Vietnam: Does formal credit affect farmer's income? Responding to this question can orient adjustment to credit resource allocation to agricultural and rural areas. This has long been considered an unsolved problem in Vietnam and aslo a challenge to both Vietnam's policy makers and researchers. In this paper, the focus is shifted onto the two main perspectives: (i) determining the level of formal credit effects on rural household income; and (ii) offering solutions for promoting the role and further effects of formal credit programs on rural household income in Vietnam.

2. Theoretical and empirical bases

2.1. Relationship between formal credit and rural income

Rural credit is necessary for agricultural development. Not only does it handle the failures of rural capital market but it is also a crucial component for promoting agricultural production, increasing income and production transformation, and applying new technologies in agriculture (Atieno, 1997; and Barslund & Tarp, 2008). According to Morduch and Haley (2001), rural credit is regarded as an effective tool for poverty reduction and improvement in households' living standards. The preferential credit programs for agriculture and rural areas were initiated and have strongly developed since the early 1990s (Dinh & Senanayake, 2001). At the same time non-government organizations were formed, engaging in capital supply to rural areas through microcredit forms. As with diverse participation of financial institutions, the rural credit market has so far achieved significant development.

According to DERG (2012), there exists a mixture of formal, informal, and semiformal markets in Vietnam rural credit market, in which formar credit is provided for households in rural areas through the two state-owned banks, VBSP and AGRIBANK, whose proportion of total lending accounts for over two-thirds of Vietnamese rural households' loans. Additionally, recent times witness the participation of state-owned banks, private banks, and People's Credit Fund in capital structure of the rural credit market, but the proportion of these is insignificant. Formal credit plays an important role in agricultural promotion, and most formal loans are used for agricultural production, in accordance with Barslund and Tarp (2008).

Atieno (1997) reasons that rural credit is an important component in promoting agricultural production, increasing income and production transformation, and applying new technologies in agriculture. Meanwhile, Diagne et al. (2002) clarify credit effects on rural household income through at least two channels as follows:

First, credit reduces capital constraints on agricultural households. Access to agricultural inputs is crucial for ensuring productivity and households' outputs collected from the harvests. Expenditures on agricultural inputs originate from the beginning of agricultural production process (crop planting and growth periods), "while returns are received only after the harvest several months later. Therefore, to finance the purchase of inputs, the farm household must either dip into savings or obtain credit" (Diagne *et*

al., 2002). Access to credit can significantly increase the ability to acquire needed agricultural inputs of poor households with no or little savings (Diagne et al., 2002).

Second, access to credit reduces opportunity costs of capital assets relative to family labor, thus "encouraging labor-saving technologies and raising labor productivity," (Diagne et al., 2002) which is an important factor for agricultural development, especially in developing countries.

2.2. Relationship between non-credit factors and farm income

In fact, credit is not a single determinant of change in rural household income. Besides credit, it is necessary to also take into consideration other factors with similar effects on the household income.

Figure 1 indicates three main groups of factors affecting farm income, which include: (i) market advantage; (ii) household characteristics; and (iii) household's production capacity. Access to credit is a factor categorized as market advantage.

3. Reasearch method

3.1. Difference-in-Differences method

Difference-in-Differences (DID) method or Double Differences (DD) method is increasingly widely used in the studies on the effects of a certain program or policy (Khandker et al., 2010).

Based on differences between the results in each surveyed period, DD approach basically compares impact and control groups. Particularly, after initial investigation into both nonparticipants and (subsequent) participants, "a follow-up survey can be conducted of both groups after the intervention." Through the information, the difference is calculated between the observed average results from participant and control groups before and after program intervention (Khandker *et al.*, 2010).

An example of DD is presented clearly below in Figure 2:

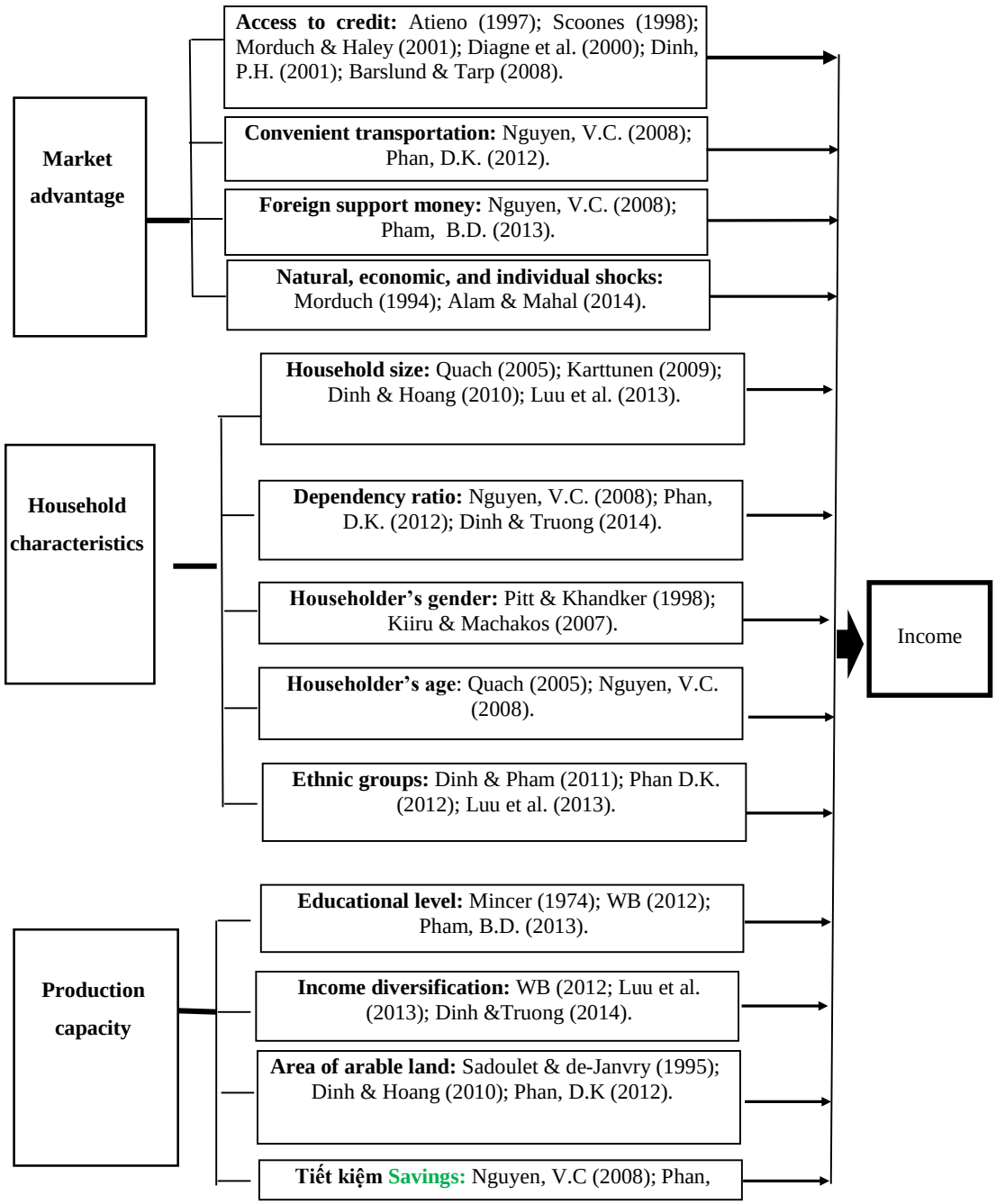


Fig. 1. Factors affecting farm income

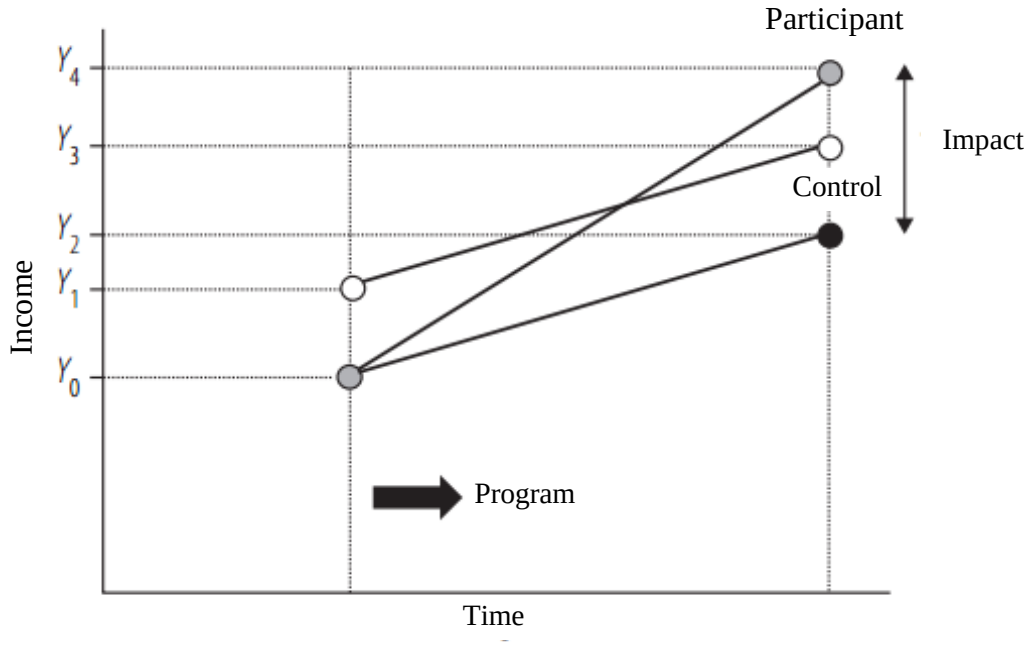


Fig. 2. An example of DD

Source: Khandker et al. (2010)

Y_0 (group of participants) and Y_1 (control group) denote income of the two groups used for the initial analysis. Under the impact of formal credit program, income of the group of participants increases from Y_0 to Y_4 whereas income of the control group (nonparticipants in any credit program) increases from Y_1 to Y_3. In the event of no participation in the program, income of the program participants may only increase from Y_0 to Y_2. The difference in average income of two groups is performed as (Y_4 - Y_3). However, Y_4 and Y_3 depend on other relevant factors, so it cannot be concluded that the household income is affected by credit as the only factor. Based on the assumption of unchangeable extrapolation factors, hence, the difference in income between Y_4 and Y_2 (assumed that households do not participate in formal credit program) is deemed the result of program impact on household income.

3.2. Diference-in-Differences method in combination with panel data regressions

According to Khandker et al. (2010), DD method may be combined with a Pooled OLS regression model to estimate the effects of a certain program and/or policy in terms of time (time data) and space (cross data). The estimated model can be written as follows:

$Y_{it} = \beta_0 + \beta_1 T_i + \beta_2 t_i + \beta_3 T_i t_i + \beta_4 Z_{it} + \varepsilon_{it}$

where:

T is dummy variable (T = 1 denotes participant group, whereas T = 0 denotes control group);

t is dummy variable (t = 0 denotes pre-program period and t = 1 denotes post-program period);

Z_{it} is control variable in the model; and

- T*t denotes the interaction between T and t.

The Difference-in-Differences (DD) method in the OLS regression model with Y (denoting output variable) is explained as follows:

In the pre-program period (t = 0):

+ Income of nonparticipants (T=0):

$E(Y_{00}) = \widehat{\beta_0} + \widehat{\beta_4}.Z_{it}$

+ Income of participants (T=1):

$E(Y_{10}) = \widehat{\beta_0} + \widehat{\beta_1} + \widehat{\beta_4}.Z_{it}$

Similarly, in the post-program period

+ Income of nonparticipants (D=0):

$E(Y_{01}) = \widehat{\beta_0} + \widehat{\beta_2} + \widehat{\beta_4}.Z_{it}$

+ Income of participants (D=1):

$E(Y_{11}) = \widehat{\beta_0} + \widehat{\beta_1} + \widehat{\beta_2} + \widehat{\beta_3} + \widehat{\beta_4}.Z_{it}$

Difference in income between two groups at T=0:

$E(Y_{10}) - E(Y_{00}) = \widehat{\beta_1}$

Difference in income between two groups at T=1:

$E(Y_{11}) - E(Y_{01}) = \widehat{\beta_1} + \widehat{\beta_3}$

Difference in income under the impact of credit program:

$DD = [E(Y_{11}) - E(Y_{01})] - [E(Y_{10}) - E(Y_{00})] = \widehat{\beta_3}$

In the OLS regression model combined with DD method, effects of rural credit program on the output variable are defined by the coefficient on the interation between the dummy variables T and t.

The evaluation of formal credit program is implemented in the order from simple regression model (interaction between income and formal credit) to extended one (supplementing more variables denoting other effects). Statistically insignificant variables are then removed from the models to come up with a standard one for analysis.

Simple regression model:

$$Y_{it} = \beta_0 + \beta_1 T_i + \beta_2 t_i + \beta_3 T_i t_i + U_{it} \quad (1)$$

Extended regression model:

$$Y_{it} = \beta_0 + \beta_1 T_i + \beta_2 t_i + \beta_3 T_i t_i + \beta_4 Z_{it} + \varepsilon_{it} \quad (2)$$

Table 1

Expected independent variables

Symbol	Definition	Unit	Expected sign*
T	Dummy variable for intervention: T=1 for group of participants and T=0 for control group		+
t	Dummy variable for time: t=0 for pre-program period and t=1 for post-program period		+
DD	Interaction between dummy variables: DD=T*t		+
ENTHNIC	Dummy variable for enthnic group: 1 for 'Kinh' ethnic group and 0 for others		+/-
SEX	Householder's gender: 1 for male and 0 for female		+/-
HHSIZE	Household size (including all family members)	Person	-
HHAGE	Householder's age	Age	+
HHEDU	Householder's education	Year	+
AV_EDU	Householder's average education level	Year	+
R_DEPEN1	Proportion of children under16		-
R_DEPEN2	Proportion of elders over 60		-
SHOCK1	Dummy variable for shocks such as natural disasters and diseases: 1 for suffering households and 0 for non-suffering ones		-
SHOCK2	Dummy variable for economic shocks: 1 for suffering households and 0 for non-suffering ones		-

Symbol	Definition	Unit	Expected sign*
SHOCK3	Dummy variable for individual shocks as household member' severe sickness, divorce, etc.: 1 for suffering households and 0 for non-suffering ones		-
RURAL	Dummy variable for valid rural areas: 1 for rural areas and 0 for urban city		-
LAND	Area of household's arable land	m^2	+
SAVING	Dummy variable for savings: 1 for households with savings and 0 for those without		+
ROAD	Dummy variable for traffic road: 1 for households with passing motorway and 0 for those without		+
REMIT	Dummy variable for Individual remit: 1 for households with monetary aids from relatives' sources and 0 for those without		+
R_FARM	Proportion of household members participating in agricultural production		-
R_NFARM	Proportion of household members participating in non-agricultural activities		+

* Note: + and - denote increase/decrease expected.

3.3. Data descriptions

The panel data were selectively retrieved from the VARHS (Vietnam Access to Resources Household Survey – IPSARD, 2013) in 2006–2012, when 2,323 and 3,161 households were engaged in the surveys respectively. Particularly, 2,027 out of 2,323 households in 2006 proceeded with their responses in such following years as 2008, 2010, and 2012. Due to its highly interrelated contents, the research datasets should be considered appropriate to appraisal of the studied effects.

To determine the effects based on the DD approach, the first step was to divide the rural household respondents into groups. The data-filtering process applied to the 2006 dataset enabled the selection of participants including borrowers from official capital supply institutions such as AGRIBANK and VBSP, whose borrowing had been

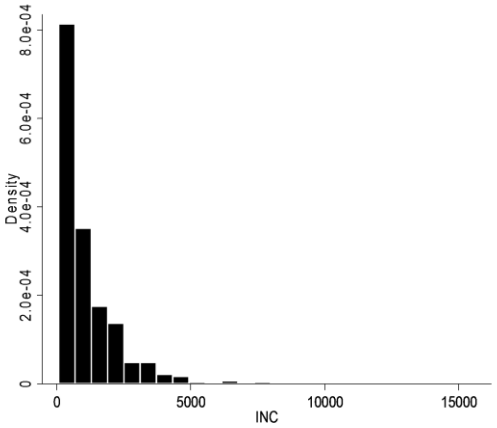
uninterrupted for at least two years 2006–2008 and was supposed not to come from any other kinds of credit (including both semi-formal and non-formal credit) during 2006–2012. These mentioned criteria would ensure the consistency of the effects, allowing for the selection of 169 rural households along the other 172 respondents, who confirmed no involvement with any credit institutions throughout the surveyed period 2006–2012.

The outcome of credit programs participated by rural household groups could be predicted from the findings of the T-test on the independent samples of the 2006 and 2012 groups. At 95% confidence level there was no difference in average income between the two groups in 2006, yet the difference was significant in 2012, arising between participation and no participation (average income of the former was 75% higher than that of the latter). The marked difference, nevertheless, might lie in impact of the factors other than formal credit.

4. Results and discussion

4.1. Simple regression model:

Since skewed distribution can be detected as illustrated by Fig. 3, logarithm of income (LG_INC) is used in place of income as a variable.



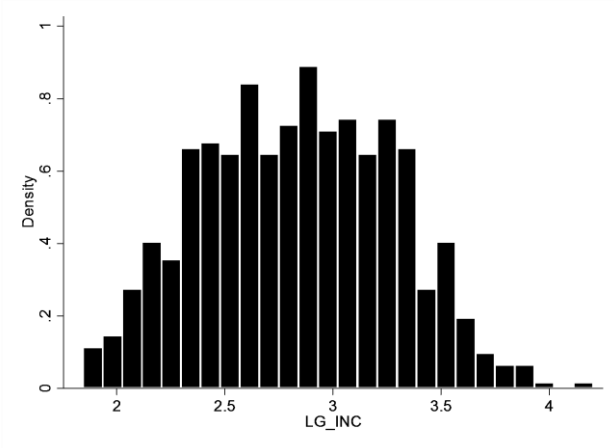


Fig. 3. Column graph of income distribution

Table 2

Regression results

Variable	Regression coefficient	Standard error	t-value	P> $\|t\|$	95% confidence interval	
					Lower bound	Upper bound
Constant	2.5803	0.261787	98.56	0.000	2.5288	2.6317
t	.5114812	.0370222	13.82	0.000	.43879	.58417
T	-0.04608	.0371862	-1.24	0.216	-.11909	.02693
DD	.089238	.0525892	1.70	0.090	-.01401	.19249

Based on Table 2, simple regression model can be represented as follows:

$LG\_INC = 2.5803 - 0.046\ T_i + 0.5114t_i + 0.089DD$

The variable DD (effects of formal credit) positively affects income at 91% confidence level.

The adjusted $R^2 = 0.396$ implies that 39.6% of change in income is explained by the independent variables in the model. The prob > $Chi^2 = 0.8016 > 0.05$ means that the residual variance remains unchanged, and VIF < 10 indicates no possibility of multicollinearity.

4.2. Extended regression model

Based on Table 3, extended regression model can be presented as follows:

LG_INC = 2.4699 - 0,062T_i + 0,401t_i + 0,095DD + 0,085ETHNIC – 0,007SEX – 0,0001HHEDU + 0,033AV_EDU - 0,0003HHAGE - 0,0380HHSIZE-0,245R_DEPEN1 + 0,009R_DEPEN2-0,071SHOCK1 + 0,129SHOCK2 + 0,006SHOCK3 + 0.046RURAL - 0,19R_FARM + 0,173R_NFARM + 0,018ROAD + 0,000004LAND + 0,170SAVING - 0.018REMIT.

The variable DD (effects of formal credit) positively affects income at 95% confidence level.

The adjusted R^2 = 0.638 implies that 63.8% of change in income is explained by the independent variables in the model. The prob > Chi^2 = 0.602 > 0.05 means that the residual variance remains unchanged, and VIF < 10 also indicates no possibility of multicollinearity.

The variables with no statistical significance (p > 0.05) include SEX, HHEDU, HHAGE, R_DEPEN2, SHOCK3, RURAL, ROAD, and REMIT.

4.3. Optimal regression model

The elimination of the eight statistically insignificant variables allows for the optimal regression model as given in Table 3 below:

LG_INC = 2.4979 - 0,061T_i + 0,404t_i + 0,095DD + 0,086ETHNIC + 0,033AV_EDU - 0,038HHSIZE - 0,2430R_DEPEN1 - 0,069SHOCK1 + 0,126SHOCK2 - 0,192R_FARM + 0,185R_NFARM + 0,000004LAND + 0,167SAVING.

The variable DD (effects of formal credit) positively affects income at 95% confidence level.

The adjusted R^2 = 0.6389 implies that 63.89% of change in income is explained by the independent variables in the model. The prob > Chi^2 = 0.635 > 0.05 means that the residual variance remains unchanged, and VIF < 10 indicates no possibility of multicollinearity.

The variables with no statistical significance (p > 0.05) include DD, ETHNIC, AV_EDU, HHSIZE, R_DEPEN1, SHOCK1, SHOCK2, R_FARM, R_NFARM, SAVING, and LAND.

Table 3

Estimated results of the research models

Independent variable	Estimated coefficient		
	Simple model (1)	Extended model	Optimal model
t	E	0,401***	0,404***
T	-0,046	-0,062**	-0,061**
DD	0,089*	0,095**	0,095**
ETHNIC		0,085**	0,086**
AV_EDU		0,033***	0,033***
HHSIZE		-0,038***	-0,038***
R_DEPEN1		-0,245***	-0,243***
SHOCK1		-0,071***	-0,069***
SHOCK2		0,129**	0,126**
R_FARM		-0,190***	-0,192***
R_NFARM		0,173***	0,185***
SAVING		0,170***	0,167***
LAND		0,000004***	0,000004***
Intercept value ($\beta_{0)}$	2.5803	2.4699	2.4979
Prob > F	0,0000	0,0000	0,0000
Adjusted R^2	0,3960	0,6384	0,6389
Prob > Chi^2	0,8016	0,602	0,635

Note: *, **, and *** denote significance levels at 10%, 5% và 1% respectively.

The regression results from the study reinforce the role of participation in formal credit programs, which produce positive effects on Vietnam's rural household income. An increase in average monthly income per capital to 9.5% were achieved by formal credit participation.

Besides formal credit, other variables with strong relations to rural household income comprise ETHNIC (+8.6%), AV_EDU (+3,3%); HHSIZE (-3,8%); R_DEPEN1 (-24,3%); SHOCK1 (-6,9%); R_NFARM (+18,5%); R_FARM (-19,2%); LAND (+0,1%); and SAVING (+16,7%). The impact of formal credit participation was not significant, though; its positive effects were obvious. Such demonstrates an important role of credit programs in facilitating rural household resources besides access to advanced manufacturing technology, which fosters productivity and improves household income. It can be stated that the presence of formal credit programs in rural areas actively contributes to Vietnam's rural development.

5. Policy implications

Due to the positive effects of formal credit programs on rural income, access to these should be further supported in rural areas to enhance its active role in modernization of the agricultural sector. Based on the findings, the authors propose the following recommendations to improve rural household access to the programs:

To the government: Extending formal credit programs to disadvantaged areas: Strikingly similar features of the two surveryed groups as evidenced by the study suggest that little systematic constraints have been imposed on the households in their approach to these. This implies that most of the households will enjoy the formal credit programs if they should gain access to the banking channel. However, the rural formal credit market suffers a lack of supply. Thus, on the one hand, formal financial institutions should be encouraged to engage themselves in rural areas since financial institutions in the private sector still benefits from their investment in Vietnam's financial sector (DERG, 2012). On the other hand, there should be governmental supports to Vietnam Bank for Agriculture and Rural Development and Vietnam Bank for Social Policies in their network extention to remote areas, allowing rural households to enjoy the programs that satisfy their formal credit demand.

Extending unsecured credit programs in the agricultural sector: Comparing the two groups in the research, the group with participation in formal credit programs owned far more arable land than the one without. In practice, unsecured credit loans only applicable for poor households through the programs offered by VBSP were often small in amount, failing to meet the demands for rural development. Regarding the other rural households, they were required to possess secured properties that enable their access to bank loans.

According to Decree 41/2010/ND-CP, farm households are allowed to be granted unsecured credit loans but have to present their land title certificates to the credit institutions, which means that those without land possession or those possessing land without legal rights are ineligible to access this source. Barriers concerning these kinds of secured properties should be accordingly removed to allow for higher possibility of further access to the formal credit programs.

To banks: Providing effective loan advisory service for farm households: Elder householders are less motivated to participate in credit programs. Concerning these households, formal credit access is not their single choice, but they should be advised on efficient use of loans (DERG, 2012). Therefore, helpful advice provided by the involved parties, especially banking institutions, is considered valuable in fostering their formal credit participation. Additionally, further widespread dissemination of information essentially aids farm households in grasping loan requirements, and less paperwork and simplified procedures are considered to provide strong motivation for household participation.

To rural households themselves: It is important for rural households to upgrade their educational level and be skillfully trained. Plainly, those having involvement in the credit programs in the 2006–2012 period demonstrated higher average level than those not having. The higher the educational level and the better the skills, the more possible that loan repayments are made from the households to the banks in addition to their increasingly efficient use of capital. Bank loans for rural households' investment and improvement of living standards, hence, are strongly avocated.

All in all, effective formal credit programs and sustainable agricultural and rural modernization should fundamentally require the participation of the government, banking instituations, and rural households themselves■

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