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Does productive microcredit improve rural children's education? Evidence from rural Vietnam

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ABSTRACT

Whether increasing access to microcredit results in better educational outcomes for children's education in rural areas remains an important but inconclusive topic in development literature. This paper contributes to this strand of research both theoretically and empirically. We develop a theoretical model where a representative household uses microcredit to fund its family business and maximises its lifetime utility. Based on the outcomes of its business, the parents make an optimal decision on the level of their children's schooling investment. Solving the maximisation problem, we show that a household's optimal education for its children is directly related to the level of microcredit. Empirically, we utilise the Vietnam Access to Resources Household Survey (VARHS) dataset from 2008 to 2016 to estimate the impact of microcredit on rural children's schooling. We find that microcredit borrowing by rural households negatively affects their children's education, which is more profound for boys than girls. Policymakers need to be aware of such side effects in designing microcredit policy and adopt auxiliary measures, such as incorporating a clause on children's education in the borrowing terms, to alleviate the negative impact on children's educational outcomes.

1. Introduction

Microcredit is fast becoming a key instrument in poverty alleviation. It is found to affect recipients not only economically, such as on consumption, income, and financial assets (see for example [Khandker, 1998](#); [Khandker & Samad, 2014](#)), but also non-economically, for example, on social networks ([Phan, Sun, Zhou, & Beg, 2020](#)). One potential impact of microcredit is on the recipients' human capital accumulation, such as their children's education. In this regard, there is a growing body of existing literature that explores key determinants of children's schooling from both supply and demand sides. Supply-side factors include the availability of teachers, schooling resources, and the quality of infrastructure such as road access, internet access, and electricity supply (see for example [Islam & Choe, 2013](#)). Microcredit programmes in the community are likely to positively affect these supply-side factors and subsequently promote children's education. For example, a new school funded by microcredit in the community can encourage parents to send their children to the school. On the demand side, a household's choice to invest in their children's education, must trade off income forgone from productive employment and increasing costs from sending their children to school with the potential of future returns to the

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family (Hill & King, 1993), subject to their budget constraints.

At a household level, microcredit borrowing, particularly for consumption purposes, can ease a household's budget constraint and consequently promote greater investment in children's education. Alternatively, microcredit borrowing to improve households' productive capacity (productive microcredit hereafter), on which this study focuses, can dampen a household's demand for its children's education. First, the microcredit-funded business may fail, and the loss of income due to business failure tightens the household's budget, which in turn negatively affects the educational outcomes of its children. On the other hand, an increase in productive microcredit borrowing helps expand the family business, resulting in increased worker demand. In such a situation, the household is likely to ask the children to contribute more labour to the business, reducing their education outcomes. Maldonado and González-Vega (2008) find that when parents invest in projects that demand child labour for farming or housework, their children's education is sacrificed. In rural areas, children often work in labour-intensive sectors, such as agriculture, and have limited access to educational facilities. In addition, they are vulnerable to child-labour abuse, particularly when household earnings are on a decline (Jacoby & Skoufias, 1997). It is important to investigate the impact of productive microcredit on rural children's schooling. This will have significant implications for policymakers and researchers seeking to enhance rural human capital development in developing countries.

Rural Vietnam is a valuable case for investigating the impacts of microcredit. Firstly, 70% of the population lives in rural areas, and 90% of rural households can be considered as low-income (Binh et al., 2017). As development aid microcredit programmes mainly focus on poor clients, rural Vietnam provides a good sample for assessing the impacts on children's educational outcomes. Secondly, in Vietnam, reducing poverty continues to be a key development priority. The government has put in significant efforts in poverty alleviation, where microcredit plays a critical role, in achieving impressive poverty reduction targets (Thanh Binh & Ha, 2019).¹ Therefore, lessons from Vietnam, particularly those on the secondary impacts of microcredit, are likely to help policymakers refine their poverty-alleviation strategies. Finally, there is a lack of empirical research on both the direct and indirect or secondary impacts of microcredit schemes in Vietnam.

Despite its importance, to the best of our knowledge, very few existing studies investigate the impacts of productive microcredit on the educational outcomes of children residing in rural communities. Indeed, past research has failed to distinguish between microcredit loans for income-generating activities and loans for consumption (see Islam & Choe, 2013; Maldonado & González-Vega, 2008). This differentiation is important, since the educational outcomes of children who reside in households that use microcredit for production purposes, may be quite different than those who use microcredit to increase consumption. Failing to account for differences between the uses of microcredit, can result in contrasting impacts of microcredit in the research literature. Additionally, given the potential for differences in outcomes, policymakers may be interested in understanding the role of increasing access to microcredit for production relative to consumption purposes. This research aims to fill this gap, by examining the impact of increases in productive microcredit among rural households in the case of Vietnam.

This paper makes two important contributions to the literature, both theoretically and empirically. Theoretically, we extend the model of Phan et al. (2020) by allowing the representative household to make optimal decisions on its children's education. Solving the utility maximisation problem, we find a household's optimal decision on its children's education can be modelled as a function of microcredit borrowing. Empirically, guided by the theoretical modelling, we estimate the impact of productive microcredit on children's schooling outcomes, using a unique panel dataset of the Vietnam Access to Resources Household Survey (VARHS) which includes five waves covering the period of 2008–2016.

Based on the results of our instrumental variable (IV) Poisson models we find that increases in productive microcredit loans exert a significant and negative impact on children's educational outcomes in rural Vietnam, and this impact is more profound for young males. This result has significant implications for microcredit policy setting since it implies that increases in microcredit, while potentially beneficial to households in the short term, can be detrimental to the longer-term educational outcomes of the children residing in these households. This suggests a greater need to tailor microcredit packages to ensure development outcomes of children are achieved.

The remainder of this paper is structured as follows. Section 2 contains an overview of the empirical literature on microcredit and children's education. Section 3 presents the theoretical framework. Section 4 specifies the econometric models and discusses the estimation strategy. Section 5 describes the dataset, while Section 6 reports the results. Finally, concluding remarks are provided in Section 7.

2. Literature review

The existing literature has confirmed the key role of microcredit in human capital development, especially through education. Nevertheless, while some benefits of microcredit remain, a considerable number of studies also report negative or insignificant impacts from microcredit.

Pitt and Khandker (1998) state that financial services enhance children's schooling in Bangladesh, and in addition, girls receive more education if their families are Grameen bank's clients. Karlan and Zinman (2008) suggest that only male micro-entrepreneurial clients pay more attention to sending their children to school. Utilising a quasi-experimental design Holvoet (2004) shows that when compared with non-borrowers, the education of borrowers' children exhibits no significant difference when they borrow directly from

¹ The poverty rate declined from 60 % in the early 1990 s to 20.7 % in 2010, then 13.5 % in 2014 (World Bank Data, 2016)

local banks. However, a significant difference emerges when loans are secured through social intermediations, such as women's groups. Moreover, mothers who secure microcredit through social groups are more likely to realise more educational benefits to girls than boys. [Doan, Gibson, and Holmes \(2014\)](#) utilise a propensity score matching technique to match outcomes of non-borrowers with borrowers and find that only loans from formal credit sources significantly enhance education and healthcare spending in Vietnam, while there is no evidence for the impacts of informal credit. [You and Annim \(2014\)](#) examine the impact of formal credit in China. Based on the results of static and dynamic regression-discontinuity designs, they find that formal microcredit helps borrowers' children gain longer schooling years and achieve a higher average grade level. However, it shall be noted that their study mainly focuses on the short-term impacts, given that their data only covered two years, 2000 and 2004.

Unfortunately, not all researchers agree that microcredit borrowing benefits education. Some argue that access to credit leads to an increase in income-generation activities, which may result in increasing demand for child labour. This can be particularly applicable when we consider the longer-term effects of increasing access to microcredit. [Islam \(2011\)](#) argues that time length is a significant factor in return from microcredit to realise. Households need time to build up their reputation to access larger loans, which enable them to fund more productive projects and achieve higher profits. In addition, long-term clients are more likely to receive financial institutions' support than non-clients or short-term clients. Owing to additional financial, households may not need to pull their children out of school for business expansion. [Osborne \(2006\)](#) uses a dynamic model to assess the impacts of microcredit on rural households in developing countries. He concludes that credit borrowing only has short-run benefits for productivity, consumption, and lifetime utility. In the long run, in contrast, the benefits are not sustained and can even become negative.

Recently, a randomised evaluation of a group-lending programme in India, conducted by [Banerjee, Duflo, Glennerster, and Kinnan \(2015\)](#), finds little or no significant differences in health, education, or women's empowerment outcomes between the borrowers and non-borrowers. Notably, there is no change in enrollment of children or teenagers, despite a decrease in teenage girls' labour supply. Furthermore, there is no difference in expenditure for schooling between private and public enrolment for boys and girls aged from five to fifteen.

In Guatemala, [Wydick \(1999\)](#) points out that the linkage between microcredit and child schooling is not unequivocally positive. Microcredit borrowers tend to invest in labour-intensive equipment/assets and the potential for moral hazard exists within family businesses, since households may prefer to use their children rather than hiring workers. Furthermore, for successful businesses the demand for labour derived from the children of business owners increases, as does the returns to employment and this increases the opportunity cost of schooling. Consequently, microcredit, which is frequently assumed to ease credit constraints, does not guarantee an increase in children's educational outcomes.

[Hazarika and Sarangi \(2008\)](#) also find a similar result in rural Malawi. Their study reveals that children in borrowing households are more likely to work during the season of peak labour demand. Adults in borrowing households are frequently busy with the increased workload due to improved access to microcredit, particularly during the peak season, and subsequently, their children have to take up more domestic work. Moreover, data from Malawi show a significantly lower rate of primary school enrolment among children in borrowing households, compared with those in non-borrowing households. This impact is found to be more pronounced among young boys.

In the case of Bosnia, [Augsburg, De Haas, Harmgart, and Meghir \(2012\)](#) show that microcredit dramatically decreases school participation, particularly among children aged 16–19. However, there is no significant effect on children under 16. The authors argue that the decrease in children's schooling occurs when loans are not sufficient to overcome the liquidity constraint. As such, households muster resources from elsewhere and reduce costs as much as possible. Internal labour, especially child labour, is a cheaper and more flexible input for household businesses compared to those obtained from the traditional labour market. These advantages promote demand for child labour and reduce school enrollment of children. Moreover, the adverse effect is magnified if parents care more about the immediate benefits of the business rather than their children's future utility. In such cases, access to microcredit leads to transferring resources to parents and worsening children's schooling.

Using a large data set from rural Bangladesh, [Islam and Choe \(2013\)](#) find that microcredit participation adversely affects children's education and even increases child labour abuse rate. Notably, the authors point out that girls and younger children of borrowers are less likely to enroll in school and more likely to be forced to work relative to boys and older siblings. Moreover, mothers tend to bring more benefits to girls in terms of education than fathers. Based on this they argue that self-employment activities can be a significant determinant of the educational outcomes of children.

Despite these contributions, previous studies which estimate the impact of microcredit on children's education, do not distinguish between microcredit utilised for production or consumption purposes. Conceptually, microcredit borrowing for consumption including expenditure on children's education, can promote children's school attendance in the current period, which, however, becomes a burden in later periods when it needs to be repaid. In contrast, productive microcredit borrowing tends to be targeted to expand a household's family business and can increase its demand for workers, which is most likely to be satisfied by utilising family labour, particularly children, usually at the expense of their education. Given these potential differences in outcomes, we argue that it is necessary to separate these two types of microcredits in empirical studies to achieve a more accurate result.

Considering this gap in the literature, this paper focuses on productive microcredit. It analyses its impact on rural children's education in Vietnam by using the Vietnam Access to Resources Household Survey (VARHS), a nationally representative panel dataset. The VARHS allows us to track microcredit loans based on reported uses among households in rural Vietnam. Hence, we can therefore distinguish between microcredit used for production and consumption purposes.

3. Theoretical framework

To investigate the impact of microcredit on the borrowing households' children's education,² we build on Phan, Sun, Zhou, and Beg (2019) and Phan et al. (2020) by allowing representative households to make optimal decisions on their children's education. Then through utility maximisation, we derive a child's optimal education level as a function of microcredit borrowing and a set of control variables.³

The representative household has a constant-elasticity-of-substitution (CES) per-period utility function, $u_t = \frac{C_t^{1-\sigma} - 1}{1-\sigma}$, where u represents per-period utility; C denotes consumption of goods and services; t denotes time; and σ is the constant elasticity of substitution. The household chooses consumption to maximise its lifetime utility, as follows:

$$\max_{\{C_t\}} U = \sum_{t=0}^{\infty} \rho^t \frac{C_t^{1-\sigma} - 1}{1-\sigma} \tag{1}$$

where U stands for the total utility; and ρ is the discount rate. The household is subject to the following budget constraint in each period:

$$W_{t+1} = (1+r)[Y_{B_t} + Y_t + W_t - (1+r)M_{t-1} - C_t] \tag{2}$$

where W presents the household's wealth; r stands for the real interest rate; Y_B denotes net income from family business which is financed by microcredit; Y is the earnings from activities other than the household's business, for instance, wages or remittance; and M denotes microcredit borrowing.

The household is endowed with a capability (z), which is only partially observable, namely $z = \tilde{z} \times \hat{z}$, where \tilde{z} is an unobserved component and \hat{z} is an observed component. The unobserved component is a random variable with a cumulative distribution function (CDF) of $G(\tilde{z})$. The observed component, \hat{z} , is a function of education achievement (E) and a set of household characteristics (H).⁴ The household utilises microcredit borrowing to finance its family business. Running the business requires the household to have a minimum level of capability, denoted as \underline{z} , to achieve success. The probability of achieving success (p) can then be written as:

$$p \equiv Prob(z > \underline{z}) = G\left(\frac{z}{\underline{z}}\right) = G(E, H) \tag{3}$$

Once the household succeeds in the business, it receives an income of AK_t^α where K denotes the capital stock, A is the productivity of using the capital (K), and $0 < \alpha < 1$. The capital stock is the depreciated accumulation of microcredit borrowing, namely $K_t = (1 - \delta)K_{t-1} + M_t$, where δ is the depreciation rate. With the probability of success, the expected income from the family business at time t can be written as:

$$Y_{B_t} = pAK_t^\alpha = G(E_t, H_t)AK_t^\alpha \tag{4}$$

Conceptually, education and other household characteristics all influence the household's capability in operating its business. As a proxy for human capital, the education of households is expected to have a positive impact on the probability of success in business by enhancing access to new knowledge and technologies. The set of household characteristics includes (1) household experience such as age and education of household head, and whether the household is local, (2) household resources such as family size, area of land owned, whether the household involves in non-farming business, number of dependent members, and income from non-business sources, and (3) its economic status such as its poor status and whether it faces any income shock.

These household attributes are expected to signal unobserved household capability for business success. A household head with more experience is more likely to deal with unforeseen situations better than younger counterparts. Similarly, a household with more resources such as labour, land, and diversified income sources are more likely to succeed in its business. Finally, household economic status, such as low or volatile income levels, is a sign of a lower probability of business success (see for more details Phan et al., 2019).

For simplicity, we focus on the steady state. At the steady state, the household utility maximisation problem, Eq. (1), becomes

$$\max_{\{E\}} \frac{1}{1-\rho} \frac{C^{1-\sigma} - 1}{1-\sigma} \tag{5}$$

Eq. (5) admits the same solution as $\max_{\{E\}} \ln C = \max_{\{E\}} f(E, M, H)$, subjects to the budget constraint as follows:

² Microcredit refers to small loans provided to the poor with an aim to lift them out of poverty.

³ In solving the model, we assume households are engaged in sequential decision making, namely first to make decision on children's education and then consumption. A different order of sequencing will also result in the optimal education as a function of microcredit borrowing and other control variables. Since the purpose of modelling is to motivate the empirical specification, a different sequencing order will not affect our results.

⁴ The set of household characteristics includes age of household's head ($AgeH$), education of household's head ($EduH$), household size ($HSize$), total land that a household owns ($Plot$), number of dependent members (Dep), whether a household involvement in non-farming business activities ($Nfarming$), whether a household experiences any income shock ($Shock$), whether a household is classified as being poor ($Poor$), whether a household is local or not ($Local$).

$$W = -\frac{(1+r)}{r} [G(e^{f(E,M,H)}, E, H)A(\sigma M)^\alpha + Y - (1+r)M - e^{f(E,M,H)}] \tag{6}$$

The household’s utility maximisation yields an optimal solution for education achievement as follows:

$$E = \left(\beta_{c3} + \frac{(1+r)}{r} \beta_{c3} e^{f(E,M,H)} \right) \left(W - \left(\frac{(1+r)}{r} \left[\left(\frac{\lambda \partial G(e^{f(E,M,H)}, E, H)}{\partial S} - G(e^{f(E,M,H)}, E, H) \right) A(\sigma M)^\alpha - (\lambda + 1)e^{f(E,M,H)} - Y + (1+r)M \right] \right) \right)^{-1} \tag{7}$$

where λ stands for the Lagrange multiplier.

Eq. (7) shows that the optimal education attainment is a function of microcredit borrowing and other household’s characteristics. Taking natural logarithms of Eq. (7), and linearising $\left(\beta_{c3} + \frac{(1+r)}{r} \beta_{c3} e^{f(E,M,H)} \right)$ and $\left(W - \left(\frac{(1+r)}{r} \left[\left(\frac{\lambda \partial G(e^{f(E,M,H)}, E, H)}{\partial S} - G(e^{f(E,M,H)}, E, H) \right) A(\sigma M)^\alpha - (\lambda + 1)e^{f(E,M,H)} - Y + (1+r)M \right] \right) \right)$, we obtain the following estimable Equation:

$$\ln E = \beta_1 + \beta_2 \ln M + \beta_3 \ln Y + \beta_4 \ln W + \beta_5 \ln H + \epsilon \tag{8}$$

where $\beta_i, i = 1, \dots, 5$, are coefficients to be estimated from the data; and the error term, ϵ , captures the measurement error in the model and is assumed to be i.i.d.

4. Empirical specification

As illustrated in Section 3, the household’s optimal decision on its children’s education depends on a set of factors, such as microcredit borrowing (M), non-business income (Y), household wealth (W), and other household characteristics (H). It shall be noted that the optimal education in Eq. (8) is an aggregate of the education of all individual children in the household. For a particular child, his/her education will also depend on his/her characteristics. Therefore, motivated by Eq. (8), we write the educational achievement for child j in household i as follows:

$$\ln E_{ijt} = \beta_{e1} + \beta_{e2} \ln M_{it} + \beta_{e3} \ln Y_{it} + \beta_{e4} \ln W_{it} + \beta_{e5} \ln H_{it} + \beta_{e6} \ln I_{ijt} + \epsilon_{ij} \tag{9}$$

Our key outcome variable, children’s education, is measured in two ways, namely the child’s completed grade level and the schooling gap. In the literature, a child’s educational achievement can be proxied by the status of school enrolment (dummy variable); the completed grades (grades); and the schooling gap (number of years) (Islam & Choe, 2013). We argue that the status of school enrolment does not inform the achievement, level, or quality of schooling for children who are not in school at the survey time. So, instead, this study employs the completed grades and schooling gap for the empirical estimations. The completed grade captures children’s schooling grade. However, it does not reflect how well children do in school or whether they complete a grade in more than one year. So, we also employ the schooling gap, which captures such issues as late entries, dropping out, or failing grades.

The vector I includes a child’s age, gender, and birth order. A child’s age is expected to exert a positive effect. Not surprisingly, the older a child is, the more schooling grades he/she will be likely to complete. For the schooling gap, an older child tends to have a higher schooling gap by construction (see definition in Section 5). For example, a six-year-old child’s schooling gap is 0, while an eighteen-year-old child has a schooling gap between 0 and 12. A child’s gender is a dummy variable that has a value of one for a girl and zero otherwise. In rural Vietnam, girls are expected to have fewer schooling years than boys due to son preference. Hence it is expected to have a negative effect. The birth order of a child in the family is expected to exert a negative impact. In rural areas, parents are believed to take younger children out of school to do housework when they are too busy (Banerjee et al. (2015); Islam and Choe (2013)).

Since the two dependent variables are positive integers ranging from zero to twelve, it is appropriate to use the Poisson model in the estimation. The Poisson model has been widely employed to analyse such count data (Wooldridge, 1997). One might argue that the distributions of school gap and completed grade violate a Poisson model’s assumption that the variance equals its mean, namely equi-dispersion. If this assumption is violated, it results in the under-/over-dispersion issues.

To address the under-/over-dispersion problem, we also use the negative binomial model (NB), which is a Poisson maximum likelihood estimation with correction of under-/over-dispersion problem. To determine which method is more appropriate, we conduct the Likelihood-Ratio (LR) test with a null hypothesis that the under-/over-dispersion does not occur. A failure to reject the null hypothesis suggests that there is no under-/over-dispersion issue, and both NB and Poisson models can produce consistent results.

Furthermore, if the value of dependent variables contains a significant proportion of zero, namely “excess zeros”, the zero-inflated Poisson or zero-inflated NB models would be more appropriate. In our sample, there is only 0.41%, and 0.19% of the school gap and the completed grade is zero, respectively (see Table A.1 and A.2 in appendices). Thus, it is not necessary to consider these zero-inflated models.

However, estimating Eq. (9) is subject to a selection bias due to the non-random access to microcredit. The selection bias may arise from both the demand and supply sides. On the supply side, the placement of financial institutions is non-random, and as such, it is unlikely that financial services are allocated across the villages randomly. The financial institutions could be located systematically more in high-income villages as the wealthier villagers can afford to the loans. On the demand side, there is a tendency for borrowers to possess attributes that non-borrowers lack (such as the "entrepreneurial ability"). The borrowers with "entrepreneurial ability" are likely to get loans and earn higher income from investment activities than others. Therefore, the assumption that $E[X_{ijt}\epsilon_{ijt}] = 0$, where

X is a vector of all explanatory variables in Eq. (9), is likely not to hold, which, if not addressed, will lead to inconsistent estimates.

To address the endogeneity problem, we instrument the microcredit borrowing in the Poisson regression model. We utilise participation in social unions as the first instrument variable for microcredit borrowing. Arguably, there is a strong connection between social unions, such as woman's unions, and access to credit in rural Vietnam. These unions play a key role in collaborating with Vietnamese banks and other credit providers, including informal credit providers, to support their members in their loan applications. Traditionally, access to credit tends to be severely limited since only a few low-income households can provide collateral for their loan applications. Social unions tend to offer a collective guarantee to their members. Therefore, participating in a social union would benefit households seeking financial support, and be more likely, to obtain approval for their loan applications. However, we argue that social union membership appears not to directly influence the household's children's education attainment but rather indirectly by increasing access to microcredit borrowing.

For the second instrument variable, the borrower network in a commune is measured by the proportion of borrowers accessing microcredit in the commune. This instrument variable indicates households' ability to access information on microcredit and helps connect households in the commune to have higher credit uptake. The more borrowers are in the commune, the better information that a credit seeker can access. By providing information about credit sources or credit borrowing procedures through friends, relatives, and neighbours, borrower networks could lower the cost of searching and increase accessibility to credit sources for new borrowers. Thus, the borrower network is more likely to drive microcredit participation. One might argue that the instrument might capture other commune differences rather than households' ability to access microcredit information. For example, communes with a higher proportion of borrowers may have bad economic conditions, which can also affect children's educational attainment. We acknowledged this point and verified the correlation between the borrower network and the number of poor households in each commune. A correlation value of 0.21 signals that this is not the case in our study (see Appendix). Therefore, we believe that the borrower network's size only affects rural households' accessibility to credit information rather than directly affecting their children's education levels.

For our negative binomial model, we employ the control function approach to account for possible endogeneity. We first obtain residuals in the first stage regression of microcredit against all explanatory variables and including the two instruments. Then, adding the estimated residuals in the second stage, using the NB model, as an additional regressor (see Wooldridge, 2015).

In the estimations, several tests are conducted to confirm the relevance and validity of the two instruments. We utilise the under-identification and weak identification tests to verify the instruments' relevance (i.e., strongly correlated with microcredit), and the over-identification test to check whether the instruments are valid (i.e., uncorrelated with the error term). Finally, we control for inflation effects, as all monetary values are converted to real terms using the producer price index (PPI) with the base year of 2008 (General Statistics Office of Vietnam, 2017).

5. Data

5.1. The Vietnam access to resources household survey

The VARHS has been conducted every two years since 2006 and contains not only social-economic information, including the children's educational outcomes but also the financial activities of rural households in 12 selected provinces.⁵ Therefore, by utilising the variations in children's education and access to microcredit in the surveys, we can estimate the impacts of microcredit on children's education in rural households in Vietnam.

As discussed earlier, this study focuses on productive microcredit loans. We, therefore, exclude households that use microcredit only for consumption.⁶ The exclusion allows us to focus on productive microcredit and avoid the confounding effect of consumption microcredit. For households who use microcredit for production, their children's education level may be lower than those who use microcredit for consumption, including spending for their children's schooling, which then inflate the effects of microcredit on children's education. Furthermore, we exclude communities that contain only borrowers or non-borrowing households to avoid any potential bias caused by community characteristics. Finally, only households with children ages 11–18 are included in the analysis. In Vietnam, children's schooling can be classified into primary school (6–10 years old), secondary school (11–15 years old), and high school (16–18 years old). The t-test fails to confirm significant differences in children's educational achievement in primary schools between borrower and non-borrower groups. This is not surprising because primary school education is compulsory for all children in Vietnam. Thus, this study focuses on the sub-sample of children from 11–18 years old. Through this filtering, we obtain a sample of 7232 observations,⁷ which spreads over 1626 households, 336 communes, and 12 provinces, for estimations.

⁵ Ha Tay, Lao Cai, Phu Tho, Lai Chau, Dien Bien, Nghe An, Quang Nam, Khanh Hoa, Dak Lak, Dak Nong, Lam Dong, and Long An.

⁶ Based on the information on the main use of loans reported in the surveys, we excluded all households who borrowed for consumption. For example, there are 14 main use of loans from the survey: (1) for rice production; (2) for other crop production; (3) for animal husbandry; (4) for forestry; (5) for fishery; (6) for non-farm activity; (7) build/buy houses; (8) buy land; (9) buy another asset; (10) pay for wedding/funeral; (11) for education expenses; (12) for health expenses; (13) for general consumption; (14) for other consumption. We excluded all households who borrowed for weddings/funerals; education expenses; health expenses; general consumption; and other consumption.

⁷ 2014 children in 2008; 1642 children in 2010; 1433 children in 2012; 1174 children in 2014; and 969 children in 2016.

Table 1
Variable definition and descriptive statistics.

	ALL Children					Non-borrowing group			Borrowing group			diff	p-value
	N	Mean	SD	Min	Max	N	Mean	SD	N	Mean	SD		
Completed grade (Grades)	7,232	6.70	2.490	0	12	2,062	6.83	2.584	5,170	6.64	2.449	-0.18***	0.005
School gap (Schgap)	7,232	3.07	1.753	0	12	2,062	3.17	1.895	5,170	3.04	1.691	-0.13***	0.003
Microcredit (M)	7,232	10,312.33	54,860.618	0	3,104,626	2,062	0.00	0.000	5,170	14,425.29	64,427.941	14,425.29***	0.000
Child's gender (Childgender)	7,232	0.49	0.500	0	1	2,062	0.45	0.497	5,170	0.51	0.500	0.06***	0.000
Child's age (Childage)	7,232	14.77	2.264	11	18	2,062	14.99	2.266	5,170	14.68	2.257	-0.31***	0.000
Birth order (Birthorder)	7,232	2.21	1.293	1	11	2,062	2.27	1.422	5,170	2.19	1.237	-0.08**	0.014
Non-business income (Y)	7,232	23,448.15	34,716.086	0	1,081,250	2,062	24,536.71	30,635.124	5,170	23,014.00	36,209.340	-1,522.71*	0.092
Wealth (W)	7,232	27,864.52	63,647.951	0	1,571,043	2,062	23,188.63	47,915.768	5,170	29,729.45	68,843.737	6,540.82***	0.000
Education of head (EduH)	7,232	1.32	1.039	0	5	2,062	1.19	1.040	5,170	1.37	1.034	0.19***	0.000
Household size (HSize)	7,232	5.82	1.979	2	17	2,062	5.86	2.222	5,170	5.81	1.873	-0.06	0.263
Age of head (AgeH)	7,232	42.91	7.262	21	84	2,062	43.97	7.879	5,170	42.49	6.957	-1.48***	0.000
Land size (Plot)	7,232	13,865.77	17,387.790	0	326,000	2,062	11,214.18	12,183.698	5,170	14,923.33	18,969.210	3,709.15***	0.000
Dependent members (Dep)	7,232	2.53	1.562	0	10	2,062	2.46	1.780	5,170	2.56	1.466	0.10**	0.015
Non-farming (Nfarming)	7,232	0.24	0.427	0	1	2,062	0.23	0.424	5,170	0.24	0.428	0.01	0.531
Income-shock (Shock)	7,232	0.62	0.487	0	1	2,062	0.60	0.490	5,170	0.62	0.485	0.02	0.156
Poor status (Poor)	7,232	0.27	0.446	0	1	2,062	0.30	0.460	5,170	0.26	0.440	-0.04***	0.000
Local household (Local)	7,232	0.76	0.427	0	1	2,062	0.84	0.368	5,170	0.73	0.445	-0.11***	0.000
Borrower network (IV1)	7,232	0.43	0.226	0	1	2,062	0.35	0.179	5,170	0.46	0.235	0.11***	0.000
Social union participation (IV2)	7,232	0.54	0.499	0	1	2,062	0.51	0.500	5,170	0.55	0.498	0.04***	0.001

Note: Grades stands for grades a child completed in school; Schgap is differences between the expected schooling and the actual schooling years (years); M is total microcredit borrowing (000 VND); Childgender indicates gender of child (1-female; 0-otherwise); Childage is age of child (years); Birthorder is the birth order of a child in its family (start from 1 for the oldest child); Y is income from sources other than the family business (000 VND); W is household total physical asset value (000 VND); EduH is the number of school years of the household head; HSize is the number of household members; AgeH is the age of household head (years); Plot stands for total of land size owned by the household in square metre; Dep is the number of dependent members; Nfarming is whether a household is involved in non-farming business activities (1-yes; 0-otherwise); Shock is whether a household experienced any income shock (1-yes; 0-otherwise); Poor indicates poverty status. Whether a household is classified as poor by authority (1-yes; 0-otherwise); Local is whether a household is local (1-yes; 0-otherwise); IV1 is borrower network at the commune level (percentage); and IV2 is whether any household member participates in any social union, such as women union.

Table 2
Marginal effects of microcredit on children's education.

VARIABLES	(1)	(2)	(3)	(4)
	School gap (<i>Schgap</i>)		Completed grade (<i>Grades</i>)	
	IV-Poisson	NB	IV-Poisson	NB
log Microcredit (<i>M</i>)	0.0233** (0.0092)	0.0227** (0.0093)	-0.0215** (0.0095)	-0.0203** (0.0095)
Child's gender (<i>Childgender</i>)	-0.2452*** (0.0359)	-0.2424*** (0.0358)	0.2508*** (0.0364)	0.2460*** (0.0363)
Child's age (<i>Childage</i>)	0.2195*** (0.0090)	0.2202*** (0.0090)	0.7764*** (0.0096)	0.7757*** (0.0096)
Birth order (<i>Birthorder</i>)	0.0365** (0.0165)	0.0344** (0.0165)	-0.0542*** (0.0207)	-0.0520** (0.0207)
log Non-business income (<i>Y</i>)	0.0040 (0.0075)	0.0044 (0.0075)	-0.0024 (0.0061)	-0.0025 (0.0061)
log Wealth (<i>W</i>)	-0.0362*** (0.0079)	-0.0361*** (0.0079)	0.0430*** (0.0097)	0.0431*** (0.0096)
Education of head (<i>EduH</i>)	-0.2907*** (0.0214)	-0.2908*** (0.0212)	0.2652*** (0.0208)	0.2665*** (0.0208)
Household size (<i>HSize</i>)	0.0565*** (0.0164)	0.0570*** (0.0164)	-0.0909*** (0.0196)	-0.0912*** (0.0196)
Age of head (<i>AgeH</i>)	0.0097*** (0.0031)	0.0096*** (0.0031)	-0.0088*** (0.0033)	-0.0085** (0.0033)
log Land size (<i>Plot</i>)	0.1029*** (0.0166)	0.1024*** (0.0167)	-0.0775*** (0.0148)	-0.0776*** (0.0148)
Dependent members (<i>Dep</i>)	0.0830*** (0.0213)	0.0829*** (0.0212)	-0.0530** (0.0236)	-0.0534** (0.0236)
Non-farming (<i>Nfarming</i>)	-0.1134*** (0.0426)	-0.1177*** (0.0426)	0.0760* (0.0417)	0.0782* (0.0416)
Income-shock (<i>Shock</i>)	-0.0839** (0.0382)	-0.0823** (0.0381)	0.0837** (0.0379)	0.0833** (0.0378)
Poor status (<i>Poor</i>)	0.3572*** (0.0468)	0.3588*** (0.0467)	-0.3958*** (0.0516)	-0.3981*** (0.0515)
Local household (<i>Local</i>)	0.1402*** (0.0461)	0.1391*** (0.0460)	-0.1359*** (0.0446)	-0.1345*** (0.0445)
Estimated residuals		-0.0304*** (0.0101)		0.0285*** (0.0103)
Observations	7,232	7,232	7,232	7,232
Anderson canon. corr. LM statistic	1,403.06***		1,403.06***	
Cragg-Donald Wald F statistic	868.34*		868.34*	
Hansen's J statistic	2.56		2.43	
Likelihood-ratio (LR) statistic		0.000		0.000

Notes: ***, **, and * indicate the statistical significance at the 1, 5, and 10% levels, respectively; the coefficients reported are marginal effects; Bootstrap standard errors presented in the parentheses; all tests are two-tailed tests.

5.2. Measuring children's educational achievement

In this study, the children's education is measured by two variables, namely the completed grades (*Grades*) and school gap (*Schgap*). The completed grades are measured by grades children completed in school. The school gap is the difference between expected schooling and actual schooling years, according to the child's age (see Islam & Choe, 2013). For example, in Vietnam, a child is expected to finish high school at age 18. Schooling usually commences at age 6. Therefore, if a child is older than 18, then the expected schooling is 12 years. The actual schooling is the number of years that the child completed and is based on self-reported survey data. Subsequently, the schooling gap is defined as

$$Schgap = \max\{0, es - as\}$$

where *Schgap* represents the school gap; *as* denotes the actual schooling years; and *es* denotes the expected schooling years and $es = \begin{cases} 0, & \text{if } age \leq 6, \\ age - 6, & \text{if } 7 \leq age \leq 18. \end{cases}$

5.3. Variable definitions and summary statistics

Table 1 reports variable definitions and summary statistics. Both dependent variables, *Grades* and *Schgap*, are in a range from zero to twelve. On average, the schooling grade that a typical child completed is 6.7, and the school gap is around three years, indicating that rural households in Vietnam are facing difficulties in sending their children to school. Many poor households find they must forego education for their children so that the children can help in the family's business.

Total microcredit borrowing (*M*), the variable of interest, is measured by summing up all current loans. On average, a rural

household in the sample can borrow an amount of 14 million VND (equivalent to six hundred US dollars). For the first instrument, on average, the percentage of borrowers in a typical commune is 43. The borrower network is as large as 46% for the borrowing groups, which is 11% statistically higher than that for the non-borrowing groups. This relatively high number reflects a high demand for credit in rural areas. We utilise survey data which capture whether the household participates in any social group as the second instrument variable for the endogenous variable, microcredit. On average, 54% of parents of children in our sample were involved in at least one social group. We observe a statistically significant difference in participation in social groups among the two groups in our sample. Among the group of micro-credit borrowers, parents of children have connections with social unions, while 51% of that in non-borrowing clusters are involved in those memberships

Children's characteristics include age, gender, and birth order. The average age of children is 14.77 years old. Forty-nine percent of children are female. Most of the children in the sample are the second oldest child in the family.

On average, a household's income, from sources other than the family's business, is about 23.45 million VND (1019 USD). The average household's wealth is 27.86 million VND (1211 USD).⁸ The average age of a household head is nearly 43 years old. The highest number of schooling years of a household's head is five.⁹ On average, s/he can accumulate only 1.32 schooling years. A household tends to have around six members and owns 1.39 ha of land. One-fourth of the children in the sample are involved in non-farming business activities. Sixty-two percent of the children come from households that experienced at least one income shock. Twenty-seven percent of children belong to poor households. The local children (non-migrant) account for 76% of the sample.

6. Results

6.1. Baseline results

Table 2 reports the main estimation results. We employ the IV Poisson and the control function method in the negative binomial regression to estimate Eq. (9). The results for the *school gap* are reported in Columns (1) and (2), while the results for *completed grades* are presented in Columns (3) and (4). Overall, the sign and magnitude of the coefficient of microcredit borrowing remain consistent and relatively close to each other across the two estimation approaches.

About the choice of model, the likelihood-ratio (LR) tests obtain a test statistic of zero with a p-value greater than 0.1, which fails to reject the null hypothesis that there is no under-/over-dispersion in both cases of *school gap* and *completed grade*. This test verifies that the Poisson model is appropriate for this empirical study. Therefore, the following discussions are based on the IV Poisson estimation results in Columns (1) and (3).

For the two excluded instruments, we conducted several tests to verify their relevance and validity. The value of the Anderson canonical correlation LM statistic is 1403 with a p-value less than 0.001. It thus rejects the null hypothesis and implies the instruments are relevant and correlated with microcredit borrowing. In the weak identification test, the value of the Cragg-Donald Wald F statistic is 868.3, which rejects the null hypothesis that the correlation between the instruments and the endogenous regressor is weak. The Hansen's J test has test statistics of 2.56 and 2.43, respectively, and both p-values greater than 0.1. We thus fail to reject the null hypothesis that the instruments are valid. Hence, the tests confirm the relevance and validity of the two excluded instruments.

The estimations find microcredit borrowing exerts significantly positive impacts on children's school gap but has significantly negative impacts on children's completed grades in rural areas of Vietnam. The finding suggests that microcredit access discourages borrowers from sending their children to school. Particularly, a 1% increase in the amount of microcredit borrowing is expected to increase children's school gap by 0.023 years, and decrease the completed grade by 0.02 years, ceteris paribus. The finding is consistent with those of Augsburg et al. (2012), Banerjee et al. (2015) and Islam and Choe (2013), who report adverse impacts of microcredit on children's education in Bosnia, India, and Bangladesh, respectively.

It is acknowledged that the level of investment in children's education results from several supply factors and individual families' demand for child schooling. While the level and quality of the supply are determined by the national infrastructure and education system, the decision of child education depends predominantly on an implicit cost-benefit analysis made within the family, namely intrahousehold allocation. Costs combine direct expenditure, such as tuition fees, and indirect or opportunity costs, such as the income foregone due to sending their children to school. The benefits include returns to parents from their high-educated children's income (Hill & King, 1993). All costs and benefits are entered in the calculus, as well as their relative importance, determined mainly by the preferences of family decision-makers.

The negative impact of microcredit in our study can be explained by this framework of intra-household allocation. This study focuses on the impact of productive microcredit on borrowers' children's education in rural Vietnam. Most of the rural households in Vietnam are low-income and have credit constraints. When a typical household takes up microcredit and invests in their businesses, it is more likely to need more labour to work on the business. Particularly, the borrower tends to invest in agriculture-related projects, which are labour-intensive businesses. It has limited resources to hire external workers, so will likely resort to their school-aged children: pulling their children out of school to do housework or assist them with basic tasks in farming.

Evidence from past research also provides strong support that microcredit borrowing negatively affects the demand for education. Maldonado and González-Vega (2008) propose that credit-constrained households are more likely to find new demands for child

⁸ Measured by household's assets plus saving.

⁹ It is noted that the maximum school years of household heads in the survey is 12. However, the proportion of those households is small and excluded when we form the dataset for children level.

Table 3
Marginal effects of microcredit in sub-samples.

log Microcredit (<i>M</i>)	Observation	School gap (<i>Schgap</i>)		Completed grade (<i>Grades</i>)	
		Coef.	Robust S.E	Coef.	Robust S.E
Boys versus girls					
Boys	3691	0.0436***	0.0132	-0.0419***	0.0139
Girls	3541	0.0025	0.0127	-0.0013	0.0128
Formal versus informal credit					
Formal credit	6631	0.0236**	0.0105	-0.0227**	0.0110
Informal credit	5470	0.0392***	0.0145	-0.0402**	0.0158

Notes: *** and ** indicate the statistical significance at the 1 % and 5 % levels, respectively; the coefficients reported are marginal effects; other estimated coefficients are presented in [Appendices Tables A.3 and A.4](#); all estimations are IV Poisson regression model.

labour for farming when parents are busy with a new or expanded business and having their children take care of siblings or do housework. Microcredit borrowers, thus, are more likely to pull their children out of school. A decrease in demand for child education also might result from poor business performance. [Wydict \(1999\)](#) and [Attanasio, Augsburg, De Haas, Fitzsimons, and Harmgart \(2015, pp. 20130489\)](#) point out that microcredit could increase the return for child labour, thus, increasing the opportunity cost of schooling.

These findings have significant implications for policymakers and development practitioners as to the unintended effects of microcredit on rural children's education. Conventional thinking suggests that loans geared to support productive activity are expected to help rural borrowers increase their income, which can improve children's educational outcomes. This investment in education, can have a positive impact on children's long-term lives. Unfortunately, our findings do not support this hypothesis in the case of rural Vietnam, where productive microcredit reduces children's educational outcomes.

The other explanatory variables also exert considerable influence on children's education. The results indicate that a girl's completion rate in terms of grades is 0.25 more than boys. This finding is in contrast to traditional thinking that parents are more likely to send their sons rather than daughters to school in rural areas. The coefficients of a child's age are found to be positive in both the *school gap* and *completed grade* estimations. Not surprisingly, an older child tends to have completed more grades, and because of age, he/she also has a higher likelihood of having a bigger school gap.

Regarding the impacts of household characteristics, wealth and education level of the household head have significantly positive influences on children's education. Educated parents tend to encourage their children to pursue high academic standing and have a higher expectation for education. A household with a better wealth endowment tends to bring more opportunities for children to achieve better education. In rural areas, non-farming activities are expected to reduce risk and increase income for households whose livelihood strategies mostly rely on the unstable nature of weather. Being involved in non-farming business activities helps diversify rural households' income sources and minimise losses in case of negative income shocks.

In contrast, family size, the average age of the household head, land ownership, number of dependent members, poverty status, and being a local household significantly reduce children's academic achievement. Arguably, the bigger a family is, the fewer resources can be allocated for each member, especially for educational purposes. The negative impact of the age of household heads suggests that older household heads are more conservative in evaluating the return on education investment. It is likely that the longer they are involved in agricultural activities, the stronger they believe that their children would follow them to work on their farms and do not need much education. This is also consistent with the adverse impact of land ownership. More labour is required when households obtain more land. Subsequently, they might withdraw their children from school to increase the family labour force. A household with more dependent members or designated as poor tend to have limited resources to support their children's education. It is expected that microcredit borrowing would be a burden for poor parents due to their limited resources and lack of labour to work on their business. As such, poor children would be taken out of school to support their family's businesses. Nevertheless, this negative impact can be alleviated by the tuition fee exemption policy in Vietnam. The tuition fee exemption for the poor makes it affordable for poor households to keep their children at school.

6.2. Tracing heterogeneous impacts

To examine whether the impact of microcredit is heterogeneous across child's genders and credit sources, we estimate [Eq. \(9\)](#) with sub-samples of boys, girls, formal credit, and non-formal credit separately. In developing countries, such as Vietnam, it is generally believed that parents are more likely to be biased in favour of their son's education. Therefore, it is necessary to investigate whether such a perception is true. We also consider whether formal microcredit secured from formal sources such as banks and microlending facilities helps households in rural areas. This analysis, thus, aims to provide some deeper insights into the impacts of microcredit that benefit policymakers.

Results are presented in [Table 3](#), where the top panel reports the regression results for boys and girls, and the bottom panel presents the estimated results for formal and non-formal credit sources. Overall, we find that microcredit has a negative and significant impact on boys as opposed to girls' educational outcomes. Our results find that male children tend to drop out if their parents borrow loans for business, while borrowing has no impact on girls' educational outcomes. Indeed, a 1% increase in microcredit borrowing leads to a decrease of 0.0419 in completed grades and an increase of 0.0436 in the school gap of boys, ceteris paribus. This finding contradicts the traditional viewpoint of preferring boys to girls in rural developing countries. In Bangladesh, [Islam and Choe \(2013\)](#) and [Mark and](#)

Table A.1
Summary of school gap for children aged from 12 to 18.

School gap	Frequency	Percent	Cumulative
0	30	0.41	0.41
1	536	7.41	7.83
2	3,094	42.78	50.61
3	1,514	20.93	71.54
4	911	12.6	84.14
5	455	6.29	90.43
6	258	3.57	94
7	187	2.59	96.58
8	129	1.78	98.37
9	62	0.86	99.23
10	35	0.48	99.71
11	10	0.14	99.85
12	11	0.15	100
Total	7,232	100.00	100.00

Note: Authors compilation extracted from the Vietnam Access to Resources Household Survey.

Table A.2
Summary of completed grades for children aged from 12 to 18.

Completed grade	Frequency	Percent	Cumulative
0	14	0.19	0.19
1	92	1.27	1.47
2	185	2.56	4.02
3	465	6.43	10.45
4	762	10.54	20.99
5	971	13.43	34.42
6	955	13.21	47.62
7	916	12.67	60.29
8	847	11.71	72
9	1,011	13.98	85.98
10	560	7.74	93.72
11	396	5.48	99.2
12	58	0.8	100
Total	7,232	100.00	100.00

Note: Authors compilation extracted from the Vietnam Access to Resources Household Survey.

[Khandker \(1998\)](#) also detect adverse effects of microcredit on male children's education.

These results highlight the issue of child labour in rural areas. Although our study uses the two measures of child schooling, which are not measures of child labour, the findings somewhat send signals to local authorities about the concern of the negative effect of increasing microcredit lending on male children's labour. There are many reasons that may influence parents to lower the expected benefits of sending their boys to school, such as the poor educational performance of male students ([Duc & Tam, 2016](#)). For this study, we focus only on productive loans, which are mainly invested in agricultural-related businesses by rural borrowers. With those labour-intensive investments, the loan holders are more likely to increase demand for labour, including their children, if the earnings are insufficient to cover external labour costs. One might argue that, given the traditional belief in rural Vietnam (boys are preferable to girls), if households need extra labour, they will first pull girls out of school before boys. However, this may not be the case for two reasons. First, the parents' gender preference is not as severe as it used to be. Second, farming is hard work, and if children are pulled out of school to support their family income, boys are preferred to girls, perhaps due to their greater physical strengths.

For the credit sources, the coefficients in the bottom panel of [Table 3](#) suggest that microcredit borrowing negatively impacts rural households regardless of where they take up credit. In addition, formal credit has a relatively smaller harmful impact on borrowers' education investment. This is most likely attributable to the differences in terms of interest rate, credit term (time), and size of loans. The rural households' demand for the loans is significant because their savings are very limited. If rural dwellers meet all requirements of formal lenders, they can get official loans at reasonable prices, bigger loan sizes, and longer loan terms. However, completing a formal loan application process could take a long time. Moreover, formal credit institutions also provide training workshops to their clients to improve entrepreneurship among credit borrowers. Overall, these supports help rural credit borrowers have better use of loans. As a result, better business outcomes would lead to a better impact on their children's education. On the other hand, informal credit is a complement to formal credit to meet urgent needs. Informal microcredit is more likely to be small and associated with high-interest rates and shorter repayment conditions. As a result, the poor are more likely to reduce costs by using their children as labour in the business, thereby limiting the children's schooling.

Table A.3
Marginal effects of microcredit, boys versus girls.

VARIABLES	(1)	(2)	(3)	(4)
	School gap (<i>Schgap</i>)		Completed grade (<i>Grades</i>)	
	Girls	Boys	Girls	Boys
log Microcredit (<i>M</i>)	-0.0013 (0.0127)	0.0436*** (0.0132)	0.0025 (0.0128)	-0.0419*** (0.0139)
Child's age (<i>Childage</i>)	0.1850*** (0.0129)	0.2481*** (0.0125)	0.8115*** (0.0139)	0.7456*** (0.0133)
Birth order (<i>Birthorder</i>)	0.0350 (0.0232)	0.0414* (0.0234)	-0.0462 (0.0288)	-0.0657** (0.0298)
log Non-business income (<i>Y</i>)	0.0031 (0.0104)	0.0009 (0.0108)	-0.0005 (0.0085)	-0.0000 (0.0089)
log Wealth (<i>W</i>)	-0.0171 (0.0116)	-0.0573*** (0.0107)	0.0206 (0.0139)	0.0686*** (0.0135)
Education of head (<i>EduH</i>)	-0.2885*** (0.0298)	-0.2886*** (0.0305)	0.2655*** (0.0291)	0.2575*** (0.0297)
Household size (<i>HSize</i>)	0.0415* (0.0228)	0.0705*** (0.0232)	-0.0728*** (0.0271)	-0.1075*** (0.0278)
Age of head (<i>AgeH</i>)	0.0179*** (0.0043)	0.0023 (0.0042)	-0.0179*** (0.0050)	-0.0011 (0.0044)
log Land (<i>Plot</i>)	0.1419*** (0.0207)	0.0504* (0.0258)	-0.1113*** (0.0181)	-0.0314 (0.0238)
Dependent members (<i>Dep</i>)	0.0722** (0.0294)	0.0927*** (0.0301)	-0.0430 (0.0326)	-0.0670** (0.0334)
Non-farming (<i>Nfarming</i>)	-0.1158** (0.0574)	-0.1304** (0.0626)	0.0769 (0.0566)	0.1044* (0.0616)
Income-shock (<i>Shock</i>)	-0.1092** (0.0527)	-0.0578 (0.0552)	0.1061** (0.0528)	0.0595 (0.0546)
Poor status (<i>Poor</i>)	0.4280*** (0.0654)	0.2695*** (0.0669)	-0.4784*** (0.0726)	-0.2919*** (0.0736)
Local household (<i>Local</i>)	0.1927*** (0.0606)	0.0490 (0.0691)	-0.1783*** (0.0579)	-0.0609 (0.0676)
Observations	3,541	3,691	3,541	3,691
Anderson canon. corr. LM statistic	644.74***	762.43***	644.74***	762.43***
Cragg-Donald Wald F statistic	392.35*	478.38*	392.35*	478.38*
Hansen's J statistic	8.65	0.32	8.24	0.31

Notes: ***, **, and * indicate the statistical significance at the 1, 5, and 10 %, respectively; The coefficients reported are marginal effects; Bootstrap standard errors presented in the parentheses; Variable *Childgender* is omitted to avoid the multicollinearity problem; All estimations are IV poisson regression model.

7. Concluding remarks

This paper examines the impact of microcredit on children's schooling in rural areas of Vietnam.¹⁰ For this purpose, we first set up a theoretical framework. Briefly, a representative household borrows microcredit to invest in its small business. The investment in the small business brings in additional income, should it achieve success. The household maximises its lifetime utility, subject to a budget constraint, which yields an optimal education as a function of microcredit borrowing and a set of control variables. Guided by the theoretical framework, we empirically estimate the impact of microcredit on children's education in rural Vietnam.

Our results indicate that productive rural microcredit has negative effects on children's education, especially for boys. Given the negative impact on children's education, local authorities and development practitioners need to pay more attention to the effectiveness of rural production loans. Although microcredit can serve the poor as a key effective tool for poverty alleviation and promote the local economy in the short term, microcredit programmes might also have an undesired side effect on rural children's education outcomes, which, in the longer term, has the potential to perpetuate poverty. The negative impact is found not to be homogenous across the child's genders, as males are found to be more affected than females. Access to microcredit could reduce the effectiveness of government policies that aim to eliminate gender imbalance in education.

From the findings, three key implications can be drawn for policymakers and microcredit providers. First, policymakers and financial institutions should pay more attention to the possible child labour impacts of increasing access to productive microcredit. Using microcredit for a household's business often requires extra labour to work. For instance, rural borrowers might use the loans to purchase livestock or new farms. Consequently, children might be asked to take care of the animals for the family, while their parents are not able to allocate time for such work. In the end, children's schooling is sacrificed. To avoid such a situation, a condition of using no child labour can be added to the loan contract, particularly for labour-intensive projects.

¹⁰ The study on the impact of microcredit on children education is reserved for future work. One might conduct a further research on the impact of credit provision on child labour to verify the findings.

Table A.4
Marginal effects of microcredit, formal versus informal credit.

VARIABLES	(1)	(2)	(3)	(4)
	School gap (<i>Schgap</i>)		Completed grade (<i>Grades</i>)	
	Formal Credit	Informal Credit	Formal Credit	Informal Credit
log Microcredit (<i>M</i>)	0.0236** (0.0105)	0.0392*** (0.0145)	-0.0227** (0.0110)	-0.0402** (0.0158)
Child's gender (<i>Childgender</i>)	-0.2413*** (0.0376)	-0.2231*** (0.0414)	0.2442*** (0.0381)	0.2365*** (0.0422)
Child's age (<i>Childage</i>)	0.2170*** (0.0094)	0.2205*** (0.0105)	0.7792*** (0.0100)	0.7731*** (0.0112)
Birth order (<i>Birthorder</i>)	0.0433** (0.0172)	0.0568*** (0.0186)	-0.0608*** (0.0216)	-0.0828*** (0.0233)
log Non-business income (<i>Y</i>)	0.0055 (0.0079)	-0.0028 (0.0092)	-0.0042 (0.0065)	0.0022 (0.0075)
log Wealth (<i>W</i>)	-0.0363*** (0.0082)	-0.0415*** (0.0090)	0.0429*** (0.0100)	0.0475*** (0.0111)
Education of head (<i>EduH</i>)	-0.2879*** (0.0222)	-0.2848*** (0.0249)	0.2619*** (0.0216)	0.2582*** (0.0241)
Household size (<i>HSize</i>)	0.0518*** (0.0170)	0.0524*** (0.0192)	-0.0862*** (0.0202)	-0.0792*** (0.0226)
Age of head (<i>AgeH</i>)	0.0106*** (0.0032)	0.0075** (0.0036)	-0.0099*** (0.0035)	-0.0064 (0.0039)
log Land (<i>Plot</i>)	0.1072*** (0.0176)	0.1051*** (0.0191)	-0.0796*** (0.0156)	-0.0766*** (0.0167)
Dependent members (<i>Dep</i>)	0.0816*** (0.0220)	0.0677*** (0.0245)	-0.0514** (0.0243)	-0.0423 (0.0272)
Non-farming (<i>Nfarming</i>)	-0.0809* (0.0445)	-0.1746*** (0.0491)	0.0440 (0.0434)	0.1269*** (0.0483)
Income-shock (<i>Shock</i>)	-0.0653 (0.0401)	-0.0897** (0.0446)	0.0662* (0.0399)	0.0897** (0.0444)
Local household (<i>Local</i>)	0.3449*** (0.0486)	0.4666*** (0.0553)	-0.3865*** (0.0534)	-0.5089*** (0.0606)
Observations	6,631	5,470	6,631	5,470
Anderson canon. corr. LM statistic	1,157.07***	939.54***	1,157.07***	939.54***
Cragg-Donald Wald F statistic	699.03*	565.43*	699.03*	565.43*
Hansen's J statistic	2.68	2.77	2.55	2.66

Notes: ***, **, and * indicate the statistical significance at the 1, 5, and 10 %, respectively; The coefficients reported are marginal effects; Bootstrap standard errors are presented in the parentheses; All estimations are IV Poisson regression model.

Second, one of the possible causes for the negative effect on children's schooling is that the parents are not able to manage costs in their projects due to limited resources. Subsequently, their children serve as a cheap and available resource, which they tap into if needed. This problem can be overcome if the size of loans is increased and lower interest-rates charged on loans are distributed to the poor. The local authorities should make formal microcredit available to the poor and reduce some requirements in the loan application process, such as the need for collateral. As such, a larger size of loans allows the borrowers to invest in more profitable projects; hence, higher returns and more resources enable the borrowers to hire external labour, instead of using their children as an input in the family business, eventually increasing schooling investment.

Third, to increase the demand for children's schooling in society, especially in rural areas, the government can introduce preferred loans that target only education, such as credit for school-related fees (i.e., textbooks and tuition fees). Along with the loan, lenders can provide training courses to increase borrowers' awareness of the value of education for their children. Through these ways, it is expected to expand opportunities for the poor, increase schooling demand, and keep children longer in school.

Declaration of conflict of interest

There is no conflict of interest related to the work.

Appendix A

see Table. A1-A4.

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