

ERIA Discussion Paper Series**No. 357****Child Education: Rethinking Microcredit in Cambodia**

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Abstract: *Conflicting and controversial conclusions about the potential effects of microcredit on socio-economic development raise concerns over the effects on child education. This study analyses the effects of microcredit offered by microfinance institutions on child education using data from the Cambodia Socio-Economic Surveys conducted in 2014 and 2017. The effects on textbook spending school dropout and child labour are quantified with regression models addressing the endogeneity of the household decision to use microcredit and of the borrowed amount. The results suggest that microcredit is unlikely to promote household spending on textbooks but is liable to increase the likelihood of a child dropping out of school and the probability of child labour.*

Keywords: microcredit, child education, Cambodia

JEL Classification: O1, O12, O15

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1. Introduction

The formation of human capital plays the main role in alleviating poverty. In rural communities in developing countries, however, children's access to education remains limited because of insufficient school infrastructure and resources (schools, teachers, materials), and needy households' preferences for and budget constraints on investment in schooling (Maldonado and Gonzalez-Vega, 2008). Human capital cannot be used as loan collateral because it cannot be seized in case of default, so the poor finance their children's schooling using the available wealth or by abstaining from current consumption spending rather than using credit (Maldonado and Gonzalez-Vega, 2008). Credit market shortcomings point to a joint causality between child schooling and needy households' income generation. Together with decreasing returns on investment in education, limited access to credit is likely to plunge poverty-stricken households into a poverty trap.

Microfinance – the provision of financial services by microfinance institutions (MFIs) – is widely touted for its great potential to overcome the shortcomings of the credit market for needy households in the developing world. Microcredit – the lending of a small amount of money at low interest – is the main element of microfinance and likely to help promote child education in the developing world (Behrman and Rosenzweig, 2002; Maldonado and Gonzalez-Vega, 2008; Becchetti and Conzo, 2014; Mazumder and Lu, 2015). Microcredit is likely to help reduce household financial constraints on child schooling (Deloach and Lamanna, 2011). Such intended effects can be reinforced by empirical studies that found that microcredit contributes to poverty reduction (Imai, Arun, and Annim, 2010; Montgomery and Weiss, 2011; Deloach and Lamanna, 2011; Imai and Azam, 2012; Imai, Gaiha, Thapa, and Annim, 2012; Kislak, 2015; Akotey and Adjasi, 2016) and to the mitigation of households' socio-economic risk by empowering women, relaxing household credit constraints, allowing borrowers to acquire needed inputs and necessary assets, and helping households in a timely manner incur certain unforeseen spending (Kulb, Hennink, Kiiti, and Mutinda, 2015; Akotey and Adjasi, 2016). These favourable socio-economic effects suggest that microcredit is likely to indirectly promote borrowers' child schooling. Some studies, however, suggested that microcredit has unfavourable effects on child education, such as increasing child labour (Maldonado and Gonzalez-Vega,

2008; Hazarika and Sarangi, 2008) and reducing school attendance by young girls (Shimamura and Lastarria-Cornhiel, 2009). Other studies found mixed impacts but advocated the use of microcredit as a poverty alleviation strategy, arguing that it should be implemented with ‘cautious optimism’ (Banerjee, Duflo, Glennerster, and Kinnan, 2009; Karlan and Zinman, 2010; Duvendack and Palmer Jones, 2012).

In Cambodia, some empirical studies¹ found favourable socio-economic effects of microfinance, showing that MFI microloans contribute to poverty alleviation in rural localities (Teng, Prien, Mao, and Leng, 2011; Phim, 2014) and probably promote child schooling. Household borrowers, however, are likely over-indebted, epitomised by the steadily rising ratio of average outstanding loans to gross national income (GNI) per capita, particularly from 2012 to 2014, with rates higher than 100% (Seng, 2018a). The most recent studies (Bylander, 2015; Bateman, 2017; Seng, 2018a and 2018b; Green and Estes, 2018; Bylander et al., 2018) found unfavourable effects of MFI microcredit on household borrowers. Productive microloans – loans offered for income-generating activities – are likely to help reinforce positive socio-economic effects, however, particularly child-schooling effects. Regardless of the controversial conclusions of these studies, which may illustrate diverse settings because of their different methods and geographical focuses, evaluating the impacts remains one of the most powerful tools for estimating the effects of microcredit on child schooling.

Because of the conflicting and controversial conclusions about the potential effects of microcredit, specifically on child education, this study’s objective is to analyse the effects of microcredit on household expenditure on textbooks, dropping out, and child labour. Regression models with an instrumental variable (IV) procedure addressing the endogeneity of the uptake of microcredit are utilised with data from the Cambodia Socio-Economic Surveys (CSEs) conducted in 2014 and 2017. Whilst Cambodia is one of the top five economies in terms of MFI penetration (Bylander, 2015), with 13% of Cambodians taking up MFI microloans (Gonzalez, 2010),¹ little is known about the child education effects of microloans. This study contributes to the literature by describing the child-schooling effects of microcredit on household spending on textbooks, dropping out, and child labour. The study concludes that

¹ The highest MFI penetration country is Bangladesh (25%) followed by Bosnia Herzegovina (15%), Mongolia (15%), Cambodia (13%), and Nicaragua (11%) (Gonzalez, 2010).

microcredit is unlikely to increase household spending on textbooks and is liable to increase the likelihood of dropping out of school and the probability of child labour. However, borrowing to generate income is likely to reduce dropping out and child labour and to promote spending on textbooks. The likely unfavourable effects on school outcomes might explain why borrowers mostly do not use MFI credit for income generation. To encourage using MFI credit for education, policy makers should consider introducing credit to generate income.

The rest of the chapter is structured as follows. Section 2 gives a brief overview of microcredit and child schooling in Cambodia. Section 3 reviews the relevant literature. Section 4 describes the empirical framework, data, and variables used in the analysis. Section 5 describes the data and variables used in the regression analysis. Section 6 discusses the estimated results. The final section puts forward conclusions.

2. Overview of Microcredit and Child Schooling

The lending market has developed remarkably and Cambodia's human capital development is likely to improve.

2.1. Microcredit Development

Over the past 2 decades, microfinance has grown rapidly and promoted socio-economic development, helping alleviate poverty, particularly in remote communities. In the early 1990s, the sector emerged from not-for-profit microcredit projects initiated by international donors and non-governmental organisations (NGOs) to create jobs for demobilised soldiers and to fill in for the non-existent banking sector (Seng, 2018a). Microfinance has developed into more commercial and profitable models, particularly since 2000, when five major MFIs provided loans averaging US\$137 to 175,051 borrowers (Bylander, 2015). Five years later, the sector nearly doubled in size (Seng, 2018a), with 14 MFIs offering loans to about 366,000 household borrowers in 2005. By 2014, Cambodia had 39 MFIs and 6 microfinance NGOs, with 100,342 village offices operating nationwide (National Bank of Cambodia [NBC], 2014), offering loans averaging US\$1,140 (Seng, 2018a). In 2016, MFIs offered microloans to 1,921,000 household borrowers (Lam, 2017). The average individual loan increased

from KR2,762,000 (US\$691) in 2012 to KR9,579,000 (US\$2,395) in 2017 (National Institute of Statistics [NIS], 2016 and 2017).

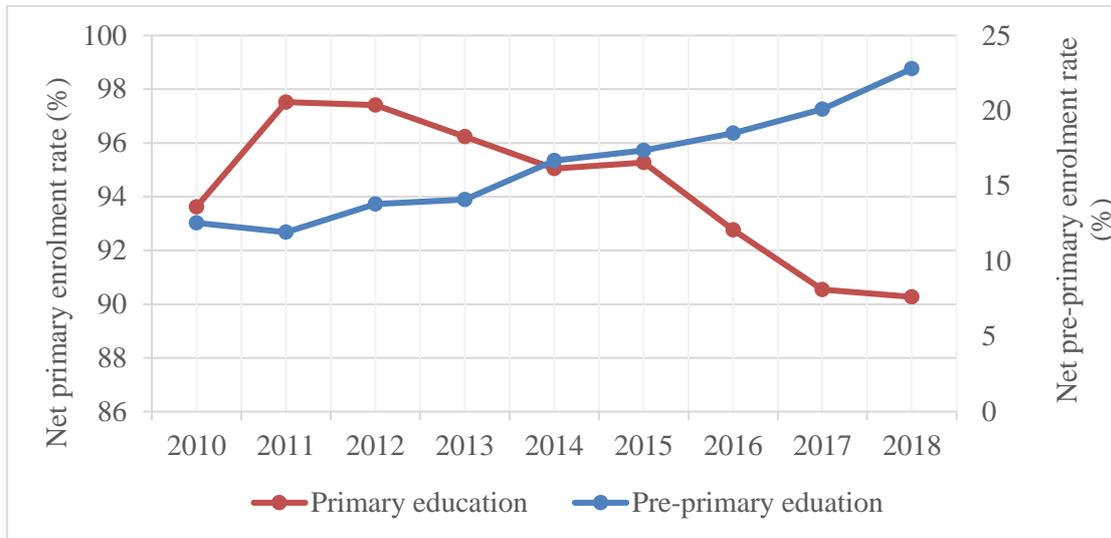
In 2018, however, the NBC shut down 32 MFIs, who requested it possibly because of the interest rate cap of 18% imposed by the NBC. Improved rural livelihoods are partly attributed to MFI loans funding the expansion of cultivated land (Eliste and Zorya, 2015). The extension of MFI services benefited 3,878,618 people, or an average of about 5 per household, easing impoverished households' access to microcredit to set up and/or expand micro-businesses (Cambodian Microfinance Association [CMA], 2018). The CMA argued that MFI credit is 'the key to breaking the poverty cycle' by empowering women household heads to run their own micro-businesses and manage cash. The CMA is optimistic that MFIs, by taking the place of informal credit providers, will free the needy from the poverty trap, particularly in rural communities.

2.2. Child Schooling

The pre-primary school enrolment rate increased from 2010 to 2018, suggesting that access to basic education had improved (Figure 1). The rate of secondary and post-secondary school attendance increased remarkably from 2004 to 2017, according to annual CSESs from 2004 to 2017, suggesting that human capital had developed. From 2011 to 2018, however, the primary school enrolment rate declined and the number of out-of-school children increased from 82,584 in 2015 to 186,109 in 2018 (UNESCO, 2020).

The 2004–2017 CSESs indicate an increasing trend of children dropping out. Dropout rates were higher during the transition to lower and upper secondary education, particularly in rural localities (USAID, 2011; MoEYS, 2018), raising concerns over human capital development.

Figure 1. Net Enrolment Rate in Pre-primary and Primary Education



Source: Author, based on UNESCO (2020).

The reasons that children dropped out of school in 2007–2017 are in Table 1. Most children who dropped out at 6–17 years of age did so because they needed to help their parents generate household income. The percentage of children citing this reason was unlikely to decrease in 2007–2017, reflecting household income poverty that was likely partly responsible for children dropping out. A number of studies showed that MFI loans, especially for needy households to improve their earnings, would help enhance child schooling.

Table 1. Reasons for Not Attending School amongst Children 6–17 Years of Age

(%)

Reason	2007	2009	2010	2012	2013	2014	2015	2016	2017
Unwilling to attend	23.0	14.4	12.5	17.8	12.7	19.0	13.8	12.7	12.0
Poor study results	7.0	12.4	15.0	8.4	7.0	10.8	4.5	7.1	9.4
No school, school is too far, no teachers	8.0	4.8	7.0	2.4	5.1	4.5	5.7	4.7	0.9
High cost of schooling	1.0	0.1	0.0	0.0	0.4	0.0	0.3	0.0	0.0
Need to help generate household income	15.0	16.2	29.5	29.1	28.8	29.1	38.4	34.7	36.6
Need to help with chores	16.0	10.7	8.5	7.8	7.4	6.3	6.9	6.3	16.7
Family is too poor	0.0	15.9	14.0	11.2	12.2	11.0	12.1	12.7	7.4
Disability (illness longer than 3 months)	5.0	4.1	3.0	3.0	3.0	2.1	4.0	3.3	4.6
Too young to attend	0.0	18.2	13.5	19.6	22.0	16.2	14.0	16.1	11.5
Other	26.0	1.6	1.0	0.6	1.4	0.9	0.4	2.4	0.9
Total	100	100	100	100	100	100	100	100	100

Source: National Institute of Statistics (NIS), 2008–2018.

3. Literature Review

Microcredit can affect child schooling through four potential channels (Maldonado and Gonzalez-Vega, 2008):

1. If households take out a loan to generate income through a project with returns above credit cost (interest rate), household income increases. Under the parental altruism assumption (Basu and Van, 1998), the increased income will likely trigger parents' decision to invest in their child's education (Becchetti and Conzo, 2014). If returns are delayed, however, income might fall and not even increase in the short run because loans need to be repaid. Parents might behave strategically by not prioritising investment of incremental income in schooling. Thus, the income effects on schooling are determined by bargaining between parents and children (Moehling, 2006).
2. If microcredit helps smooth household consumption, borrowers will likely not withdraw their children from school (Kanbur and Squire, 2001) or reduce spending on investment in them.

3. When women are empowered, they prefer, more than men do, to invest in child education (Behrman and Rosenzweig, 2002).
4. Microloans might increase the opportunity cost of sending children to school (Becchetti and Conzo, 2014). If microcredit funds income-generating projects and therefore increases parents' working hours, children might be forced, deliberately or otherwise, to do household chores. In such cases, the use of microcredit increases demand for child labour, thereby reducing child schooling or schooling performance (Becchetti and Conzo, 2014).

These possible outcomes of households' microcredit uptake suggest that the effects on child education likely vary by country and household characteristics.

Empirical studies are inconclusive: some found favourable effects of microcredit on child education, some found unwanted effects, and some found no effects. On the positive side, Maldonado and Gonzalez-Vega (2008) found that microfinance contributes to enhancing child schooling in Bolivia through effects of household income, risk management, gender, and information. Khandker (1998) found that microcredit helps increase parents' investment in child schooling, particularly for boys, in Bangladesh. In Ghana, using cross-sectional data from clients of a microfinance NGO, Sinapi Aba Trust, Adjei, Thankom, and Farhad (2009) found that participation in the programme puts clients in a better position to contribute to their child's education. In Kerala, India, Viswanath (2018) found that microcredit encouraged investment in child education. On the negative side, Wydick (1999) found that microcredit increases 'the return on child labor and thus augments the opportunity cost of schooling' in Guatemala. Augsburg, Ralph, Heike, and Costas (2015) found a lower level of schooling amongst teenagers in needy households that take up microcredit in Bosnia and Herzegovina. In Bolivia, Maldonado and Gonzalez-Vega (2008) found that farm households using microcredit are likely to involve children in activities such as taking care of siblings whilst the mothers run a new or expanded business. In rural Ethiopia, however, Tarozzi, Jaikishan, and Kristin (2015), using data from a randomised control trial to evaluate the effects of microcredit on socio-economic outcomes, suggested that child schooling was not affected.

Such inconclusive findings, together with the unwanted socio-economic effects of microcredit suggested by recent empirical studies (Bylander, 2015; Bateman, 2017; Seng, 2018a and 2018b; Green and Estes, 2018; Bylander et al., 2018), raise concerns over the effects of microcredit on child schooling in Cambodia. The current study tackles these concerns by analysing the effects of microcredit on child education outcomes measured by household spending on textbooks, dropout rates, and child labour.

4. Empirical Framework

This study estimates the effects of microcredit on household spending on textbooks, dropout, and child labour. The analysis is performed with regression models addressing the endogeneity of the household decision to take up credit from MFIs.

4.1. Modelling the Effects of Microfinance Institution Credit on Textbook Spending

Because microcredit can affect household income and spending, deciding to take up credit from a MFI is likely to affect spending on textbooks. The simplest approach to examining the effects of MFI credit is to include a dummy variable equal to 1 if the household takes up MFI credit, and zero otherwise in the textbook spending function as a regressor, and then to apply the ordinary least squares (OLS) method of estimation. A commonly used regression model in the literature on effect evaluation is as follows:

$$Y_i = \beta_1 X_i + \beta_2 I_i + v_i \quad (1)$$

where Y_i is household i 's spending on textbooks; X_i is a controlling factor expected to determine the expenditure; I_i is a dummy for the uptake of MFI microcredit; and β_1 and β_2 are the parameters to be estimated, capturing the effects of controlling factors and the effects of MFI credit uptake on textbook spending, respectively. However, the OLS procedure is likely to yield biased and inconsistent estimates of the effects because decisions to use MFI loans are potentially endogenous. IV approaches are used to address the endogeneity issue. A two-stage least squared (2SLS) approach can be adopted with appropriate instruments.

Because the decisions can be voluntarily made and might be based on individual households' self-selection, however, standard treatment-effects models can be used to account for this self-selection bias and other unobservable confounders (Seng, 2018b). The treatment-regression model is composed of an equation for the outcome Y_i (spending on textbooks) and an equation for endogenous treatment I_i , with the following specification:

$$Y_i = \beta_1 X_i + \beta_2 I_i + v_i \quad (2)$$

$$I_i = \begin{cases} 1, & \text{if } \alpha_1 Z_i + u_i > 0 \\ 0, & \text{otherwise} \end{cases} \quad (3)$$

where I_i is a binary-treatment variable that is assumed to stem from an unobservable latent variable $I_i^* = \alpha_1 Z_i + u_i$, Z_i is the covariates used to model treatment assignment, α_1 is the parameter to be estimated, and ε_i and u_i are error terms assumed to follow bivariate normal with mean zero and covariance matrix; i.e. $(v_i, u_i) \sim N(0, cov(.))$. Following Maddala (1983), β_2 is the coefficient capturing the treatment effects of MFI credit uptake on textbook spending and is estimated with a two-stage method using the earlier mentioned instruments.

4.2. Modelling the Effects of MFI Credit on Dropout and Child Labour

Because the outcome variables (a dummy for dropout and a dummy for child labour) are binary, the simplest method for examining the effects of MFI credit is to include a dummy variable for the use of MFI credit in the outcome equations as a regressor and then apply a probit model. However, a probit model cannot address the potential endogeneity of MFI credit uptake. An IV probit model can be used to address this potential endogeneity issue and formally specified as follows:

$$Y_i^* = \beta_1 X_i + \beta_2 I_i + v_i \quad (4)$$

$$I_i = \lambda_1 X_i + \lambda_2 Z_i + u_i \quad (5)$$

where I_i is the endogenous variable representing MFI credit, X_i is a vector of exogenous variables, Z_i is a vector of instruments (the amount of gifts in riel received by a household and a dummy for a household owning less than 0.5 acre of land). β_1 and β_2

are vectors of structural parameters to be estimated. Equation (5) is expressed in its reduced form, with λ_1 and λ_2 being matrices of reduced-form parameters to be estimated. The IV probit model is estimated with a maximum likelihood estimator method under the assumption that the error terms v_i and u_i are independently and identically distributed multivariate normal for all observations. Y_i^* is not observed. Instead, Y_i is observed as follows:

$$Y_i = \begin{cases} 1, & \text{if } Y_i^* \geq 0 \\ 0, & \text{if } Y_i^* < 0 \end{cases} \quad (6)$$

The IV probit model assumes, however, that the endogenous regressor is continuous (Newey, 1987). In addition to the discrete endogenous regressor (the decision to take up MFI credit), the MFI credit amount received by the borrowers is used as the endogenous regressor to evaluate the effects of MFI credit on child education outcomes.

4.3. Instruments

The possession of less than 0.5 acre of arable land, which is the eligibility requirement for MFI lending, is usually assumed to be exogenous for households' borrowing decision in the context of a static land market (Pellegrina, 2011). The inactive land market is the rationale for considering ownership of less than 0.5 acre of cultivable land an exogenous instrument for quantifying the effects of credit on household borrowers' behaviour in almost all empirical studies in South Asia (Rosenzweig, 1980; Rosenzweig and Wolpin, 1985; Binswanger and Rosenzweig, 1986; Pitt and Khandker, 1998; Pitt, 1999; Pellegrina, 2011).²

In Cambodia's MFI credit market, households owning small plots of land, especially in rural communities, usually have extremely limited access to MFI credit because MFIs enforce the 0.5-acre rule when issuing loans without guarantors. Following these studies and the practice in Cambodia, a dummy for a household owning less than 0.5 acre of cultivable land is selected as an instrument, whilst controlling for household land area in hectares and other household characteristics.

² Further discussion on de jure and de facto eligibility rules to enforce the 0.5-acre rule and on addressing concerns about land purchases by households, raised by Morduch (1998), can be found in Pitt (1999).

Pellegrina (2011) included gifts of money, goods, or estate, such as land presented by a woman to her husband in marriage, as an instrument to estimate the effects of credit on household investment in Bangladesh. Such gifts are simultaneously brought by a man to his bride in the same culture. Dowry is also commonly practiced in Cambodia. The current study considers other forms of gifts received by a spouse or household from parents or relatives. Generally, such gifts are not decided by the receivers but by their presenters; the gifts are offered as something personal and cannot be easily claimed by others (Anderson, 2007) and are infrequently sold for other spending (Pellegrina, 2011). This practice suggests that gifts are exogenous and their impacts on child schooling outcomes are unlikely to be direct. By helping facilitate household access to MFI credit, however, gifts are likely to determine household income. According to Anderson (2007), gifts such as land are often used as collateral against loans in Pakistan and India (Aleem, 1990; Bhattacharyya, 2005). Similarly, in Cambodia, especially in rural areas, gifts such as land can be used as collateral and increase household assets, helping loan applicants win the trust of MFIs, thus facilitating access to formal credit.

5. Data and Variables

This section describes the source of data and defines the main variables used in the regression analysis, and ends with a descriptive statistical analysis, including a simple statistical test of the differences in means between households that take up MFI credit and those that do not.

5.1. Data

The data from the CSESs carried out in 2014 and 2017 by the NIS are used in this study. The 2017 survey was conducted with 3,840 sampled households and the 2014 survey with a total of 12,096 households in all 25 provinces. The NIS has conducted the CSESs since 1993 and annually since 2007. The 2014 dataset is the largest CSES sample and is nationwide, whilst the 2017 CSES data are the most updated and can be used to capture the most recent development issues related to microcredit and child education. Because the study focuses on child education, however, the main sample of analysis includes only households that have children of

school age but below 18 years. To find the similarity amongst the 2014 and 2017 samples, the 2014 sample includes households based on their locations found in 2017 sample. With these adjustments, the samples in the regression analysis represent rural households because they made up 99% of the 2014 sample and 96% of the 2017 sample. Still, some observations are missing in the regression analysis because some sampled households did not offer full information on the variables of interest related to the current study. Thus, adjusting for the missing observations, the total sample counts are 2,235 households in 2014 and 1,873 in 2017 for the regression estimation.

5.2. Variables

A binary variable for the uptake of MFI loans is selected as the variable of interest (dependent variable in the selection equation, Equation [4]). Following Pellegrina (2011), the analysis is performed with the borrowed amount used as the variable capturing the effects of MFI credit on child school outcomes. In the outcome equations, annual disposable income per capita, annual total expenditure on textbooks, a dummy for dropout rates, and a dummy for child labour are used as the dependent variables. A set of independent variables included in the regression equations consist of the household head's characteristics, household characteristics, farm characteristics, household borrowing for productive activities, and a set of instrumental variables.

The household head's characteristics are age, gender, ethnicity, and education levels (Hazarika and Sarangi, 2008; Imai, Arun, and Annim, 2010; Akotey and Adjasi, 2016; Seng, 2018a and 2018b). The household heads are equally clustered into two groups according to marriage status – single or married. These characteristics are expected to affect the decisions to take up MFI credit and the outcome variables. Household characteristics include size and whether the household received remittances. The variable of family members is incorporated into the models to control for the potential effects of household size on household decisions to take up microcredit and on child schooling outcomes (Maldonado and Gonzalez-Vega, 2008). Remittances facilitate access to microcredit by helping remove household credit constraints (Akotey and Adjasi, 2016); remittances are used mostly to meet debt obligations (Bylander, 2015) and equally raise household earnings and spending. Remittances, however, can be used instead of microloans by a recipient household to incur other necessary household expenditure (Seng, 2018a). In this case, the household is likely to invest more in child education.

The potential impacts of farm characteristics are captured by the variables of household land area owned in hectares (Hazarika and Sarangi, 2008; Imai, Arun, and Annim, 2010; Akotey and Adjasi, 2016; Seng, 2018a and 2018b). There might be a concern over the endogeneity issue of land area owned by households. Yet, endogeneity is potentially low because the sampled households in this study represent those in rural communities where markets for land are underdeveloped (Azam, Imai, and Gaiha, 2012; Seng, 2018a and 2018b). Although households can put up land as collateral in applying for MFI credit, the current study finds it difficult to hypothesise about the impacts of land area on decisions to take out microcredit and on child schooling expenditure.

Following Imai and Azam (2012), the analysis controls for households' productive borrowing purpose, which is categorised into agricultural activity and non-agricultural activity. Such a borrowing purpose helps facilitate household access to MFI credit because it is related to investment to generate household income. Imai and Azam (2012) found that productive MFI credit helps increase household income in Bangladesh. Because it can contribute to household earnings, especially if the investment return can allow the borrower to make profit, productive borrowing likely promotes child schooling and reduces child labour resulting from household poverty. All these variables are summarised in Table A1.

5.3. Descriptive Statistics

The results of descriptive statistical analysis are in Table A2. They illustrate that, in 2014, about 49% of borrowers take up credit from banks or MFIs and 21% from NGOs. The loans are categorised as formal in the current study. The remaining 30% borrow from informal lenders such as relatives (12%), friends and neighbours (3.6%), moneylenders (12%), traders (2%), landlords (0.10%), employers (0.2%), and others (0.8%) to meet certain spending. In 2017, about 78.27% of borrowers took out loans from banks and MFIs and 6.15% from NGOs, whilst the remaining 15.58% borrowed from relatives (7.01%), friends and neighbours (2.10%), moneylenders (4.91%), traders (0.62%), landlords (0.16%), employers (0.23%), and others (0.55%). Borrowing from formal credit providers increased from 70.00% in 2014 to 84.42% in 2017, consistent with the decrease in informal loans from 30.00% in 2014 to 15.58% in 2017.

These trends show that MFIs aim to replace informal credit providers, which usually offer smaller loans with a shorter duration and higher interest rate. The shift in borrowing from informal lenders to MFIs proves that more household borrowers have access to credit at low interest rates and longer debt durations. MFI borrowers enjoyed lower monthly interest rates, from about 2.60% in 2014 to 1.84% in 2017, and an increase in debt duration, from about 11 months in 2014 to 12 months in 2017 (Table A3). The credit cost advantage to borrowers helps them make a larger profit margin if the MFI loans are used to generate income and, therefore, indirectly encourages household spending on child education.

On average, borrowers receive about KR10,735,000 (US\$2,684). In 2017, they received about KR17,491,437 (US\$4,373), suggesting that borrowed amounts increased remarkably.³

The significant increase in credit amount and duration offered to borrowers in 2014–2017 resulted from the increase in number of MFIs, causing the industry to become more competitive. In April 2017, the NBC imposed a ceiling interest rate of 18% per year in response to criticism and recent research findings of MFIs' failure to help reduce poverty. The result was that the monthly interest rate fell to 1.84% in 2017.

In 2014, about 40% of the households borrowing from formal institutions used microcredit to invest in agricultural and non-agricultural productive activities (Table A3). The remaining 60% took out loans for non-investment expenditures such as household consumption (29.1%); illness, injury, or accident (7.5%); rituals (2.6%); purchasing or building a dwelling (9%); durable goods (5.4%); and payment of existing debts (4.2%) (non-productive activities). In 2017, about 29% of households borrowing from formal institutions used microcredit to invest in agricultural and non-agricultural productive activities. The remaining 71% used loans for non-investment spending such as household consumption (29.6%); illness, injury, or accident (5.9%); rituals (2.2%); purchasing or building a dwelling (12.80%); durable goods (12.8%); and payment of existing debts (6.1%). These results suggest that in 2014–2017, MFI loans used for productive activities decreased (from 40% to 29%), whilst non-productive MFI credit increased remarkably, especially to finance a dwelling (from 9.0% to 12.8%), purchase durable goods (from 5.4% to 12.8%), and pay existing debts (from 4.2% to 6.1%).

³ US\$1 = KR4,000.

Table 2: Household Differences by Borrowing Status

Variables	2014					2017				
	Borrowers		Non-borrowers		Differences in Mean	Borrowers		Non-borrowers		Differences in Mean
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
H income	4,840.32	18,932.6	4,592.40	16,556.2	247.92	5,287.65	5,926.9	6,546.02	22,107	-1,258***
Textbook exp.	28,524.57	1,953.2	33,086.96	4,337.9	-4,562.39	32.04	86.33	39.01	114.42	-6.97**
School dropout	0.12	0.33	0.10	0.30	0.02**	0.36	0.48	0.28	0.45	0.09***
Child labour	0.17	0.38	0.15	0.36	0.02*	0.38	0.49	0.39	0.49	-0.01
HH's age	43.01	10.86	42.54	11.50	0.48	45.61	12.22	50.01	13.91	-4.40***
HH's gender	0.16	0.36	0.15	0.36	0.00	0.18	0.38	0.24	0.43	-0.06***
HH's ethnicity	0.99	0.11	0.94	0.23	0.04	0.97	0.16	0.97	0.18	0.00
HH's education	4.41	3.27	3.95	3.37	0.46***	6.24	3.21	7.08	3.92	-0.84***
Single	0.00	0.07	0.00	0.06	0.00	0.01	0.08	0.02	0.13	-0.01**
Married	0.88	0.32	0.87	0.34	0.01	0.82	0.39	0.77	0.42	0.05***
H size	5.64	1.76	5.54	1.74	0.10*	4.81	1.66	4.31	1.75	0.49***
Remittances	0.18	0.38	0.15	0.36	0.03**	0.47	0.50	0.46	0.50	0.00
Land	1.75	6.32	1.75	2.02	0.00	1.73	2.11	1.59	2.54	0.14
Agri. purp.	0.40	0.49	0.31	0.46	0.09***	0.15	0.36	0.03	0.17	0.12***
Non-agri. purp.	0.10	0.30	0.05	0.22	0.04***	0.13	0.33	0.02	0.14	-0.11***
Gifts	18.91	3.64	12.59	1.47	6.32**	192.25	94.73	110.16	13.88	82.09
Land < 0.5 acre	0.20	0.40	0.23	0.42	-0.03*	0.16	0.37	0.16	0.36	0.00

Agri. purp. = agricultural purpose, exp. = expenditure, H = household, HH = household head, Non-agri. purp. = non-agricultural purpose, SD = standard deviation.

Note: Household income is total annual disposable income per capita in thousand riels. Textbook expenditure is the total amount of household spending on textbooks in thousand riels. Gifts are in thousand riels.

* Test statistic significance at 10%.

*** Test statistic significance at 1%.

Source: Author, based on the Cambodia Socio-Economic Surveys, 2014 and 2017.

The summary statistics in Table 2 illustrate differences between borrowers and non-borrowers in terms of household income, school dropout rates, and child labour. In 2014, with an average household income per capita of about KR4,840,322 (US\$1,210) per year, borrowers' income was not significantly higher than non-borrowers', averaging KR4,592,399 (US\$1,148) per year. With average textbook expenditure of about KR28,525 (US\$7) per year, borrowers' textbook spending is not significantly lower than non-borrowers', averaging KR33,087 (US\$8) per year. About 14% of children in borrowing households dropped out of school, compared with about 10% in non-borrowing households. Borrowers' child labour was about 17%, significantly higher than non-borrowers', averaging 15%.

In 2017, borrowers had with an average household income per capita of about KR5,287,650 (US\$1,322) per year, significantly lower than that of non-borrowers, which averaged KR6,546,020 (US\$1,636) per year. Borrowers' average textbook spending of KR32,040 (US\$8) per year was significantly lower than non-borrowers' of KR39,010 (US\$10). About 36% of children in borrowing households dropped out of school, compared with 28% in non-borrowing households. Borrowers' child labour is about 38%, which is not significantly lower than non-borrowers', which averages about 39%. Further details on the differences in mean between borrowers and non-borrowers in terms of other variables are in Table 1.

These results, however, do not necessarily show that using microcredit increases and/or decreases per capita household income, textbook spending, dropout rates, and/or child labour due to issues such as the endogeneity of the decision to take up credit, which results from selection bias and household heterogeneity (Seng, 2018a).

6. Econometric Results and Discussion

The descriptive statistical analysis suggests significant differences in household income per capita, textbook expenditure, and dropout rate between borrowers and non-borrowers in 2014 and 2017, but not in child labour. Econometric analysis is conducted to quantify the effects of microcredit on outcome variables.

6.1. Determinants of Microfinance Institution Credit Uptake

Table 3 reports the results of the probit model, describing the decision to use MFI credit, and the results of the OLS model for the borrowed amount. The results suggest that the life-cycle effects of household head on the probability of taking up MFI credit are quadratic, confirmed by the significantly positive coefficient of age and the significantly negative coefficient of age-squared term for the 2017 sample. As found by Seng (2018a and 2018b), the likelihood of using MFI credit increases but starts to decrease by degree after the household head turns 30 in 2017. As household heads get older, they gain more experience and economic opportunities and become eager to take out MFI loans, but start to lose opportunities after reaching 30 and are less keen to use credit (Seng, 2018a and 2018b).

Table 3. Determinants of Microfinance Institution Credit Uptake

Variables	MFI Credit Uptake (probit)				Borrowed Amount (OLS)			
	2014		2017		2014		2017	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
HH's age	3.89	0.13	6.11**	0.02	1.19	0.58	15.11**	0.02
HH's age squared	-0.50	0.15	-0.91**	0.01	-0.15	0.60	-2.30**	0.01
HH's gender	0.15	0.21	-0.16	0.27	-0.06	0.59	0.12	0.74
HH's ethnicity	0.86***	0.00	-0.38	0.13	0.49***	0.00	0.52	0.41
HH's education	0.02**	0.01	-0.03***	0.00	0.05***	0.00	0.00	0.97
Single	0.41	0.39	-1.15***	0.00	0.59	0.22	2.09***	0.00
Married	0.19	0.15	-0.28*	0.07	0.06	0.63	-0.36	0.34
H size	0.02	0.21	0.09	0.00	0.04**	0.01	0.34***	0.00
Remittances	0.10	0.19	0.07	0.29	-0.12	0.10	0.18	0.31
Land	-0.11***	0.00	-0.04	0.25	0.12***	0.00	-0.11	0.21
Land squared	0.01**	0.02	-0.02	0.34	0.001***	0.00	-0.04	0.35
Agri. purpose	0.35***	0.00	0.98***	0.00	0.14**	0.01	5.67***	0.00
Non-agri. purpose	0.53***	0.00	1.17	0.00	0.73***	0.00	5.91***	0.00
Gifts	0.001**	0.04	0.001	0.21	0.002	0.48	0.001	0.35
Land area < 0.5 acre	-0.06	0.41	-0.28***	0.00	-0.13**	0.04	1.03***	0.00
Constant	-8.84*	0.06	-10.40**	0.04	3.33	0.40	-22.51*	0.07
Observations	2235		1873		2235		1873	
R-squared					0.11		0.27	
Pseudo R ²	0.04		0.12					
Log likelihood	-1488.86		-907.58					

Agri. purpose = agricultural purpose, H = household, HH = household head, Non-agri. purpose. = non-agricultural purpose, OLS = ordinary least squares.

Note: The dependent variables are the dummy for the uptake of MFI credit and the natural log of borrowed amount in riel. Joint significance tests of instruments (the coefficients of gifts and land area less than 0.5 acre are equal to zero) are significant, with $\chi^2 = 5.06$ (P - value = 0.07) and $\chi^2 = 16.10$ (P - value = 0.00) for MFI credit uptake (probit) in 2014 at 10% and in 2017 at 1%, and with $F = 2.40$ (P - value = 0.09) and $F = 17.11$ (P - value = 0.00) for borrowed amount (OLS) in 2014 at 10% and in 2017 at 1%.

* Test statistic significance at 10%.

** Test statistic significance at 5%.

*** Test statistic significance at 1%.

The results illustrate that larger households are likely to be induced to borrow and to borrow larger amounts. As expected, the coefficients on MFI credit used for productive purpose are significantly positive for the decision to use credit and the credit amount in 2014 and 2017. This fact suggests that borrowing for productive purpose induces households to take up MFI credit and increase the borrowed amount, and explains why productive borrowing helps facilitate household access to MFI credit and larger credit amounts. These results are consistent with the findings of Imai and Azam (2012). Households possessing larger lots of land were likely to be encouraged to borrow from MFIs in 2014. Consistent with Pellegrina (2011), the testing results of joint significance of instruments show that the instruments (the dummy for 0.5-acre land ownership and the gifts received by a spouse or household) jointly determine household decisions to take up MFI credit and the borrowed amount in 2014 and 2017. Households owning less than 0.5 acre of cultivable land are likely to be discouraged from using MFI credit. This result confirms the 0.5-acre land ownership arguments in previous studies (Rosenzweig, 1980; Rosenzweig and Wolpin, 1985; Binswanger and Rosenzweig, 1986; Pitt and Khandker, 1998; Pitt, 1999; Pellegrina, 2011), indicating that the instruments can be considered valid in the current study.

6.2. Effects of Microfinance Institution Credit on Textbook Spending

Table 4 presents the 2SLS and treatment-effects results of textbook expenditure. Consistent with the OLS results in Table A4, the results suggest non-significant effects of MFI credit on textbook spending in 2014. Consistent with the 2SLS results in 2017, however, the results from the treatment-effects model controlling for the endogeneity of the decision to use MFI credit, which resulted from selection bias, demonstrate the significantly negative effects of MFI credit uptake. The significant lambda at 1% suggests that treatment-effects results are more reliable than 2SLS results and can show that MFI credit does not promote textbook spending. 2SLS and treatment-effects results in Table A5 show that MFI credit is likely to decrease borrowers' income per capita in 2017, confirming recent findings (Bylander, 2015; Bateman, 2017; Seng, 2018a and 2018b; Green and Estes, 2018; Bylander et al., 2018). These unwanted effects on household income per capita might help reduce textbook spending.

Table 4. Determinants of Textbook Spending

Variables	2SLS				Treatment			
	2014		2017		2014		2017	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
MFI credit					-2.59	0.27	-8.89***	0.00
MFI amount	1.83	0.30	-1.25***	0.00				
HH's age	63.78***	0.00	109.4***	0.00	69.85***	0.00	98.26***	0.00
HH's age squared	-8.34***	0.00	-15.11***	0.00	-9.12***	0.00	-13.49***	0.00
HH's gender	0.50	0.24	0.56	0.41	0.52	0.16	0.12	0.84
HH's ethnicity	0.90	0.38	-0.61	0.49	2.51***	0.00	-2.32*	0.05
HH's education	0.10	0.32	0.18***	0.00	0.22***	0.00	0.09**	0.02
Single	-1.25	0.61	-2.95*	0.06	0.24	0.86	-2.09	0.17
Married	-0.14	0.77	-0.70	0.33	0.15	0.72	-0.72	0.24
H size	0.30*	0.09	1.42	0.14	0.40*	0.05	1.22	0.10
Remittances	-0.19	0.52	0.35	0.25	-0.28	0.24	0.31	0.25
Land	-0.24	0.27	0.24	0.12	-0.07	0.28	0.26*	0.06
Land squared	0.001	0.26	-0.02	0.82	0.0004	0.24	-0.01	0.89
Agri. purpose	-0.08	0.80	6.82***	0.00	0.52	0.14	2.76***	0.00
Non-agri. purpose	-1.63	0.23	8.07***	0.00	0.27	0.64	4.32***	0.00
lambda					1.13	0.26	5.21***	0.00
Constant	-128***	0.00	-193***	0.00	-129.5***	0.00	-172.7***	0.00
Observations	2,235		1,873		2,235		1,873	
Adj. R-squared	0.10		0.26					

Agri. purpose = agricultural purpose, H = household, HH = household head, Non-agri. purpose = non-agricultural purpose, 2SLS = two-stage least squares.

Note: The dependent variable is the natural log of annual household expenditure on textbooks. 2SLS results are estimated with the natural log of gift amount and a dummy for land area less than 0.5 acre serving as instruments. The treatment-effects results are estimated using a two-stage method and the same instruments for the uptake of MFI credit.

*** Test statistic significance at 1%.

2SLS and treatment-effects results consistently showed a significantly positive coefficient of household head's education level in 2014 and 2017, suggesting that the higher the education level, the higher the spending on textbooks. 2SLS and treatment-effects results indicate that borrowing to generate income was likely to increase household spending on textbooks in 2017, showing that household income is important to spending.

6.3. Effects of Microfinance Institution Credit on School Dropout and Child Labour

Table 5 shows the IV probit results of the effects of MFI credit uptake on school dropout and child labour in 2014 and 2017, with the Wald test of exogeneity confirming that the uptake of MFI credit is not exogenous. The IV probit results suggest that the uptake of MFI credit is likely to increase the likelihood of a child dropping out and the probability of child labour in 2014 and 2017, consistent with the findings of Shimamura and Lastarria-Cornhiel (2009). The significantly negative coefficients of the household head's education level for school dropout and child labour in 2014 suggest that the higher the education level, the lower the probability of a child dropping out and child labour. These findings reveal that the household head's or parents' education is important in promoting school attendance and reducing child labour.

Table 5. Effects of Microfinance Institution Credit on School Dropout and Child Labour (instrumental variable probit model)

Variables	School Dropout				Child Labour			
	2014		2017		2014		2017	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
MFI credit	1.95***	0.00	1.95***	0.00	1.79***	0.00	1.80***	0.00
HH's age	6.26	0.37	14.24**	0.05	5.14	0.36	-2.88	0.16
HH's age squared	-0.82	0.36	-1.83*	0.06	-0.69	0.35	0.45	0.10
HH's gender	-0.13	0.23	-0.02	0.88	-0.10	0.35	0.04	0.71
HH's ethnicity	-0.39*	0.06	0.42	0.23	-0.33	0.19	0.00	0.99
HH's education	-0.03***	0.00	-0.01	0.42	-0.04***	0.00	0.01	0.11
Single	0.23	0.68			0.42	0.49	0.45	0.12
Married	-0.19	0.12	-0.03	0.89	-0.20	0.11	0.12	0.31
H size	0.03	0.39	0.04	0.35	0.06	0.24	0.02	0.55
Remittances	-0.05	0.43	0.01	0.89	0.02	0.81	-0.04	0.46
Land	0.03**	0.03	0.02	0.62	0.02	0.25	0.03	0.30
Land squared	0.001**	0.04	-0.01	0.79	-0.0001	0.28	0.00	0.97
Agri. purpose	-0.28	0.00	-0.57**	0.01	-0.21***	0.00	-0.63***	0.00
Non-agri. purpose	-0.32**	0.01	-1.00***	0.00	-0.29*	0.06	-0.76***	0.00
Constant	-12.78	0.35	-29.48**	0.04	-10.55	0.34	3.71	0.33
Observations	2,235		1,856		2,235		1,873	
Wald test of exog.	$\chi^2 = 5.24$	0.02	$\chi^2 = 4.54$	0.03	$\chi^2 = 3.22$	0.07	$\chi^2 = 9.77$	0.00
Log likelihood	-2,265.35		-1,387.38			-2,478.93		-2,168.94

Agri. purpose = agricultural purpose, exog. = exogeneity, H = household, HH = household head, Non-agri. purpose = non-agricultural purpose.

Note: The dependent variables are the dummy for school dropout rates (for children under 18 years of age) and the dummy for child labour (5–15 years of age). IV probit results are estimated with the natural log of gift amount and a dummy for land area less than 0.5 acre serving as instruments.

* Test statistic significance at 10%.

** Test statistic significance at 5%.

*** Test statistic significance at 1%.

Household borrowing to generate income was liable to reduce the likelihood of a child dropping out in 2014 and 2017, evidenced by the significantly negative coefficients of borrowing for agricultural and non-agricultural purposes. The results reveal that MFI credit for income-generating activities is more likely to promote child education by reducing dropout rates and child labour. These outcomes are reinforced by the results in Table A5, which show that MFI credit to generate income from agricultural and non-agricultural activities is likely to help raise household income per capita. The results illustrate that productive credit helps enhance child education by increasing household earnings.

Table 6. Effects of Credit Amount on Child School Dropout and Child Labour (instrumental variable probit model)

Variables	School Dropout				Child Labour			
	2014		2017		2014		2017	
	Coef.	<i>P</i> -value						
MFI amount	0.71***	0.00	0.15**	0.01	0.66**	0.03	0.16***	0.00
HH's age	12.21	0.14	17.82**	0.01	7.60	0.35	-3.38	0.12
HH's age squared	-1.59	0.14	-2.30**	0.01	-1.01	0.35	0.52*	0.07
HH's gender	0.01	0.91	-0.12	0.52	0.04	0.75	-0.04	0.75
HH's ethnicity	-0.11	0.66	0.15	0.70	-0.13	0.69	-0.34	0.15
HH's education	-0.05***	0.00	-0.04**	0.01	-0.07***	0.00	0.00	0.71
Single	0.35	0.60			0.37	0.69	0.46	0.14
Married	-0.14	0.31	-0.10	0.61	-0.14	0.33	0.08	0.52
H size	0.05	0.38	0.06	0.21	0.06	0.53	0.02	0.46
Remittances	0.11	0.11	0.03	0.69	0.13*	0.07	-0.03	0.55
Land	-0.10***	0.00	0.01	0.84	-0.10***	0.00	0.02	0.40
Land squared	0.004***	0.00	-0.01	0.57	0.0004**	0.03	0.003	0.79
Agri. purpose	-0.14**	0.02	-0.74**	0.04	-0.07	0.39	-0.91***	0.00
Non-agri. purpose	-0.41**	0.04	-1.16***	0.00	-0.42	0.18	-0.96***	0.00
Constant	-28.53*	0.07	-36.06***	0.00	-19.03	0.19	4.87	0.23
Observations	2,235		1,856		2,235		1,873	
Wald test of exog.	$\chi^2 = 3.68$	0.06	$\chi^2 = 4.62$	0.03	$\chi^2 = 1.15$	0.28	$\chi^2 = 10.0$	0.00
Log likelihood	-4,306.03		-5,554.56		-4,519.95		-6,376.79	

Agri. purpose = agricultural purpose, exog. = exogeneity, H = household, HH = household head, Non-agri. purpose = non-agricultural purpose.

Note: The dependent variables are the dummy for school dropout rates (for children under 18 years of age) and the dummy for child labour (5–15 years of age). IV probit results are estimated with the natural log of gift amount and a dummy for land area less than 0.5 acre serving as instruments.

* Test statistic significance at 10%.

** Test statistic significance at 5%.

*** Test statistic significance at 1%.

The IV probit model estimation was conducted using the MFI credit amount offered to the borrowers as the endogenous regressor instead of the dummy for the decision to take up MFI loans. Table 6 illustrates that the credit amount was liable to increase the likelihood of a child dropping out and the probability of child labour in 2014 and 2017, whilst the MFI loans for income-generating purposes significantly contributed to enhancing child education. The unfavourable effects on school dropout rates and child labour reveal that children drop out probably because they are forced to work (labouring in a private company or on a farm, grinding grain, making palm sugar, caring for animals, weaving, amongst others) to help generate household earnings. These results are consistent with the estimated results in Table 5 and confirm previous findings (Maldonado and González-Vega, 2008; Hazarika and Sarangi, 2008; Shimamura and Lastarria-Cornhiel, 2009).

The fact that MFI credit contributes little to child education might be attributed to its income-reducing effects. This mechanism is consistent with the arguments by Moehling (2006) and Becchetti and Conzo (2014) that credit unfavourably affects child schooling if it reduces borrowers' income. The income-reducing effects can be explained by the fact that most MFI loans are not used for productive activities but for non-productive expenditures such as household consumption, dwellings or buildings, durable goods, and payment of existing debts, epitomised by the descriptive statistics in Table A3. The results show that MFI credit oriented to income-generating activities would help promote child education and reduce child labour.

7. Conclusion

The conflicting and controversial conclusions about the socio-economic effects of MFI loans raise concerns about the consequences for child schooling. To provide evidence on the effects of MFI credit, this chapter quantifies the potential effects on textbook spending, dropout rates, and child labour. The analysis employs econometric approaches to tackle the endogeneity of household decisions to take up MFI credit, utilising data from the 2014 and 2017 CSEs. The results suggest that MFI loans are unlikely to increase textbook spending, reduce the probability of a child dropping out, and reduce the likelihood of child labour, whilst borrowing for productive purpose is

likely to reduce the probability of a child dropping out and child labour, and to promote household spending on textbooks. The likely unfavourable effects on child schooling outcomes might explain why borrowers use MFI credit for non-productive activities and not to generate income. These results provide insights into how the expansion of microcredit affects child education and underscores the need to reconsider microcredit as a strategy to indirectly enhance child education.

Policy should focus on credit for income-generating activities (productive credit), coupled with financial literacy training for household heads so that MFI loans can produce more favourable effects on household income and child education. Income-generating credit costs should be reduced by lowering loan transaction costs. Mobility technology can help reduce MFIs' transaction and administrative expenses (Shankar, 2007; Vong and Song, 2014) and loan interest rates. The lack of transparency distorts the price of MFI credit, and borrowers, especially those with limited knowledge, are usually not aware of all the charges imposed on them or of the overall costs of microcredit. Thus, MFIs should be more transparent in terms of credit costs to borrowers. Alternatively, policy makers should consider an appropriate interest rate cap temporally applied to income-generating loans, with a specific basis on which to compute the cap. Because individuals need financial skills and knowledge to make informed financial decisions, the government should consider a range of programmes such as money management to improve financial literacy, especially in rural localities. Such a programme can promote productive borrowing.

The study's data have limitations because the panel data cannot be constructed, and the data used in the analysis are not ideal for estimating effects. The study can be improved with accurate data and the appropriate approach and instruments to deal with issues of endogeneity in MFI credit uptake when quantifying treatment effects. This goal is left for future studies that have better data.

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Appendix

Table A1. Summary of Variables Used in the Study

Variables	Definition
<i>Dependent</i>	
Household income	Natural log of annual household disposable income per capita
Child textbook spending	Natural log of annual household expenditure on textbooks in riel
Child school dropout	=1 if at least one child below 18 years of age has dropped out of school because he or she must help generate household income or help with household chores
Child labour	=1 if at least one child 5–15 years of age is forced to work during the past 7 days (labouring in a private company or on a farm, grinding grain, making palm sugar, caring for animals, weaving, amongst others)
MFI credit	=1 if the household takes up microcredit from formal financial institutions such as microfinance institutions and non-governmental organisations
Borrowed amount	Natural log of borrowed amount in riel
<i>Independent</i>	
HH's age	Natural log of HH's age
HH's gender	=1 if the household is headed by woman
HH's ethnicity	=1 if the HH is Khmer
HH's education	HH's years of school completed
Single	=1 if the HH is single
Married	=1 if the HH is married
H size	Total household members
Remittances	=1 if the household receives remittances
Land	Natural log of land area in hectares possessed by the household
Agricultural purpose	=1 if the household uses credit for agricultural purpose
Non-agricultural purpose	=1 if the household uses credit for other income-generating activities than agriculture
Gifts	Natural log of amount of money, goods, or estate (estimated in riel) received by the spouse or household
Land area < 0.5 acre	=1 if the household possesses less than 0.5 acre of arable land area

H = household, HH = household head, MFI = microfinance institution.

Table A2: Types of Lenders

(%)

Lenders	2014	2017
Banks and microfinance institutions	48.8	78.27
Non-governmental organizations	21.1	6.15
Relatives	11.7	7.01
Friends and/or neighbours	3.6	2.10
Moneylenders	12.1	4.91
Traders	1.7	0.62
Landlords	0.1	0.16
Employers	0.2	0.23
Others	0.8	0.55
Total	100	100

Source: Author, based on the Cambodia Socio-Economic Surveys, 2014 and 2017.

Table A3. Credit and Households' Borrowing Purpose

	Microfinance Institution Credit	
	2014	2017
<i>Loans</i>		
Borrowed amount (riel)	10,735,000.00	17,491,436.92
Outstanding loans (riel)	4,184,000.00	11,068,036.05
Monthly interest rate (%)	2.60	1.84
Duration (months)	10.7	11.67
<i>Purpose (%)</i>		
Agricultural activities	27.1	17.90
Non-agricultural activities	13.3	11.10
Household consumption	29.10	29.60
Illness, injury, accident, amongst others	7.50	5.90
Other urgencies	0.1	0.0001
Rituals (marriage, funeral, amongst others)	2.60	2.20
Purchasing or building a dwelling	9.00	12.80
Purchasing durable goods	5.40	12.80
Servicing existing debts	4.20	6.10
Others	0.70	1.40

Source: Author, based on Cambodia Socio-Economic Surveys, 2014 and 2017.

Table A4. Effects of Microfinance Institution Credit on Child Textbook Spending

(ordinary least squares)

Variables	2014		2017		2014		2017	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
MFI credit	0.09	0.54	0.02	0.93				
MFI amount					0.16**	0.01	0.001	0.96
HH's age	66.17***	0.00	85.84***	0.00	66.08***	0.00	85.84***	0.00
HH's age squared	-8.65***	0.00	-11.6***	0.00	-8.64***	0.00	-11.6***	0.00
HH's gender	0.38	0.25	0.43	0.35	0.39	0.23	0.43	0.35
HH's ethnicity	1.76***	0.00	-1.29	0.14	1.71***	0.00	-1.30	0.14
HH's education	0.20***	0.00	0.15***	0.00	0.19***	0.00	0.15***	0.00
Single	-0.16	0.90	-0.45	0.69	-0.24	0.84	-0.45	0.69
Married	-0.02	0.95	-0.19	0.68	-0.03	0.94	-0.19	0.68
H size	0.38***	0.00	1.01***	0.00	0.37***	0.00	1.01***	0.00
Remittances	-0.39*	0.06	0.14	0.51	-0.37*	0.07	0.14	0.51
Land	-0.02	0.69	0.37***	0.00	-0.04	0.37	0.37***	0.00
Land squared	0.0001	0.59	0.04	0.45	0.0002	0.32	0.04	0.45
Agri. purpose	0.17	0.29	-0.17	0.64	0.16	0.32	-0.17	0.66
Non-agri. purpose	-0.28	0.34	0.75	0.17	-0.38	0.20	0.75	0.18
Constant	-							
	122.4***	0.00	-155***	0.00	-123.1***	0.00	-155***	0.00
Observations	2,235		1,873		2,235		1,873	
Adj. R-squared	0.14		0.25		0.15		0.25	

Agri. purpose = agricultural purpose, H = household, HH = household head, Non-agri. purpose = non-agricultural purpose.

Note: The dependent variable is the natural log of annual household expenditure on child textbooks.

* Test statistic significance at 10%.

** Test statistic significance at 5%.

*** Test statistic significance at 1%.

Table A5. Effects of Microfinance Institution Credit on Per Capita Income

Variables	2SLS				Treatment			
	2014		2017		2014		2017	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
MFI credit					0.64	0.55	-4.90***	0.00
MFI amount	2.00**	0.04	-0.63***	0.00				
HH's age	15.76**	0.01	69.46***	0.00	17.28***	0.00	64.44***	0.00
HH's age squared	-1.96**	0.02	-9.54***	0.00	-2.18***	0.00	-8.81***	0.00
HH's gender	0.42	0.14	0.34	0.39	0.19	0.22	0.10	0.78
HH's ethnicity	-1.27**	0.01	-0.52	0.50	-0.75**	0.03	-1.43**	0.05
HH's education	-0.01	0.82	0.14***	0.00	0.09***	0.00	0.09***	0.00
Single	0.70	0.68	-1.82	0.08	2.22**	0.02	-1.46	0.12
Married	0.08	0.81	-0.35	0.39	0.16	0.39	-0.39	0.31
H size	0.04	0.44	0.88***	0.00	0.11***	0.00	0.79***	0.00
Remittances	0.16	0.36	0.18	0.33	0.01	0.92	0.16	0.34
Land	-0.25*	0.07	0.18**	0.05	0.04	0.22	0.19**	0.03
Land squared	0.001*	0.07	-0.01	0.76	0.0002	0.23	-0.01	0.78
Agri. purpose	-0.25	0.16	3.44***	0.00	-0.09	0.59	1.54**	0.01
Non-agri. purpose	-1.22	0.10	4.24***	0.00	0.06	0.81	2.53***	0.00
lambda					-0.39	0.56	2.87***	0.00
Constant	-	0.00	-123.4**	0.00	-27.9***	0.00	-	0.00
	36.21***						114.2***	
Observations	1,916		1,873		1,916		1,873	
Adj. R-squared	0.10		0.26					

Agri. purpose = agricultural purpose, H = household, HH = household head, non-agri. purpose = Non-agricultural purpose, 2SLS = two-stage least squares.

Note: The dependent variable is the natural log of annual per capita income. The treatment-effects results are estimated using a two-stage method and the same instruments for the uptake of MFI credit, with the natural log of gift amount and a dummy for land area less than 0.5 acre serving as instruments, which are also used as instruments for the 2SLS estimation.

* Test statistic significance at 10%.

** Test statistic significance at 5%.

*** Test statistic significance at 1%.

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