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ABSTRACT *This article analyses the effects of financial inclusion on poverty in terms of household income per capita in Cambodia, with data from the FinScope Survey carried out in 2015. The analysis describes the effects via financial literacy, accounting for endogenous selection bias resulting from unobserved confounders and for structural differences between users and non-users of financial services in terms of income functions. The findings suggest that the use of financial services is very likely to make a great contribution to reducing household budget deficit and poverty if the users, female in particular, have at least basic financial knowledge.*

Keywords: Poverty, financial inclusion, financial literacy, endogenous, Cambodia

Introduction

Financial inclusion, defined as access to and use of financial services offered by financial institutions, is a main goal of economic development via financial development and accordingly has been argued to serve as a key policy tool for achieving the Sustainable Development Goals (SDGs) (Klapper, El-Zoghbi, & Hess, 2016). The wanted effects of financial deepening on economic growth, income inequality and poverty alleviation has been evidenced in many studies (Levine, Loayza, & Beck, 2000; Beck, Demirguc-Kunt, & Peria, 2007). Nonetheless, less evidence has been provided on the effects of financial inclusion on inclusive growth and poverty, but the previous evidence points into this direction (Demirguc-Kunt, Klapper, & Singer, 2017). For example, financial inclusion has been found to reduce rural poverty (Burgess & Pande, 2005; Swamy, 2014), create jobs (Bruhn & Love, 2014), increase expenditures (Dupas & Robinson, 2013) and savings (Brune, Giné, Goldberg, & Yang, 2016). Access to such financial services as microcredit can help minimise households' socio-economic risk through empowering women, relaxing credit constraints, acquiring needed inputs and necessary assets, and helping them in a timely manner to incur certain unexpected expenditure (Kulb, Hennink, Kiiti, & Mutinda, 2015; Akotey & Adjasi, 2016). Furthermore, it allows the poor to take control of their lives and avoid less desirable factory jobs and insecure wage labour (Bornstein, 1996), by bankrolling microbusinesses, raising household income and smoothing household consumption (Seng, 2018b). Such a pro-poor mission is underpinned by the success of Yunus's Grameen Bank in Bangladesh. These findings provide evidence that financial inclusion can produce welfare-

enhancing effects, extending beyond its benefits in the financial realm to the economy (Grohmann, Klühs, & Menkhoff, 2018).

Although financial inclusion is likely beneficial to economic development, poverty alleviation in particular, there are three strands of literature with controversial conclusion. On the positive side, financial inclusion, through microcredit for needy households, is likely to contribute to fighting poverty (see, for example, Karlan & Zinman, 2010; Imai, Arun & Annim, 2010; Imai & Azam, 2012; Asad, Issam, & Imai, 2014; Rahman, Luo & Minjuan, 2014; Kulb, Hennink, Kiiti & Mutinda, 2015; Akotey & Adjasi, 2016). On the negative side, microcredit offered by microfinance institutions (MFIs) is likely to trap needy borrowers into a vicious cycle of poverty and has even weakened rather than empowered women (see, for example, Maldonado & González-Vega, 2008; Bateman, 2010; Schicks, 2013; Ganle, Afriyie & Segbefia, 2015; Seng, 2018a & 2018b). In between, some studies have seemingly cautioned against the pro-poor effects of financial inclusion and have argued that financial services, especially credit, should be used with 'cautious optimism' (see, for example, Bello, 2006; Banerjee et al., 2009; Duvendack & Palmer, 2012).

The empirical evidence on the wanted effects of financial development on needy households has drawn recent studies' attention to the determinants of financial inclusion (see, for example, Zins & Weill, 2016; Ouma, Odongo, & Were, 2017; Ghosh & Vinod, 2017; Masino & Niño-Zarazúa, 2018; Grohmann et al., 2018). Interestingly, Ghosh and Vinod (2017) and Grohmann et al. (2018) provided evidence that financial literacy has main roles to play in promoting financial inclusion. Nonetheless, the most recent evidence on the unwanted socio-economic effects of financial services is still questioning the pro-poor effects of financial development, in Cambodia in particular (see, for example, Bylander, 2015; Bateman, 2017; Seng, 2018a & 2018b). Yet, these studies do not account for financial literacy in their empirical model analysis, while attributing the undesirable effects to borrowers' limited financial literacy in their result discussion. In particular, Seng (2018a and 2018b) argued that the borrowers' limited financial knowledge is very likely to constrain the pro-poor development of microfinance in Cambodia. These studies make room for further studies on the poverty-reducing effects of financial development, a priori revealing that financial literacy is very likely to promote pro-poor financial inclusion in developing countries such as Cambodia.

To bridge this study gap, the basic objective of the current study is to analyse the effects of financial inclusion on poverty in terms of household income per capita, taking the financial literacy into account. To accomplish this objective, the analysis is conducted with an endogenous switching (ES) model by households' financial literacy status, using data from the global FinsSope survey on Cambodia conducted in 2015. The ES model addresses the endogeneity of the use of financial services, accounting not only for endogenous selection bias arising from unobserved factors determining both the decisions to use financial services and household income per capita but also for the inherent differences between the users and non-users in terms of income functions. A complementary analysis are also carried to further investigate the effects on household budget deficit with an endogenous switching probit (ESP) model. The study concludes that the use of financial services is very likely to make a great contribution to reducing

household budget deficit and income poverty if the users have at least basic financial knowledge. Although over these two decades Cambodia's financial sector has remarkably developed[1], with arguments that it has made a tremendous contribution to economic growth and household welfare enhancement, the empirical evidence is still limited. In addition, this study contributes to the literature by quantifying the pro-poor effects of financial inclusion controlling for financial literacy and addressing endogeneity and other estimation issues.

The remainder of the study is structured as follows. Section 2 reviews relevant literature. Section 3 describes the analytical framework. Section 4 reports data and descriptive analysis. Section 5 presents the estimated results, and the final section concludes the study.

Literature Review

The positive effect of finance on poverty reduction has been documented at both the macro and micro level. A number of studies (see, for example, Deininger & Squire, 1998; White & Anderson, 2001; Ravallion, 2001; Dollar & Kraay, 2002; Bourguignon, 2003) found that economies with higher levels of financial development achieve faster poverty alleviation. Limited access to financial services can plunge many people in poverty trap (Galor & Zeira, 1993; Banerjee & Newman, 1994; Aghion & Bolton, 1997; Beck, Demirguc-Kunt, & Peria, 2007). Such financial services as saving accounts, for example, allowing individuals to have access to formal saving instruments, can augment a country's net savings (Aportela, 1999; Ashraf, Gons, Karlan, & Yin, 2010). Although there are data limitations at the micro levels and methodological challenges, for instance, in addressing sample selection bias related to the use of financial services or controlling for unobservable confounders regarding financial service users' characteristics, there are various studies on quantifying the effects of financial inclusion in terms of access to microcredit on poverty alleviation.

However, empirical studies at the micro levels produced inconclusive results with very controversial conclusions on the socio-economic effects of financial inclusion in terms of access to microloans, with some confirming poverty-reducing effects (see, for example, Karlan & Zinman, 2010; Imai, Arun & Annim, 2010; Imai & Azam, 2012; Asad, Issam, & Imai, 2014; Rahman, Luo & Minjuan, 2014; Kulb, Hennink, Kiiti & Mutinda, 2015; Akotey & Adjasi, 2016), and others showing less beneficial effects (see, for example, Maldonado & González-Vega, 2008; Bateman, 2010; Schicks, 2013; Ganle, Afriyie & Segbefia, 2015; Seng, 2018a & 2018b). In between, some studies provided the mixed effects on poverty reduction, in northeast Thailand the affluent borrowers, in particular the members of village committee, are very likely to gain welfare benefits from microcredit outreach, while the rank-and-file members' benefits are unlikely (Coleman, 2006). Other mixed effects are also found in the Philippines (Kondo, Orbeta, Dingcong, & Infantado, 2008) in Ghana (Ganle et al., 2015).

Alam (2012) analysed the impacts of gender-based returns to credit on intra-household resource allocation in rural Bangladesh by dealing with endogeneity of the microcredit use with an instrumental variable (IV) method. The findings illustrate that female borrowers are better able to allocate household earnings more efficiently, indicating that the MFI microcredit empowers

women. Imai and Azam (2012) and Asad et al. (2015) used a propensity score matching (PSM) approach to quantify the poverty-reducing effects of MFI credit at the household level in Bangladesh and in Pakistan, respectively, with the results confirming the pro-poor effects. Rahman et al. (2014) analysed the welfare-enhancing effects of microloans on households by adopting a difference-in-difference (DID) approach with the collected data from the Shaanxi province of China. Their findings illustrate the wanted effects. Swamy (2014) examined the economic effects of financial inclusion on poor households by gender in India by using the difference-indifference (DID) estimator method with panel ordinary least squares (OLS) and generalized methods of moments (GMM) with standard errors for a robust analysis. The findings suggest that financial inclusion reduces poverty in terms of household income per capita, with the income-increasing effects on women being significantly higher than those on men. However, the PSM approach cannot control for such unobservable characteristics as borrowers' wealth, entrepreneurial skills, motivation, and so forth that potentially determine both the use of credit and the outcome variables (Seng, 2015), while the DID procedure may still be subject to such biases as reverse causality and omitted variable bias. Other empirical studies tried to address the issues of endogeneity regarding the household uptake of microloans by using an endogenous treatment effects method (see, for example, Imai et al., 2010) to evaluate the pro-poor effects of MFI credit for productive purposes in India and Heckman sample selection approach (see, for example, Akotey & Adjasi, 2016) to access the effects of microcredit in Ghana. These studies evidence the favourable effects. Still, these econometric approaches fail to account for structural differences between borrowers and non-borrowers in terms of outcome functions because of the assumptions that the functions differ only by constant terms (Seng, 2018a), yielding bias and inconsistent results.

Other strands of studies evidenced unfavourable effects of poverty alleviation. For instance, Coleman's (2006) studies illustrate that northeast Thailand's microcredit, used in non-productive ways, trap women in a vicious cycle of high-interest debts. The failure of financial inclusion in terms of access to credit, to break the women's poverty cycle results from the fact that women generally make low return investment and may repay loans by borrowing from other micro-lenders, bearing a heavy debt burden (Seng, 2018a). Schicks's (2013) analysis on Ghana's credit market shows that 30 per cent of the Accra borrowers from the major micro-lenders experience over-indebtedness, settling large debts. The over-indebtedness put a large burden on many borrowers in northeast Thailand (Coleman, 1999) and in Kosovo (Pytkowska & Spannuth, 2012). Furthermore, the most influential studies by Seng (2018a and 2018b) suggest that microcredit is very likely to worsen borrowers' household welfare and even trap the needy borrowers in a vicious cycle of poverty in Cambodia. These findings indicate that the financial services offered by MFIs are seemingly drifting away from its social mission, raising concerns over the poverty-reducing effects of financial inclusion in terms of access to credit. The welfare-worsening impacts are more likely caused by borrowers' over-indebtedness and the use of credit in non-productive ways. Although not accounting for the effects of financial literacy in the empirical model, Seng (2018a and 2018b) argued that the borrowers' limited financial knowledge is very likely to constrain the pro-poor development of microfinance in Cambodia. These studies make

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room for further studies on the poverty-reducing effects of financial development, a priori revealing that financial literacy such as understanding financial concepts and better financial decisions is very likely to promote pro-poor financial inclusion in developing countries such as Cambodia. In addition, Cole, Sampson, and Zia (2011), and Grohmann, Klühs, and Menkhoff (2018) found that higher financial literacy substitutes for financial infrastructure and promotes more financial inclusion, more possibly reinforcing the desirable effects of financial services on household welfare and poverty reduction. Nevertheless, some studies (see, for example, Bello, 2006; Banerjee et al., 2009; Karlan & Zinman, 2009; Duvendack & Palmer Jones, 2012) cautioned against considering financial inclusion in terms of microloans as a tool to fight poverty and have yet advocated it, arguing that it should be used with "cautious optimism".

Analytical framework

This study analyses the effects of financial inclusion in terms of utilisation of financial services on household poverty in terms of household income per capita, accounting for financial literacy, with the endogenous switching (ES) model to control for endogeneity of household use of financial services. The ES model is used to control for endogenous selection bias arising from unobservable factors affecting both the use of financial services and household income and for inherent differences between the users and non-users in terms of income functions. The endogenous switching probit (ESP) model is complementarily adopted to quantify the effects of financial inclusion on household budget deficit.

Endogenous switching (ES) model

The simplest approach to examine the effects of financial inclusion would be to use a dummy variable equal to 1 if the household uses financial services and zero otherwise in household income function as a regressor and then to apply ordinary least squares (OLS) method of estimation. However, this procedure may yield biased and inconsistent estimates of the effects because the decisions to use financial services is potentially endogenous. It is voluntarily made and may be based on individual households' self-selection (Seng, 2018b).

Standard treatment effects models can be used to account for this self-selection bias and other unobservable confounders. Nevertheless, these models cannot control for the inherent differences between the household users and non-users in terms of income functions due to the assumption that the functions differ between the users and non-users by only constant terms. The failure to address this issue may still yields biased and inconstant estimates of the effects. Addressing the inherent differences, the PSM approach can be adopted. However, this approach fail to account for unobservable confounders, more possibly still producing biased and inconsistent estimates. Following Seng (2018a and 2018b), to deal with these econometric challenges, the ES model treating the users' financial choices as regimes is used and specified as follows[2]:

$$T_i^* = \alpha Z_i + u_i \tag{3}$$

$$\text{Regime 1: } y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i} \quad \text{if } T_i = 1 \tag{4a}$$

$$\text{Regime 2: } y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i} \quad \text{if } T_i = 0 \tag{4b}$$

where T_i^* is the latent variable for household user i's use of financial services, with T_i being its observable counterpart. α, β_{1i} and β_{2i} are vectors of parameters to be estimated. y_i represents household income per capita in regimes 1 (users) and 2 (non-users). X_i represents a vector of exogenous factors expected to determine the household income. The sets of variables Z_i can overlap X_i; nonetheless, to properly identify the selection equation, at least one variable that directly affects the decisions to use financial services but would indirectly influence the income through the use of financial services is used as an instrument restriction. Imai et al. (2010) used the availability of formal banks in the village as a possible instrument to evaluate the effects of microcredit on household poverty with the treatment-effects model. Due to the unavailability of such an information in the current study's dataset, a dummy for income proof document (the variable is 1 if the household has income proof document and 0 otherwise) and a dummy for family book are used as an identification restriction. The study hypothesises that the availability of income proof document and family book determine the financial decisions but does not influence the income. Following Di Falco, Veronesi, and Yesuf (2011) a simple rejection falsification test is also conducted to justify the admissibility of the instruments: instruments are valid if affecting the financial decision but not the non-users' household income per capita. In Table A2 of the appendix confirms that the availability of income proof document and family book are jointly determine the decisions to use financial services but do not influence household income per capita; thus they can be used as the valid instruments. Finally, the error terms u_i, ε_{1i} and ε_{2i} are assumed to be correlated and jointly normally distributed with a zero mean vector and covariance matrix; i.e., $(v_i,\ \varepsilon_{1i},\ \varepsilon_{2i}) \sim N(0, cov(.))$:

$$cov(v_i, \varepsilon_{1i}, \varepsilon_{2i}) = \begin{pmatrix} \sigma_{v_i}^2 & \sigma_{\varepsilon_{1i}v_i} & \sigma_{\varepsilon_{2i}v_i} \\ \sigma_{\varepsilon_{1i}v_i} & \sigma_{\varepsilon_{1i}}^2 & . \\ \sigma_{\varepsilon_{2i}v_i} & . & \sigma_{\varepsilon_{2i}}^2 \end{pmatrix} \tag{5}$$

where $var(v_i) = \sigma_{v_i}^2$, $var(\varepsilon_{1i}) = \sigma_{\varepsilon_{1i}}^2$, $var(\varepsilon_{2i}) = \sigma_{\varepsilon_{2i}}^2$, $cov(\varepsilon_{1i}, \varepsilon_{2i}) = \sigma_{\varepsilon_{1i}\varepsilon_{2i}}$, $cov(\varepsilon_{1i}, v_i) = \sigma_{\varepsilon_{1i}v_i}$, and $cov(\varepsilon_{2i}, v_i) = \sigma_{\varepsilon_{2i}v_i}$. The variance $\sigma_{v_i}^2$ equals 1, as α is estimated only up to a scale factor, and the covariance $\sigma_{\varepsilon_{1i}\varepsilon_{2i}}$ is not defined as y_{1i} and y_{2i} are not observed together (Maddala, 1986).

The correlation between the error term v_i of Equation (3) and the error terms ε_{1i} and ε_{2i} of Equations (4a) and (4b) suggests potential unobservable effects. Thus, the expected values of ε_{1i} and ε_{2i} conditional on regime selection would be nonzero and can be derived as follows:

$$E(\varepsilon_{1i}|T_i = 1, X_{1i}) = E(\varepsilon_{1i}|v_i > -\alpha Z_i) = \sigma_{\varepsilon_{1i}v_i}\frac{\phi(Z_i\alpha)}{\Phi(Z_i\alpha)} = \sigma_{\varepsilon_{1i}v_i}\lambda_{1i} \tag{6a}$$

$$E(\varepsilon_{2i}|T_i = 0, X_{2i}) = E(\varepsilon_{2i}|v_i \leq -\alpha Z_i) = \sigma_{\varepsilon_{2i}v_i}\frac{-\phi(Z_i\alpha)}{1-\Phi(Z_i\alpha)} = \sigma_{\varepsilon_{2i}v_i}\lambda_{2i} \tag{6b}$$

where ϕ is the standard normal probability density function; and Φ is the cumulative distribution function of the standard normal distribution. λ_{1i} and λ_{2i} are the IMRs predicted at $Z_i\alpha$ for household users and non-users, respectively (Greene, 2008). Then, one can conduct an endogeneity test with the estimated covariances $\sigma_{\varepsilon_{1i}v_i}$ and $\sigma_{\varepsilon_{2i}v_i}$. Either significantly nonzero $\sigma_{\varepsilon_{1i}v_i}$ or $\sigma_{\varepsilon_{2i}v_i}$ rejects the null hypothesis that there is no sample selection bias, confirming the endogenous switching (Maddala, 1986). Thus, a test for significant coefficients of the correlation

between ε_{1i} and v_i ($\rho_{\varepsilon_{1i}v_i} = \sigma_{\varepsilon_{1i}v_i}/\sigma_{\varepsilon_{1i}}\sigma_{v_i}$) and between ε_{2i} and v_i ($\rho_{\varepsilon_{2i}v_i} = \sigma_{\varepsilon_{2i}v_i}/\sigma_{\varepsilon_{2i}}\sigma_{v_i}$) is necessarily carried out (Lokshin & Sajaia, 2004).

A full information maximum likelihood (FIML) approach is the most efficient at estimating the ES model (Lokshin & Sajaia, 2004). The FIML approach estimates simultaneously the selection and outcome equations with the availability of income proof document restricting the model identification, then providing consistent standard errors. Given the assumption that the error terms follow trivariate normal distribution, the logarithmic likelihood function for the system of Equations (3) and (4a and 4b) can be:

$$\ln L_i = \sum T_i \left[\ln \phi \left(\frac{\varepsilon_{1i}}{\sigma_{\varepsilon_{1i}}} \right) - \ln \sigma_{\varepsilon_{1i}} + \ln \Phi(\theta_{1i}) \right]$$
$$+ (1 - T_i) \left[\ln \phi \left(\frac{\varepsilon_{2i}}{\sigma_{\varepsilon_{2i}}} \right) - \ln \sigma_{\varepsilon_{2i}} + \ln(1 - \Phi(\theta_{2i})) \right] \qquad (6)$$

where $\theta_{ji} = \frac{Z_i\alpha + \rho_j\varepsilon_{ji}/\sigma_j}{\sqrt{1-\rho_j^2}}$, $j = 1, 2$, with ρ_j being the correlation between the error term v_i of Equation (3) and the error terms ε_{1i} and ε_{2i} of Equations (4a) and (4b), respectively. That is, ρ_1 and ρ_2 are equal to $\rho_{\varepsilon_{1i}v_i} = \sigma_{\varepsilon_{1i}v_i}/\sigma_{\varepsilon_{1i}}\sigma_{v_i}$ and $\rho_{\varepsilon_{2i}v_i} = \sigma_{\varepsilon_{2i}v_i}/\sigma_{\varepsilon_{2i}}\sigma_{v_i}$, respectively.

Furthermore, the pro-poor effects of financial inclusion can be estimated by comparing the users' conditional expected income derived from the ES regression with the counterfactual case that the same households have not used financial services. The conditional expected income a user enjoys with characteristics X and Z, and the conditional expected income that the same user would enjoy without using financial services are derived as follows (Lokshin & Sajaia, 2004):

$$E(y_{1i}|T_i = 1, X_{1i}) = \beta_1 X_{1i} + \sigma_{\varepsilon_{1i}v_i}\lambda_{1i} \qquad (7a)$$
$$E(y_{2i}|T_i = 1, X_{1i}) = \beta_2 X_{1i} + \sigma_{\varepsilon_{2i}v_i}\lambda_{1i} \qquad (7b)$$

where $\sigma_{\varepsilon_{1i}v_i}\lambda_{1i}$ control for sample selection arising from the fact that a user is different from others with characteristics X and Z due to unobserved confounders. Following Heckman, Tobias and Vytlacil (2001) and Di Falco et al. (2011), the effects of the treatment on the treated (TT) that accounts for all factors potentially determining the differences in income can be derived as follows:

$$TT = E(y_{1i}|T_i = 1) - E(y_{2i}|T_i = 1) = (\beta_1 - \beta_2)X_{1i} + (\sigma_{\varepsilon_{1i}v_i} - \sigma_{\varepsilon_{2i}v_i})\lambda_{1i} \qquad (8)$$

The TT results from the differences in the coefficients in Equations (7a) and (7b) ($\beta_1 - \beta_2$ and $\sigma_{\varepsilon_{1i}v_i} - \sigma_{\varepsilon_{2i}v_i}$). Thus, simply comparing average household income in the user group $E(y_{1i}|T_i = 1)$ to that in the non-user group $E(y_{2i}|T_i = 0)$ would confirm a bias of the treatment effects. If a household self-selects to use or not use financial services based on comparative advantage, $\sigma_{\varepsilon_{1i}v_i} - \sigma_{\varepsilon_{2i}v_i}$ would be positive, suggesting that the use of financial services would increase household income under self-selection than under random assignment (Maddala, 1983).

Endogenous switching probit (ESP) model

To give more insights into the potential effects of financial inclusion poverty alleviation, an analysis on the effects on household budget deficit is also conducted with the endogenous switching probit (ESP) model developed by Aakvik, Heckman, and Vytlacil (2005), and Lokshin

and Sajaia (2011). In the model, the treatment T_i is earlier defined by Equation (3) and the outcome is a binary variable for the households' behaviours towards household budget deficit (the variable is 1 if the household runs budget deficit and 0 otherwise) being used as the outcome variable. The outcome equations are specified as follows:

$$\text{Regime 1: } y_{1i}^* = \beta_1 X_{1i} + v_{1i}, \; y_{1i} = 1 \, (y_{1i}^* > 0) \tag{9a}$$

$$\text{Regime 2: } y_{2i}^* = \beta_2 X_{2i} + v_{2i}, \; y_{2i} = 1 \, (y_{2i}^* > 0) \tag{9b}$$

$$\text{Observed } y_i \text{ is defined as } y_i = \begin{cases} y_{1i} & \text{if } T_i = 1 \\ y_{2i} & \text{if } T_i = 0 \end{cases}$$

where y_{1i}^* and y_{2i}^* are the latent variables determining the observed binary outcomes y_{1i} and y_{2i}. X_i represents a vector of exogenous factors expected to determine the household budget deficit. β_{1i} and β_{2i} are vectors of parameters to be estimated. The error terms u_i of Equation (3), and v_{1i} and v_{2i} of Equations (9a) and (9b), respectively, are assumed to be correlated and jointly normally distributed with a zero mean vector and covariance matrix; i.e., $(u_i, \, v_{1i}, \, v_{2i}) \sim N(0, cov(.))$. The ESP model is also estimated with the FIML (Lokshin & Sajaia, 2011). To properly identify the selection equation, at least one variable that directly affects the decisions to use financial services but would indirectly influence the household budget deficit through the use of financial services is used as an instrument restriction. To justify the admissibility of the availability of income proof document and family book being used as the instruments, the same simple rejection falsification test as that in the ES model is performed. The results reported in Table A2 of the appendix confirms that the availability of income proof document and family book can be used as the valid instruments. Similar to the TT derived from Equation (8) for the effects on household income per capita, accounting for all factors potentially affecting the differences in probability of household budget deficit, the treatment effects on the treated (TT) can be derived as follows:

$$TT = \Pr(y_{1i} = 1 | T_i = 1) - \Pr(y_{2i} = 1 | T_i = 1) \tag{10}$$

The ATT, for the corresponding subgroups of the sample, is commonly computed and can be computed by averaging TT from Equation (10) which is the mean effects of the treatment on those who use financial services. In this case, the ATT can computed as follows (Lokshin & Sajaia, 2011):

$$ATT = \frac{1}{N_T} \sum TT_i \tag{11}$$

where N_T is the number of observations with $T_i = 1$ (i.e., the number of financial users). The ATT also provides the robustness check on the effects of financial inclusion on poverty in terms of household income per capita.

Data and variables

This section describes the source of data and main variables used in the analysis. A descriptive statistical analysis is also presented at the end of the section. The analysis is also conducted with simple statistical tests of differences in means.

Data used in the analysis

The current study uses the data from the FinScope Consumer Survey conducted in 2015. The FinScope survey was conducted by South Africa's FinMark Trust in partnership with the United Nations Capital Development Fund (UNCDF), Cape Town-based think tank Cenfri, as well as local partners including NBC and the National Institute of Statistics (NIS). The survey contains household information based on a nationwide representative sample of the adult population over 18 years of age. The sampling frame and data weighting were carried out by the NIS and weighted to the NIS estimates and validated against census data and the 2013 Cambodia Inter-censal Population Survey. In the survey, the total of 3150 household representatives over 18 years of age in both rural and urban areas were selected as the sample. Nevertheless, because some representatives did not provide full information on the variables of interest, there are some missing observations in the analysis. Adjusting for the missing observations, the final sample count is 2693 individuals in the regression analysis.

Variables

The dependent variable in the selection equation are a binary variable for the use of financial services, while the dependent variables in the outcome equation are the household income per capita for the ES model and the household budget deficit for the ESP model. Following Lusardi and Mitchell (2007) and Drexler et al. (2014), the financial literacy in the current study is defined as an ability to understand basic financial concepts, such as the importance of savings and strong judgment in borrowing decisions. A dummy for financial literacy (i.e., the variable is 1 if the household understands how banks work and benefit from a saving account at banks, and 0 otherwise) is built on the availability of data in the FinScope survey.

Due to the limitations on data, following previous studies (see, for example, Imai, Arun, & Amin, 2010; Akotey & Adjasi, 2016; Seng, 2018a & 2018b), the study uses the available information such as household head's characteristics, household characteristics, and means of access to information, and income proof document as the explanatory variables in the model. The head's characteristics consist of age, gender, ethnicity, and marriage status (single, married, devoiced, and widowed). Following Seng (2018a & 2018b), the heads are also grouped into four categories according the educational levels – training, primary education, secondary education, and tertiary education. The numbers of household income generators are included to capture the effects of household characteristics. Households are also characterised by their geographical locations – Coastal area, Plain area, Plateau area, and Tonle Sap area. The analysis also controls for rural area, as a geographical characteristic, to capture rural household behaviour towards the decisions concerning financial services as well as its effect on household income (see, for example, Akotey & Adjasi, 2016). The means of communication and access to information, proxied by cell phone and email, is used to capture the effects of access to financial information on households' financial decisions. It has main roles to play in facilitating the diffusion of information on financial services among households because it can serve as a tool for households to build social networks, then more likely to induce households to use the services, and more probably in an efficient way. Of note, social networks are very likely to promote access to microfinance services (Wydick, Hayes, & Kempf, 2011). Cell phone can also be used as mobile money that is found to promote household welfare and financial inclusion (Munyegera &

Matsumoto, 2015; Ouma, Odongo, & Were, 2017). The availability of household income proof document is one of the most important documents for credit applicants. Moreover, family book is also a main document when financial clients apply for any financial services offered by banks or MFIs. Thus, they are expected to increase the use of financial services and to determine household income per capita indirectly through access to financial services. All these variables are summarised in Table A1.

Descriptive analysis

The survey suggests that approximately 61.14 per cent of the sampled households use formal financial services, suggesting that approximately 38.86 per cent are excluded from access to financial services. Approximately 30 per cent of the financial users take out credit, while approximately 10 per cent save money at the formal financial institutions. Moreover, approximately 89.37 per cent of the sampled households at least have basic financial knowledge (i.e. understanding how banks work and benefit from a saving account at banks).[3]

Table 1. Household characteristics by users and non-users of financial services

Variables	Users		Non-users		Difference in Mean
	Mean	SD	Mean	SD	
Household income per capita	291888.60	1030364.00	302222.10	3284952.00	-10333.52
Household budget deficit	0.507	0.500	0.518	0.500	-0.011
Financial literacy	0.898	0.302	0.886	0.317	0.012
Household head's age	44.045	13.961	43.081	16.569	0.964
Household head's ethnicity	0.944	0.230	0.957	0.204	-0.013*
Household head's gender	0.074	0.261	0.094	0.292	-0.020**
Single	0.004	0.060	0.007	0.002	-0.003
Marriage	0.459	0.498	0.455	0.498	0.004
Devoiced	0.009	0.096	0.010	0.099	0.000
Widowed	0.052	0.222	0.067	0.250	-0.015**
Training	0.003	0.051	0.004	0.064	-0.001
Primary	0.241	0.428	0.292	0.455	-0.051***
Secondary	0.162	0.369	0.127	0.333	0.035***
Tertiary	0.019	0.135	0.010	0.099	0.009**
Income generators	2.469	1.287	2.368	1.233	0.101**
Cellphone	0.800	0.400	0.646	0.478	0.154***
Email	0.062	0.241	0.019	0.136	0.043***
Rural	0.676	0.467	0.741	0.438	-0.064***
Coastal	0.076	0.266	0.068	0.252	0.009
Plain	0.502	0.500	0.476	0.500	0.026*
Plateau	0.094	0.293	0.154	0.361	-0.059***
Tonlesap	0.327	0.469	0.302	0.459	0.025*
Income proof	0.074	0.261	0.042	0.200	0.032***
Family book	0.909	0.287	0.883	0.320	0.025***

Notes: Income per capita is the monthly income in riel. * denotes test statistic significance at 10 per cent level. ** denotes test statistic significance at 5 per cent level. *** denotes test statistic significance at 1 per cent level.

The descriptive statistics summarised in Table 1 illustrates some non-significant and significant differences between household users and non-users in terms of each variable, which are supported by simple statistical tests of differences in means. For example, there are non-significant differences in per capita household income between the users, who enjoy an average household income per capita of approximately 291,889 riels (US$ 73), and non-users, who enjoy an average household income per capita of approximately 302,222 riels (US$ 76). Moreover, on average, approximately 51 per cent of the users run household budget deficit, while approximately 52 per cent of the non-users run household budget deficit. The figures illustrate the non-significant difference between the users and the non-users in terms of household budget deficit. Nevertheless, the user and the non-users are significantly different in terms of household head's ethnicity, gender, household head's education achievement, the numbers of household income generators, access to information and social communication, and geographical locations. Particularly, approximately 16.2 per cent of the users are headed by a person having access to secondary school and approximately 2 per cent of the users are headed by a person having access to higher education, while approximately 13 per cent of the non-users are headed by a person having access to secondary school and approximately 1 per cent of the non-users are headed by a person having access to tertiary education. These results somehow indicate that the households headed by the secondary school person are likely to have more access to financial services.

Furthermore, on average, approximately 7.4 per cent of the users possess income proof document, while approximately 4.2 per cent of the non-users have such a document, suggesting the significant difference between the users and the non-users in terms of income proof document. This simple statistical test result somehow reveals that the document is likely to be facilitate the use of financial services, in particular when households apply for credit.

Results and discussion

The descriptive statistical analysis suggests the non-significant differences in household income per capita and in household budget deficit between the users and the non-users. The econometric analysis is further performed to quantify the pro-poor effects of financial inclusion on households, controlling for endogeneity issues regarding the decision to use financial services.

Use of financial services

Table 2 reports the results of the probit model, describing the decision to use financial services, jointly estimated with the income equations by using the FIML method. The life-cycle effects of household head on the probability of using financial services are quadratic, confirmed by the significantly positive coefficient of age and the significantly negative coefficient of age-squared term. Similar to the previous studies by Seng (2018a and 2018b), the likelihood of using financial services increases but starts to decrease by degree after attaining 48 years of age. As getting older, the head gains more experience and has increasing economic opportunities, being eager for financial services, but starts to lose by degree the opportunities after reaching this age thresholds, being less keen on using financial services (Seng, 2018a & 2018b).

Table 2. Determinants of households' financial uses (simultaneously estimated probit[a])

Variables	Use of financial services		
	Coef.	SE	P-value
Household head's age	7.547***	1.394	0.000
Household head's age squared	-0.977***	0.190	0.000
Household head's gender	0.041	0.152	0.785
Household head's ethnicity	-0.246**	0.114	0.030
Single	-0.354	0.393	0.368
Marriage	0.054	0.096	0.575
Devoice	0.007	0.321	0.983
Widowed	-0.086	0.178	0.630
Training	-0.610	0.426	0.152
Primary	-0.026	0.096	0.783
Secondary	0.100	0.109	0.359
Tertiary	0.157	0.284	0.579
Income generators	0.031	0.021	0.136
Cellphone	0.459***	0.061	0.000
Email	0.784***	0.158	0.000
Rural	-0.013	0.061	0.834
Coastal	0.321***	0.117	0.006
Plain	0.199**	0.081	0.015
Plateau	Dropped		
Tonlesap	0.245***	0.083	0.003
Income proof	0.431***	0.107	0.000
Family book	0.021	0.086	0.809
Constant	-14.600***	2.552	0.000
Observations	2693		
Prob. $> \chi^2$	0.000		

Notes: Standard errors (SE) is robust SE.
[a] Probit model is simultaneously estimated with the income regime equations by using the FIML method reported in Table 3. * denotes test statistic significance at 10 per cent level. ** denotes test statistic significance at 5 per cent level. *** denotes test statistic significance at 1 per cent level.

Nevertheless, the significantly negative coefficient of household head's ethnicity suggests that households headed by Khmer are less likely to use financial services. As expected, cellphone and email have significantly positive correlations with the decision to use financial services. These findings are consistent with the arguments by previous studies (see, for example, Wydick, Hayes, & Kempf, 2011; Munyegera & Matsumoto, 2015; Ouma, Odongo, & Were, 2017) that access to information and social networks facilitate access to microfinance services. Furthermore, households in Coastal, Plain and Tonlesap are likely to use more financial services offered by formal financial institutions. As expected, although the coefficient of family book is non-significant, it is positive and the coefficient of income proof document is significantly positive, illustrating that the availability of household income proof document is one of the most important documents for the use of financial services, in particular credit applicants.

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Household income per capita

Table 3 presents the estimates for the income equations of the ES model. The likelihood ratio test for joint independence of Equations (3)–(4b) is reported at the bottom of the Table. The testing result suggests that the three equations are jointly dependent, confirmed by the significant likelihood ratio, indicating the problem of endogeneity that needs to be controlled for in the model specification of household income equations. That is, the endogeneity is caused by a presence of both observed and unobserved confounders determining the decision to use financial services and the income outcome given the decision to use the services. In this case, the ES model is the appropriate to account for self-selection and inherent differences between the users and the non-users (Seng, 2018a & 2018b).

Table 3. Determinants of household income per capita

Variables	Users			Non-users		
	Coef.	SE	P-value	Coef.	SE	P-value
Household head's age	6.410***	1.856	0.001	8.819**	3.856	0.022
Household head's age squared	-0.922***	0.253	0.000	-1.250**	0.533	0.019
Household head's gender	-0.166	0.124	0.181	-0.172	0.204	0.401
Household head's ethnicity	-0.065	0.108	0.545	0.216	0.169	0.202
Single	-0.216	0.405	0.594	-0.550**	0.253	0.030
Marriage	-0.297**	0.122	0.015	-0.722***	0.194	0.000
Devoice	0.142	0.297	0.633	-0.162	0.331	0.624
Widowed	-0.214	0.169	0.205	-0.377	0.275	0.170
Training	0.814	0.806	0.313	0.462*	0.260	0.076
Primary	0.051	0.115	0.655	0.438**	0.177	0.013
Secondary	0.160	0.147	0.275	0.523**	0.226	0.021
Tertiary	0.587*	0.310	0.058	1.240**	0.513	0.016
Income generators	-0.166***	0.025	0.000	-0.151***	0.034	0.000
Cellphone	0.492***	0.078	0.000	0.406***	0.101	0.000
Email	0.522***	0.131	0.000	-0.797	0.848	0.347
Rural	-0.616***	0.068	0.000	-0.713***	0.109	0.000
Coastal	0.441***	0.128	0.001	0.185	0.149	0.214
Plain	0.022	0.092	0.813	-0.246**	0.106	0.020
Plateau	Dropped			Dropped		
Tonlesap	0.155*	0.090	0.084	-0.077	0.105	0.461
Constant	1.020	3.405	0.765	-3.514	6.837	0.607
$\ln \sigma_{\varepsilon_1 v}$	0.219***	0.051	0.000			
$\rho_{\varepsilon_1 v}$	0.055	0.095	0.564			
$\ln \sigma_{\varepsilon_2 v}$				0.305***	0.052	0.000
$\rho_{\varepsilon_2 v}$				-0.151	0.111	0.174
LR test of indep. eqns	Prob. $> \chi^2 = 0.000$					
Log pseudolikelihood	-6184.469					

The differences in the income equations' coefficients between the users and non-users, corresponding to the structural differences across the two regimes (use financial services and not use financial services) in terms of each explanatory variable, show the presence of heterogeneity in the samples. These differences lead to the differences between the users and non-users in terms of income functions. For example, the household heads' tertiary educations are significantly and positively associated with the income for both users and non-users; the coefficients' magnitudes are, however, lower for the users than those for the non-users. These results suggest that the effects of tertiary educations are greater among the non-users. Furthermore, the detailed results corresponding to other explanatory variables can be found in Table 4 and interpreted in a similar fashion.

Poverty-reducing effects of financial inclusion

Table 4 presents the effects of financial inclusion on poverty, with the second column corresponding to the income effects. The treatment effects (TT) are described via household head's financial literacy and gender interacted with financial literacy. The estimated results demonstrate that, for household headed by a person without financial literacy, the conditional expected income by the financial users $E(y_1|I = 1)$ is approximately 123,399 riels (USD 31) per month. The conditional expected income users would have enjoyed if they did not use financial services $E(y_2|I = 1)$ is approximately 93560 riels (USD 23) per month. Thus, when using financial services, on average, households are likely to increase the per capita income by approximately 29,838 riels (USD 7) per month. In a similar fashion, when using financial services, on average, households headed by a person with financial literacy are likely to increase the per capita income by approximately 30,600 riels (USD 8) per month. These results suggest that financial users with financial literacy get much better off in terms of household income per capita than do those without financial literacy. Overall, the results reveal that financial literacy is very likely to reinforce the wanted effects of financial inclusion on poverty reduction. These results support the findings by previous studies (see, for example, Cole et al., 2011; Grohmann et al., 2018) that financial literacy helps promote financial inclusion and then produce the welfare-enhancing and poverty-reducing effects. They also confirm the argument by Seng (2018a and 2018b) that the lack of financial knowledge is very likely to be obstacle to the pro-poor growth of microfinance, and even worse bringing about the unwanted effects of financial inclusion in Cambodia.

Taking the gender into consideration, when using financial services, on average, households headed by a man without financial literacy are likely to increase the household income per capita by approximately 28,917 riels (USD 7) per month, while those headed by a man with financial literacy are likely to increase the income by approximately 29,227 riels (USD 7) per month. Furthermore, households headed by a woman without financial literacy are likely, when using financial services, to increase the income by approximately 34,314 riels (USD 9) per month, while those with financial literacy are likely to increase the income by approximately 42,979 riels (USD 11). The results show that, regardless of financial literacy, female-headed users of financial services are very likely to gain more than male-headed users in terms of household income per capita. These results are consistent with arguments that female users of financial services are

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better able to allocate household incomes more efficiently (see, for example, Alam, 2012; Akotey & Adjasi, 2016). Of note, financial users headed by a woman with financial literacy are more likely to make the greatest gains from using financial services, suggesting that promoting financial inclusion and financial literacy for women is one of the best ways to lift needy household out of poverty. These findings complement Seng's (2018a and 2018b) studies that focused only on credit and did not account for gender and financial literacy in the estimation of the treatment effects of taking up microcredit on household welfare and poverty.

Table 4. Effects of financial inclusion on household income per capita

| | Income Effects | |
	Mean	SE
Without financial literacy		
$E(y_{1i}\|T = 1)$	123398.600	5487.527
$E(y_{2i}\|T = 1)$	93560.460	5419.053
TT	29838.140***	7712.269
With financial literacy		
$E(y_{1i}\|T = 1)$	123949.200	1885.205
$E(y_{2i}\|T = 1)$	93349.010	1867.451
TT	30600.140***	2653.558
Male head without financial literacy		
$E(y_{1i}\|T = 1)$	125012.800	5820.670
$E(y_{2i}\|T = 1)$	96095.590	5915.732
TT	28917.170***	8299.161
Male head with financial literacy		
$E(y_{1i}\|T = 1)$	124281.900	1972.431
$E(y_{2i}\|T = 1)$	95054.390	1994.227
TT	29227.480***	2804.893
Female head without financial literacy		
$E(y_{1i}\|T = 1)$	105239.300	14937.650
$E(y_{2i}\|T = 1)$	70925.410	8415.328
TT	34313.910***	17145.000
Female head with financial literacy		
$E(y_{1i}\|T = 1)$	119713.600	6298.973
$E(y_{2i}\|T = 1)$	76734.270	4710.588
TT	42979.310***	7865.539

Notes: The expected values of household income per capita by individual households are transformed from log terms. *** denotes test statistical significance at 1 per cent level.

Table 4 presents the household budget deficit effects of financial inclusion, with the second column corresponding to the treatment effects (TT) being described via household head's financial literacy and gender interacted with financial literacy. The estimated results demonstrate that, when using financial services, on average, households headed by a person without financial literacy are likely to reduce the probability of running household budget deficit by approximately 26 percent. Similarly, when using financial services, on average, households headed by a person

with financial literacy are likely to reduce the probability of running household budget deficit by approximately 27 per cent. These results suggest that financial users with financial literacy are likely to reduce the likelihood of household budget deficit at the greater level than do those without financial literacy. Overall, these results reveal financial literacy is very likely to help financial users mitigate the risk of household budget deficit, reinforcing the income effects of financial inclusion. The estimated results of probit model describing the household decision to use financial services are consistent with those reported in Table 2 and are available on request. Moreover, the detailed results related to outcome equations describing the budget deficit for the users and non-users are also available on request.

Table 5. Effects of financial inclusion on household budget deficit

	ATT		Difference in ATT
	Male	Female	
Without financial literacy	-0.116	-0.170	0.054***
	(0.005)	(0.024)	(0.017)
With financial literacy	-0.118	-0.200	0.082***
	(0.001)	(0.009)	(0.006)

*** denotes test statistical significance at 1 per cent level. Standard errors are in parentheses.

Table 5 reports the average treatment effects of financial inclusion on household budget deficit. Taking the gender into account, when using financial services, on average, households headed by a man without financial literacy are likely to reduce the probability of household budget deficit by approximately 12 per cent, while those headed by a woman without financial literacy are likely to reduce the probability by approximately 17 per cent. Furthermore, households headed by a man with financial literacy are likely, when using financial services, to reduce the probability by approximately 12 per cent, while those headed by a woman with financial literacy are likely to reduce the probability by approximately 20 per cent. The results demonstrate that, regardless of financial literacy, female-headed users of financial services are very likely to perform much better than do male-headed users in terms of reducing household budget deficit. These results confirm the arguments by Alam (2012), and Akotey and Adjasi (2016) that women can manage cash more efficiently. Of note, financial users headed by a woman with financial literacy are more likely to reduce the probability of household budget deficit by the greatest level, indicating that promoting financial inclusion and financial literacy for women is on the right way. These complementary findings provide evidence that financial literacy is likely to contribute to produce poverty-reducing effects of financial inclusion, more possibly through reducing household budget deficit.

Conclusion

The empirical evidence on the wanted effects of financial development on needy households has drawn recent studies' attention to the determinants of financial inclusion and suggests that financial literacy has main roles to play in enhancing financial inclusion. While the most recent studies do not control for financial literacy in their empirical model analysis, the evidence on the unwanted socio-economic effects of financial services is still questioning the poverty-alleviating effects of financial development.

This article analyses the effects of financial inclusion on poverty in terms of household income per capita via financial literacy and household gender interacted with financial literacy in Cambodia by applying the ES model to data from the FinScope Survey conducted in 2015. The ES model account not only for endogenous selection bias resulting from unobserved confounders potentially determining the use of financial services and household income but also for structural differences between users and non-users of financial services in terms of income functions. The ES results suggest that the use of financial services is very likely to make a great contribution to increasing household income per capita, in particular for the household users headed by a woman with financial literacy. A complementary analysis are also performed to further quantify the household budget deficit effects of financial inclusion with (ESP) model. The ESP results demonstrate that the use of financial services is more likely to reduce the probability of household budget deficit, for the users headed by a woman with financial literacy in particular. These results suggest that financial inclusion is very likely to make a great contribution to poverty reduction through reducing household budget deficit if the users have at least basic financial knowledge. Women with financial literacy are more likely to gain more from financial inclusion. These findings are robust, giving insights into how financial inclusion can promote poverty alleviation and in particular underscores the need for a rethink of financial literacy and gender access to financial services as a strategy to promote sustained poverty reduction in Cambodia.

Finally, the article has its limitations in the data as the panel data is unavailable and the data used in the analysis, in particular the variable capturing financial literacy, is not ideal for estimating treatment effects. With such accurate data, this study can be improved with more appropriate instruments and financial literacy measurement to address the issues of endogeneity regarding financial services and the issues of financial literacy when estimating treatment effects. This is an opportunity for future studies when better data is available.

Notes

1. Bangladesh is the highest MFI-penetrated economy, with a rate of 25 per cent followed by Bosnia Herzegovina (15%), Mongolia (15%), Cambodia (13%), and Nicaragua (11%) (Gonzalez, 2010; Seng, 2018a & 2018b).
2. Following the previous studies (See, for example, Chang & Mishra, 2008; Akotey & Adjasi, 2016; Seng, 2018a & 2018b), the selection model is estimated with a probit model describing the household decision to use financial services.
3. Due to the unavailability of appropriate data on financial literacy from the FinScope survey, the study construct a proxy for financial literacy based on a question: do you understand how banks work and benefit from having a saving account at bank.

References

Aakvik, A., Heckman, J.J, & Vytlacil, E.J. (2005). Estimating treatment effects for discrete outcomes when responses to treatment vary: An application to Norwegian vocational rehabilitation Programs. *Journal of Econometrics, 25*(2005), 15–51. doi:10.1016/j.jeconom.2004.04.002

Aghion, P., & Bolton, P. (1997). A theory of trickle-down growth and development. *Review of Economic Studies, 64*, 151–172. https://www.jstor.org/stable/2971707

Akotey, J.O., & Adjasi, C.K.D. (2016). Does microcredit increase household welfare in the absence of microinsurance?. *World Development, 77,* 380–394. doi:10.1016/j.worlddev.2015.09.005

Alam, A. (2012). The effects of gender-based returns to borrowing on intra-household resource allocation in rural Bangladesh. *World Development, 40*(6), 1164–1180. doi:10.1016/j.worlddev.2011.12.009

Aportela, F. (1999). Effects of financial access on savings by low-income people. Banco de México, Research Department. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.194.5270&rep=rep1&type=pdf

Asad K.G., Issam M., Imai K.S. (2014). Microfinance and household poverty reduction: empirical evidence from rural Pakistan. *Oxford Development Studies, 43*(1), 84–104. https://doi.org/10.1080/13600818.2014.980228

Ashraf, N., Gons, N., Karlan, D., & Yin, W. (2003). *A review of commitment savings products in developing countries* (ERD Working Paper Series No. 45). Tokyo: Asian Development Bank. Retrieved from http://hdl.handle.net/11540/1969

Bateman, M. (2017). *Post-war reconstruction and development in Cambodia and the destructive role of microcredit. Paper presented at the 8th International Scientific Conference "Future World by 2050.* Pula, Croatia, June 1-3rd, 2017. Retrieved from https://www.researchgate.net/publication/315788551_Post-war_reconstruction_and_development_in_Cambodia_and_the_destructive_role_of_microcredit

Bateman M. 2010. *Why doesn't microfinance work? The destructive rise of local neoliberalism.* Zed Books: London.

Beck, T., Demirguc-Kunt, A., & Peria, M.S.M. (2007). Reaching out: Access to and use of banking services across countries. *Journal of Monetary Economics, 85*(1), 234–266. http://refhub.elsevier.com/S0305-750X(18)30212-2/h0040

Bello, W. (2006). Microcredit, macro issues. *The Nation* [New York].

Banerjee, A.V., Dufio, E., Glennerster, R., & Kinnan, C. (2009). The miracle of microfinance? Evidence from a randomized evaluation. MIT Poverty Action Lab: Cambridge, MA.

Banerjee, A., & Newman, A. (1994). Poverty, incentives and development. *American Economic Review Papers and Proeceedings, 84*(2), 211–215.

Bornstein, D. (1996). *The price of a dream. The story of the Grameen Bank and the idea that it is helping the poor to change their lives*. New York, NY: Simon and Schuster.

Bruhn, M., & Love, I. (2014). The real impact of improved access to finance: Evidence from Mexico. *The Journal of Finance, 69*(3), 1347–1369. http://refhub.elsevier.com/S0305-750X(18)30212-2/h0055

Brune, L., Giné, X., Goldberg, J., & Yang, D. (2016). Facilitating savings for agriculture: Field experimental evidence from Malawi. *Economic Development and Cultural Change, 64*(2), 187–220. http://refhub.elsevier.com/S0305-750X(18)30212-2/h0060

Burgess, R., & Rohini, P. (2005). Do rural banks matter? Evidence from the Indian social banking experiment. *American Economic Review, 95*(3), 780–795. http://refhub.elsevier.com/S0305-750X(18)30212-2/h0065

Bourguignon, F. (2003). The growth elasticity of poverty reduction: Explaining heterogeneity across countries and time periods. In T. Eicher, & S. Turnovsky (Eds.), *Inequality and growth: Theory and policy implications*. Cambridge, MA: MIT Press.

Bylander, M. (2015). Credit as coping: rethinking microcredit in the Cambodian context. *Oxford Development Studies, 43*(4), 533–553. https://doi.org/10.1080/13600818.2015.1064880

Cole, S., Sampson, T., & Zia, B. (2011). Prices or knowledge? What drives demand for financial services in emerging markets?. *Journal of Finance, 66*(6), 1933–67. https://doi.org/10.1111/j.1540-6261.2011.01696.x

Coleman, B. E. (2006). Microfinance in Northeast Thailand: Who benefits and how much?. *World Development, 34*(9), 1612–1638. doi:10.1016/j.worlddev.2006.01.006

Coleman, B.E. (1999). The Impact of group lending in Northeast Thailand. *Journal of Development Economics, 60*(1), 105–142. doi:10.1016/S0304-3878(99)00038-3

Demirguc-Kunt, A., Klapper, L., & Singer, D. (2017). *Financial inclusion and inclusive growth – A review of recent empirical evidence* (World Bank Policy Research Paper, No. 8040). Washington, DC: The World Bank. Retrieved from https://ideas.repec.org/p/wbk/wbrwps/8040.html

Deininger, K., & Squire, L. (1998). New perspectives on old issues: Inequality and growth. *Journal of Development Economics, 57*(2), 259–287.

Di Falco, S., Veronesi, M., & Yesuf, M. (2011). Does adaptation to climate change provide food security? A micro-perspective from Ethiopia. *American Journal of Agricultural Economics, 93*(3), 829–846. doi:10.1093/ajae/aar006

Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth, 7*, 195–225.

Drexler, A., Greg, F., & Antoinette, S. (2014). Keeping it simple: Financial literacy and rules of thumb. *American Economic Journal: Applied Economics 6*(2), 1–31.

Duvendack, M., & Palmer, J.R. (2012). High noon for microfinance impact evaluations: re-investigating the evidence from Bangladesh. *The Journal of Development Studies, 48*(12), 1864–1880. https://doi.org/10.1080/00220388.2011.646989

Dupas, P., & Robinson, J. (2013). Savings constraints and microenterprise development: Evidence from a field experiment in Kenya. *American Economic Journal: Applied Economics, 5*(1), 163–92. http://refhub.elsevier.com/S0305-750X(18)30212-2/h0115

Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies, 60*(1), 35–52.

Ganle, J. K., Afriyie, K., & Segbefia, A. Y. (2015). Microcredit: Empowerment and Disempowerment of Rural Women in Ghana. *World Development, 66*, 335–345. doi:10.1016/j.worlddev.2014.08.027

Ghosh, S. & Vinod, D. (2017). What constrains financial inclusion for women? Evidence from Indian micro data. *World Development, 92,* 60–81. http://dx.doi.org/10.1016/j.worlddev.2016.11.011

Gonzalez, A. (2010). *Is microfinance growing too fast?* (MIX Data Brief No. 5). Microfinance Information Exchange. Retrieved from http://www.themix.org/publications/mix-microfinance-world/2010/06/microfinance-growing-too-fast

Greene, W.H. (2008). *Econometric analysis*. Prentice Hall: Upper Saddle River, NJ.

Grohmann, A., Klühs, T., & Menkhoff, L. (2018). Does financial literacy improve financial inclusion? Cross country evidence. *World Development, 111*(2018), 84–96. https://doi.org/10.1016/j.worlddev.2018.06.020

Heckman J.J, Tobias J.L, & Vytlacil E.J. (2001). Four parameters of interest in the evaluation of social programs. *Southern Economic Journal, 68*(2), 210–233. https://doi.org/10.2307/1061591

Imai, K.S., Arun, T., & Annim, S.K. (2010). Microfinance and household poverty reduction: New evidence from India. *World Development, 38*(12), 1760–1774. doi:10.1016/j.worlddev.2010.04.006

Imai, K.S., & Azam, M.D.S. (2012). Does microfinance reduce poverty in Bangladesh? New evidence from household panel data. *The Journal of Development Studies, 48*(5), 633–653. DOI:10.1080/00220388.2012.661853

Karlan, D., & Zinman, J. (2010). Expanding credit access: using randomized supply decisions to estimate the impacts. *Review of Financial Studies, 23*(1), 433–464. https://doi.org/10.1093/rfs/hhp092

Klapper, L., El-Zoghbi, M., & Hess, J. (2016). *Achieving the sustainable development goals – The role of financial inclusion* (CGAP Working Paper). Retrieved from https://www.unsgsa.org/files/3114/6489/8605/sdgs_paper_final_003.pdf

Kondo, T., Orbeta, A.J., Dingcong, C., & Infantado, C. (2008). *Impact of Microfinance on Rural Households in the Philippines* (PIDS Discussion Paper Series No. 2008-05). Philippine Institute for Development Studies. Retrieved from http://www.eaber.org/node/22639

Kulb C., Hennink, M., Kiiti, N., & Mutinda, J. (2015). How does microcredit lead to empowerment? A case study of the Vinya wa Aka group in Kenya. *Journal of International Development, 28*(5), 715–732. DOI: 10.1002/jid.3130

Lusardi, A., & Olivia S.M. (2007). Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business Economics, 42*(1), 35–44.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics, 46*(1), 31–77. http://refhub.elsevier.com/S0305-750X(18)30212-2/h0175

Lokshin, M., & Sajaia, Z. (2004). Maximum likelihood estimation of endogenous switching regression models. *Stata Journal, 4*(3), 282–289.

Lokshin, M., & Sajaia, Z. (2011). Impact of interventions on discrete outcomes: Maximum likelihood estimation of the binary choice models with binary endogenous regressors. *The Stata Journal, 11*(3), 368–385.

Maldonado, J. H., & González-Vega, C. (2008). Impact of microfinance on schooling: Evidence from poor rural households in Bolivia. *World Development, 36*(11), 2440–2455. doi:10.1016/j.worlddev.2008.04.004

Maddala, G.S. (1986). Disequilibrium, self-selection, and switching models. In Z. Griliches, and D. I. Michael (Eds.), *Handbook of econometrics* (pp. 1633–1682). North-Holland: Elsevier.

Maddala, G. S. (1983). *Limited-dependent and qualitative variables in econometrics*. Cambridge: Cambridge University Press.

Masino, S., & Niño-Zarazúa, M. (2018). Improving financial inclusion through the delivery of cash transfer programmes: The case of Mexico's Progresa-Oportunidades-Prospera programme. *The Journal of Development Studies,* 1–19. https://doi.org/10.1080/00220388.2018.1546845

Munyegera, C.K., & Matsumoto, T. (2015). Mobile money, remittances, and household welfare: Panel evidence from Rural Uganda. *World Development, 79*, 127–137. http://dx.doi.org/10.1016/j.worlddev.2015.11.006

Ouma, S.A., Odongo, T.M., & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization?. *Review of Development Finance,* https://doi.org/10.1016/j.rdf.2017.01.001

Pytkowska, J., & Spannuth, S. (2012). *Indebtedness of microcredit clients in Kosovo: Results from a comprehensive field study*. Frankfurt am Main: Microfinance Centre, Finance in Motion, EFSE.

Rahman M. W., Luo, J., & Minjuan, Z. (2014). Welfare impacts of microcredit programmes: An empirical investigation in the state-designated poor counties of Shaanxi, China. *Journal of International Development, 27*(7), 1012–1026. DOI: 10.1002/jid.3020

Ravallion, M. (2001). Growth, inequality and poverty: Looking beyond averages. *World Development, 29*(11), 1803–1815.

Seng, K. (2018a). Rethinking the effects of microcredit on household welfare in Cambodia. *The Journal of Development Studies, 54*(9), 1496–1512. https://doi.org/10.1080/00220388.2017.1299139

Seng, K. (2018b). Revisiting the microcredit's poverty-reducing promise: Evidence from Cambodia. *Journal of International Development, 30*(4), 615–642 https://doi.org/10.1002/jid.3336

Seng, K. (2015). The effects of nonfarm activities on farm households' food consumption in rural Cambodia. *Development Studies Research, 2*(1), 77–89. DOI: 10.1080/21665095.2015.1098554

Schicks, J. (2013). The sacrifices of micro-borrowers in Ghana – a customer-protection perspective on measuring over-indebtedness. *The Journal of Development Studies, 49*(9), 1238–1255. https://doi.org/10.1080/00220388.2013.775421

Swamy, V. (2014). Financial inclusion, gender dimension, and economic impact on poor households. *World Development, 56*, 1–15. http://dx.doi.org/10.1016/j.worlddev.2013.10.019

White, H., & Anderson, E. (2001). Growth vs. redistribution: Does the pattern of growth matter?. *Development Policy Review, 19*(3), 167–289.

Wydick, B., Hayes, H.K, & Kempf, S.H. (2011). Social networks, neighborhood effects, and credit access: Evidence from Rural Guatemala. *World Development, 39*(6), 974–982. https://doi.org/10.1016/j.worlddev.2009.10.015

Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of Development Finance, 6*(2016), 46–57. http://dx.doi.org/10.1016/j.rdf.2016.05.001

Appendix

Table A1. Summary of variables

Variables	Definition
Dependent	
Household income per capita	Natural log of monthly income per household member
Household budget deficit	= 1 if the household runs budget deficit (i.e., spending > income)
Financial inclusion	= 1 if the household uses financial services (i.e., saving and borrowing etc.)
Independent	
Household head's age	Natural log of household head age
Household head's gender	= 1 if the household head is female
Household head's ethnicity	= 1 if the household head is Khmer
Single	= 1 if the household head is single
Marriage	= 1 if the household head is married
Devoice	= 1 if the household head is devoiced
Widowed	= 1 if the household head is widowed
Training	= 1 if the household head had access to any training
Primary	= 1 if the household head had access to primary school
Secondary	= 1 if the household head had access to secondary school
Tertiary	= 1 if the household had access to higher education
Income generators	The number of household members who contribute to income generation
Cellphone	= 1 if the household communicates and access to information by cellphone
Email	= 1 if the household communicates and access to information by email
Rural	= 1 if the household lives in rural area
Coastal	= 1 if the household settles in Coastal area
Plain	= 1 if the household settles in Plain area
Plateau	= 1 if the household settles in Plateau area
Tonle sap	= 1 if the household settles in Tone sap area
Income proof	= 1 if the household processes income proof documents

Table A2. Parameter estimates—test for validity of the selected instruments

Variables	Per capita income by non-users (OLS)			Use of financial services (probit)			Budget deficit by non-users (probit)		
	Coef.	SE	*P*-value	Coef	SE	*P*-value	Coef	SE	*P*-value
HH's age	9.71***	2.10	0.00	9.26***	1.20	0.00	3.26*	1.65	0.05
HH's age squared	-1.37***	0.29	0.00	-1.22***	0.16	0.00	-0.43*	0.23	0.06
HH's ethnicity	0.17	0.21	0.43	-0.19*	0.11	0.08	-0.14	0.18	0.44
HH's gender	-0.17	0.27	0.52	-0.02	0.14	0.87	0.10	0.22	0.66
Single	-0.57	0.61	0.35	-0.33	0.36	0.37	-0.13	0.50	0.80
Marriage	-0.70***	0.16	0.00	0.07	0.09	0.44	0.04	0.14	0.76
Devoice	-0.13	0.48	0.79	0.25	0.27	0.37	-0.20	0.43	0.64
Widowed	-0.37	0.31	0.23	-0.01	0.17	0.94	0.05	0.26	0.85
Training	0.30	0.70	0.67	-0.54	0.43	0.21	0.91	0.67	0.18
Primary	0.41**	0.16	0.01	-0.07	0.09	0.44	-0.04	0.13	0.76
Secondary	0.52**	0.19	0.01	0.11	0.10	0.26	0.18	0.16	0.26
Tertiary	1.25**	0.54	0.02	0.12	0.22	0.59	0.15	0.39	0.71
Income generators	-0.15***	0.04	0.00	0.04*	0.02	0.05	-0.03	0.03	0.30
Cellphone	0.47***	0.10	0.00	0.43***	0.06	0.00	-0.02	0.08	0.82
Email	-0.68*	0.37	0.06	0.66***	0.14	0.00	0.14	0.28	0.62
Rural	-0.71***	0.11	0.00	-0.02	0.05	0.68	0.05	0.09	0.55
Coastal	0.22	0.20	0.26	0.09	0.10	0.38	-0.12	0.15	0.44
Plain	-0.24*	0.13	0.06	-0.03	0.05	0.54	0.03	0.09	0.77
Plateau	Dropped			-0.27***	0.08	0.00	-0.05	0.11	0.69
Tonlesap	-0.04	0.13	0.75	Dropped					
Income proof[a]	0.29	0.21	0.17	0.43***	0.11	0.00	-0.03	0.19	0.85
Family book[a]	0.08	0.14	0.54	0.01	0.08	0.91	0.25**	0.12	0.03
Constant	-5.12	3.83	0.18	-17.39***	2.19	0.00	-6.15**	3.00	0.04
Observations	1031			2693			1221		
Adj. R^2	0.14								
Prob. > Chi^2						0.00			0.48
Pseudo R^2				0.06			0.01		
Log likelihood				-1979.36			-835.20		

[a] the test for the joint effects income proof and family book under the null hypothesis: (1) for per capita income by non-users (OLS), $H_0: \lambda_1 = \lambda_2 = 0$, the critical value $F = 1.10$ and Prob. > $F = 0.33$; (2) for the use of financial services (probit), $H_0: \lambda_1 = \lambda_2 = 0$, the critical value $Chi^2 = 16.33$ and Prob. > $Chi^2 = 0.00$; and (3) for the budget deficit by non-users (probit),), $H_0: \lambda_1 = \lambda_2 = 0$, the critical value $Chi^2 = 4.65$ and Prob. > $Chi^2 = 0.10$.
* denotes test statistic significance at 10 per cent level.
** denotes test statistic significance at 5 per cent level.
*** denotes test statistic significance at 1 per cent level.