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Impact of Microcredit on Labour Migration Decisions: Evidence from a Cambodian Household Survey

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Abstract

The new economics of labour migration (NELM) suggests that migration substitutes for inaccessible credit markets. However, in a paradigm shift towards profit orientation, microfinance organizations in developing countries offer greater access to credit to potential migrants. That casts doubt on the prior understanding of the link between access to microcredit and migration. Exploiting survey data from 422 households in the northern part of Cambodia, this study examines the relationship between microcredit borrowing and migration decisions through the NELM theory in the South-South Migration (SSM) perspective. We employ the Endogenous Switching Probit model (ESP) to control for selection bias in borrowing decisions and the structural differences between borrowing and non-borrowing decisions that influence migration decisions. After instrumenting, the findings suggest that households with access to credit are more likely to have migrated family members than their non-borrowing counterparts, refuting the notion of migration as a substitute for credit. Household with borrowings from financial institution increase the likelihood of migrating by 5.6 percent while households with informal borrowing have a propensity to migrate about 3.2 percent. Our results have a number of policy implications, including guiding policymakers in rethinking the role of microcredit provision and redesigning microfinance programmes to maximise the return on labour migration.

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1. Introduction

Microcredit is often seen as an effective means of alleviating poverty in many developing countries. However, microcredit markets in developing nations are either weak or undeveloped. In rural areas, where credit markets are inaccessible, households view migration as a mean of overcoming credit or liquidity constraints, increasing income diversification, inducing risk-sharing, and obtaining insurance that responds to negative shocks (Stark & Bloom, 1985). Migration, however, can be costly that comprises upfront costs. Therefore, potential migrant households require capital to cover the costs of migration. Due to credit constraints, the emigration rate from poor countries is relatively low (Hatton & Williamson, 2005; Orrenius & Zavodny, 2005). In supporting this, McKenzie and Rapoport (2007) find an inverse U-shape relationship between household wealth and migration. However, as there is either cash transfer or credit available, liquidity or credit-constrained households would increase the likelihood of migration (Angelucci, 2015; Cai, 2020; Phan, 2012). This paper examines this ambiguous relationship between microcredit borrowing and labour migration decisions. It does so by investigating the new economics of labour migration (NELM) hypothesis in the South-South Migration (SSM) context and in a country where the microcredit market has rapidly expanded, especially into rural areas. To the extent that there is a large subject of new and unexplored areas within the global south migration, this paper provides new evidence of the microcredit-migration relationship that consequently impacts microcredit provisions and labour migration policy.

In the migration literature, the underlying relationship between microcredit and migration is negligible in the early pioneer concept of the neoclassical economics theory. However, the NELM overcomes shortcomings and limitations in the neoclassical economics theory by incorporating a focus on market failure into migration decisions. In particular, it proposes that when there is a presence of incomplete credit and insurance markets, migration specifically substitutes for inaccessible capital by providing remittances to left-behind households (Massey, 1988; Stark & Bloom, 1985). Migration becomes more attractive as an additional source of finance to increase household consumption and production and minimize vulnerability to adverse shock events. However, when liquidity or credit constraints relax, household access to credit can smooth consumption and enhance household production, decreasing the propensity to migrate (Stark & Bloom, 1985; Taylor et al., 1996). Based on the NELM, policy recommendations have frequently highlighted that a benefit of providing and expanding credit, particularly in rural areas, is viable to stem outwards migration (Bylander & Hamilton, 2015; Katz & Stark, 1986).

Another possible line of literature explaining the link between credit availability and migration is embedded in the network theory of migration. The theory suggests that a migration network is essential to inducing migration and increasing the propensity of the uptake of loans. First, the networks enable potential households and migrants to minimize asymmetric information

and uncertainty about jobs and risks at the destination by improving their understanding of migration infrastructures that facilitate the migration journey (Carrington, Detragiache, & Vishwanath, 1996; Munshi & Rosenzweig, 2005). Migration networks also lower migration costs, permitting migrants to smoothly integrate into a new labour market at the destination (McKenzie & Rapoport, 2010). Second, in developing countries where credit markets are often weak, households' ability to access credit may be heavily reliant on the strength of kinships and social networks, which may not only serve as credit guarantors but also improve the likelihood of credit awareness and participation (Ban, Gilligan, & Rieger, 2020; Okten & Osili, 2004). However, social networks may induce access to informal borrowing solely, as the networks can reveal borrower characteristics that essentially minimize the adverse selection problem (Okten & Osili, 2004). Networks, therefore, become direct moneylenders for potential borrowers (Gathergood & Wylie, 2018). The networks, however, are unlikely to accommodate formal borrowings because financial institutions frequently undertake credit evaluations to mitigate the potential problem of moral hazard. Moreover, poor financial literacy as well as credit requirements such as collateral and transaction costs, may prevent poor households from obtaining formal loans. Although credit requests could be approved, the loan amount may be relatively small (Laszlo & Santor, 2009; Okten & Osili, 2004). Therefore, a well-established migration network that provides access to opportunities at the destination with the relaxation of credit constraints for potential migrant households would increase the likelihood of migration to a large migrant community or links to a substantial migration network location.

A direct link between microcredit borrowing and migration is not obvious. Previous studies that establish this relationship are frequently discussed through the lens of remittances, in which remittances may relax household liquidity and credit constraint by either substituting credit or inducing loan uptake (See Aggarwal, Demirgüç-Kunt, and Pería (2011); Ambrosius and Cuecuecha (2013, 2016)). The unexplored research area and complication in this scholarship stem from the fact that migrant households are not always credit-constrained households. Little is known about whether greater access to microcredit induces migration or whether migration facilitates credit access. Moreover, another challenge that often impends understanding the microcredit-migration relationship arises from non-random assignments in migration and access to credit, leading to a self-selection bias problem, reverse causation, and omitted variable bias. Finally, there is limited evidence on how the NELM theory applies to South-South Migration (SSM) (Nawyn, 2016) because this theory has mainly been empirically tested in South-North Migration (SNM).[1]

Cambodia provides an intriguing setting for investigating the link between microcredit and migration for a number of reasons. First, international labour migration from Cambodia is characterised by temporary and seasonal migration, and a large proportion of undocumented migrant workers. These are the common characteristics of the SSM. Given that many migrant workers are undocumented, existing migration studies appear to convey uncertainties and

challenges in their findings due to a lack of better data on migration. Secondly, the formal credit market in Cambodia has gradually shifted from being pro-poor to a profit-oriented sector. Academics and researchers question whether microcredit is still a viable tool for poverty alleviation. Thus, gauging the effects of microcredit on migration decisions requires a different set of empirical modelling. Finally, the microcredit markets in Cambodia are categorized by the coexistence of formal and informal loans. Whilst formal loan provisions apparently substitute for informal borrowing, the demand for informal borrowings persists among poor households due to less restrictive loan requirements. Therefore, it requires a substantial investigation.

To address the above issues, we first obtain survey data of households' pre and post-migration economic conditions that represent the movement of people in the SSM context. We also gather information on the migration channel and network, length of period the migrant is abroad, and household borrowings through formal and informal channels. The data consists of 422 households, of which 275 households are non-migrant households and 147 migrant households having one or more family members working in Thailand in the last 12 months. About 73 percent of migrant households have at least one migrant family member who migrated through the informal channel.

Second, to gauge the causal effect of formal and informal borrowings on temporary migration decisions, we consider the profit-seeking behaviour of microcredit organizations. To do so requires modelling the determinants of household formal and informal borrowing. In the Cambodian credit market context, microfinance was initially inclusive of broadening the reach of the borrowers without collateral. However, a change to profit-seeking behaviour by MFIs later implies that they exclusively reach out to borrowers residing in relatively affluent areas where most households own assets that can serve as collateral, creating a self-selection bias in credit participation. To control for this, we use instrumental variables such as land ownership certificates and the number of MFIs in the village, permitting us to predict household formal and informal borrowing in the first stage of estimation.

Third, we use the Endogenous Switching Probit model (ESP) to simultaneously estimate borrowing and migration decision equations. This model can explicitly account for endogenous selection bias in borrowing decisions as well as structural differences between formal and informal borrowers and non-borrowers in terms of the household's migration decision-making function.

After instrumenting, our empirical findings show that households who acquire credit before to migrating are more likely to migrate afterwards, refuting the notion of migration as a substitute for credit. Therefore, it contradicts NELM's proposition on the credit-migration relationship. Households that obtain formal credit are 5.6 percent more likely to send a family member abroad, while households that access informal credit increase the probability to send a family member

abroad by 3.2 percent. We also find the crucial role of migration networks in facilitating informal borrowing and migration.

This paper contributes to a growing body of migration literature in a number of ways. First, our study sheds new light on the microcredit-migration relationship through the lens of the Global South labour mobility and in the context of a rapidly expanding credit market. Second, in contrast to previous research, this study advances our understanding of how credit influences migration decisions by incorporating the presence of formal and informal credit markets and their structural differences between borrowers and non-borrowers in terms of migration decisions. Finally, the research present a new perspective on the NELM hypothesis. According to our findings, the NELM theory may not adequately explain the relationship between microcredit borrowing and migration. This is because the theory was initially developed to provide an explanation in the setting of SNM. Consequently, it may be unable to explain the credit-migration link in the setting of SSM.

The remainder of the paper is organized as follows. The Cambodian microcredit market is described in the following section, which is followed by a discussion of the methodology in section 3. Section 4 then discusses the empirical specifications and approaches used to counter biases. Section 5 presents the data and variables, followed by an illustration of the descriptive statistics. Section 6 presents and discusses evidence on the factors influencing microcredit uptake and its impact on migration decisions. The last section provides our conclusions and avenues for future research.

2. Background: Cambodian Microcredit Development

Microcredit has played a significant role in poverty alleviation and development programmes in Cambodia over the last two decades (Bylander & Hamilton, 2015; CMA, 2014). In the absence of a proper banking system in the early 1990s, microfinance institutions operated on a non-profit motive to supply credit and improve the poor's livelihood. Such non-profit framework reflects the original purpose of the Yunus model of microcredit (Bateman, 2014; Bylander, 2015; Lanzavecchia, 2011; Seng, 2018a). With international donor's support, non-governmental organizations (NGOs) participations, and government efforts, microfinance flourished in Cambodian market. Moreover, due to the high demand for credit from small and medium-sized enterprises (SMEs) microfinance institutions became commercialised, and their goal shifted from supporting pro-poor growth to profitable self-sufficiency and profit maximisation (Seng, 2018a).

According to the Cambodia Microfinance Association (CMA), there were only 14 registered microfinance institutions (MFIs) in 2005, but this figure had rapidly increased to 39 by 2014 (CMA, 2014). In 2017, there were 69 MFIs and seven microfinance deposit-taking institutions (MDIs) with more than 1,341 offices operating in Cambodia (MoP, 2017; NBC,

2017).[2] The total amount of outstanding loans increased from USD 50.13 million to nearly USD 3 billion within ten years. In 2019, the outstanding loan value reached USD 5 billion, accounting for USD 2,696 on average per borrower. This figure is even higher than Cambodia's GDP per capita, which is only USD 1,384 (World Bank, 2017). This rapid expansion has made Cambodia one of the most microcredit-saturated countries in comparison to its neighbours (Bateman, 2017; IOM, 2019).

3. Methodology

This section elaborates on the estimation methods. It discusses estimate issues and challenges including reverse causality, endogeneity, and the importance of formal and informal credit. First, the reverse causation between credit uptake and migration is a crucial econometric concern. Such challenge stems from the fact that there is no evidence to verify whether migrants migrate before or after taking out a loan, which is especially problematic when panel data is unavailable (Bylander & Hamilton, 2015; Tiwari & Winters, 2019). Secondly, the uptake of microcredit is a non-random assignment that generates a selection bias problem. Using microcredit data from Northeast Thailand, Coleman (2006) suggests that self-selection bias emerges because households in the study area decided to participate in the microcredit program or access borrowing based on several factors such as wealth, land ownership, or gender. Moreover, the self-selection bias in borrowing may arise from unobservable attributes such as the differences in entrepreneurship ability and specific attributes of potential individuals or areas targeted by the microfinance institutions (Imai, Arun, & Annim, 2010). Finally, the coexistence of formal and informal borrowing posits special challenges in gauging the credit-migration nexus. It is an essential feature of households' financing options, particularly in the underdeveloped microcredit market (Chakrabarty & Chaudhuri, 2001; Chhorn, 2020; Turvey & Kong, 2010). The expansion of financial services, particularly formal loans, is often viewed as a substitute mechanism for informal borrowings and is oftentimes used to complement one another. Despite a high interest rate, household demand for informal credit remains because informal borrowing plays a significant role in reducing households' short-term liquidity constraints due to its responsiveness and accessibility. In addition, access to informal borrowing is mostly determined by a person's social reputation and trustworthiness (Gathergood & Wylie, 2018; Turvey & Kong, 2010).

We adopted the methodology used by Sabates-Wheeler, Sabates, and Castaldo (2008), employing past migration experience and pre-migration information to determine current household poverty in Ghana and Egypt and Orrenius and Zavodny (2005) with retrospective data. Using the retrospective data allows us to account for the reverse causality problem and can be utilized as an instrument for subsequent or current behaviour (Funkhouser, 2012; Taylor & Mora, 2006). This approach ensures that the direct causal effect of microcredit uptake on migration can be estimated. Moreover, we use the propensity score matching technique for sampling correction

because migration is a non-random assignment due to several unobservable attributes and household characteristics. Thus, allowing migration participation households to reside in the common support area through propensity score estimates ensures that the estimation is made based on comparable households (See Oum, Hassan, and Holmes (2021)).

We collected data on the household choice of borrowing microcredit from either formal or informal lenders or both prior to their migration journey to ensure credible identification of the causal effect of the credit-migration relationship. Because Cambodian labour migration is commonly temporary and seasonal, households may have one or more family members who are circular migrants. Therefore, it is vital to thoroughly consider the viability of the recall period to capture the household's first migration and borrowing history to minimize errors in recallable information. The choice of the recall period length is thus essential to ensure the quality of the information (Funkhouser, 2012). First, a five-year recall period is optimal for initiating a point of migration departure and for capturing valid retrospective data (Funkhouser, 2012). Second, our survey was conducted in 2019 which enables a five-year recall period. We believe the recall bias is further reduced due to a significant event in 2014, an immigration policy change by Thailand authorities to crack down on irregular migrants, enabling recalling easier (Bakewell, 2020; Funkhouser, 2012). Therefore, we obviate the drawbacks of retrospective data by not subjecting households to recall information beyond 2014.

Given the endogenous selection bias in borrowings and distinct characteristics of formal and informal borrowers and non-borrowers that may influence migration decisions, the Endogenous Switching Probit model (ESP) is then employed. Such model can account for the unconfounding factors affecting credit uptake, particularly the selection bias, and structural differences between non-borrowers and borrowers that are embedded in the migration decisions function. The ESP model also enables us to compute the counterfactual scenario which is the conditional probability of the same household migrating in the absence of borrowing. The paper builds on the conceptual framework developed by Akotey and Adjasi (2016), Bylander (2017), Bylander and Hamilton (2015), and Seng (2018a) to determine factors influencing formal or informal microcredit participation. A robust check is also conducted to determine the coexistence of formal and informal credit, which may have an effect on household migration decisions. This may be explained by the fact that the Cambodian credit market is characterised by the coexistence of formal and informal credit market. Also, it is important to assess migration decisions when households make decisions to take out multiple loans, which may be from one or both sources of borrowing.

4. Empirical Specification

As a starting exercise in examining the effect of microcredit uptake on migration decisions, we used the Instrumental Variable Probit model (IV-Probit) with the maximum likelihood method. We estimate the impact of different types of credit (Formal and formal borrowing) on migration decisions in separate equations. Therefore, it can be expressed as follows:

Migration with formal credit uptake:

$$M_{it} = \alpha_0 + \alpha_1 C_{1i,t-k} + \alpha_2 X_{it} + \alpha_3 X_{it-k} + \mu_i + \varepsilon_{1,it} \tag{1}$$

$$C_{1i,t-k} = \gamma_0 + \gamma_1 Z_{1i,t-k} + \gamma_2 X'_{it-k} + \varphi_i + \theta_{1\ it-k} \tag{1.1}$$

Migration with informal credit uptake:

$$M_{it} = \beta_0 + \beta_1 C_{0i,t-k} + \beta_2 X_{it} + \beta_3 X'_{it-k} + \mu_i + \varepsilon_{0,it} \tag{2}$$

$$C_{0i,t-k} = \gamma'_0 + \gamma'_1 Z_{0i,t-k} + \gamma'_2 X'_{it-k} + \varphi_i + \theta_{0it-k} \tag{2.2}$$

Where M_{it} denotes the binary choice in migration decision for household i that sent a family member abroad at time t. C_{0it-k} and C_{1it-k} are the binary indicators identifying the household decision to obtain informal and formal microcredit prior to migration in which takes the value of 1 and 0 otherwise. X_{it} is the set of observed household characteristics associated with migration at time t including household head characteristics- household head age, head gender, head education, and head with on-farm occupation. X'_{it-k} is the household characteristic, particularly before migration, including household dependency ratio, number of female members earning, the size of agricultural land, and migration network. μ_i and φ_i denote the village characteristic variable- irrigation infrastructure which take the value of 1 if there is an availability of irrigation system in the village, and 0 otherwise. $Z_{1i,t-k}$ and $Z_{0i,t-k}$ denote instrumental variables for formal and informal borrowing such as household possession of land ownership certificates, and an average number of MFIs operate in the village. We will return to discuss about rationale and admissibility of these instrumental variable in later in this section. $\alpha_1, \alpha_2, \alpha_3$, and $\beta_1, \beta_2, \beta_3$ are the parameters for equations (1) and (2), respectively. ε_{1it} and $\varepsilon_{0,it}$ are the random error terms and the subscripts i and t indicate household and time period while k indicates length of time that the migrant is absence from household i and has migrated. k equals zero for a non-migrant household.

To obtain consistent and unbiased estimates of migration decisions, it is necessary to employ instrumental variables that affect microcredit but do not directly affect migration decisions. We also employed instrument variables based on economic implications and our fieldwork observations to ensure the orthogonality assumption of the validity of the instrumental variables. We use a dummy variable indicating whether or not the household has a land ownership

certificate and the average number of MFIs operating in the village as instrumental variables. Based on the exclusion restrictions (ER), valid instrumental variables will affect migration decision only through credit uptakes and not directly on a migration decision and are uncorrelated with the error term ε_{it} (Pizer, 2016). The first reason for using land ownership as a proxy for formal borrowing is that in Cambodia, a land ownership certificate is an important document in applying for and obtaining formal borrowing. Household possession of the land ownership certificate is viewed and evaluated by formal lending institutions as collateral for borrowings and as identification of future loan repayment (Petracco & Pender, 2009). It is also worth mentioning that, despite owning land, not every Cambodian household, mostly those in rural areas, has a land ownership certificate. This is because the government only initiated systematic land registration in 2003, some families living on disputed or unregistered land may not have a land ownership certificate. Therefore, the possession of a land ownership certificate does not predict household migration decisions both theoretically and empirically. Secondly we employed another instrumental variable, the average number of MFIs operating in the village (Imai et al., 2010; Seng, 2018b). Since we only have the number of MFIs data at the commune level, we take the average numbers of the MFIs based on the numbers of villages in the commune. This instrumental variable would determine the demand for formal and informal loans but not directly impact household migration decisions. Several validity tests, including weak-instrument and the falsification test for both types of credit uptake, have been performed to ensure the admissibility and reliability of the selected instrumental variables (See Table A.2, A.3, A.4, and A.5 in the Appendix).

With the limitations of the IV-Probit estimation, we employ the Endogenous Switching Probit model (ESP) with a full information maximum likelihood approach (FIML). The ESP can provide more efficient and robust results than instrumental variables approaches (Khandker, Khalily, & Samad, 2012; Lokshin & Sajaia, 2011; Seng, 2018a). First, the ESP method can account for endogenous selection bias by estimating a simultaneous equation. Second, it can control for the structural differences between borrowers and non-borrowers regarding the migration decisions equations. Finally, the model allows for a counterfactual comparison of borrowing and non-borrowing (Formal and informal borrowing) on migration decisions. The ESP model can be specified as follows:

$$\gamma_1 Z_{i,t-k} + \gamma_2 X'_{it-k} + \theta_{it-k} > 0 \qquad \text{then } C_{i,t-k}= 1 \qquad (3.1)$$
$$\gamma_1 Z_{i,t-k} + \gamma_2 X'_{it-k} + \theta_{it-k} \leq 0 \qquad \text{then } C_{i,t-k}= 0 \qquad (3.2)$$

$$M_{1it} = \alpha'_0 + \alpha'_{1,} X_{1it} + \alpha'_2 X_{1it-k} + \nu_{1it}, \text{when a household obtains credit } (C_{it-k}= 1) \qquad (4.1)$$
$$M_{0it} = \alpha'_0 + \alpha'_1 X_{0it} + \alpha'_2 X_{0it-k} + \nu_{0it}, \text{when a household does not obtain credit } (C_{i,t-k}= 0) \qquad (4.2)$$

C_{it-k} represents the binary indicators identifying the household decision to obtain informal and formal microcredit, which are equal to 1; otherwise 0. M_{it} denotes the binary choice in migration decision for household i that sent a family member abroad at time t. $Z_{i,t-k}$ denotes the instrumental variables control for formal and informal borrowings, controlling for the endogeneity of credit uptakes. X_{1it} and X'_{it-k} are the vectors of variables that determine the regimes (borrowing and non-borrowing decision). The error terms θ_{it-k}, v_1, and v_0, are assumed to have a contemporaneous correlations and jointly normally distribution with a zero mean vector and covariance matrix (Lokshin & Sajaia, 2011).

$$Cov(\theta_{it-k}, v_1, v_0) = \begin{bmatrix} \sigma_{v_1}^2 & \sigma_{v_1 v_0} & \sigma_{v_1 \theta_{it-k}} \\ \sigma_{v_1 v_0} & \sigma_{v_0}^2 & \sigma_{v_0 \theta_{it-k}} \\ \sigma_{v_1 \theta_{it-k}} & \sigma_{v_0 \theta_{it-k}} & \sigma_{\theta_{it-k}}^2 \end{bmatrix} \tag{5}$$

Where $\sigma_{\theta_{it-k}}^2, \sigma_{v_1}^2$, and $\sigma_{v_0}^2$ are the variances of θ_{it-k}, v_1 and v_0 while $\sigma_{v_1 \theta_{it-k}}$ represent the covariance of θ_{it-k} and v_1. $\sigma_{v_0 \theta_{it-k}}$ is the covariance of θ_{it-k} and v_0. Finally, the covariance of v_1 and v_0 is $\sigma_{v_1 v_0}$. It is important to note that the validity of the endogenous switching model based on the statistical test in which $\sigma_{v_1 \theta_{it-k}}$ or $\sigma_{v_0 \theta_{it-k}}$ is different from zero ($\rho_{v_1 \theta_{it-k}}$ or ρ_1 represents the correlation coefficient between v_1 and θ_{it-k} and $\rho_{v_0 \theta_{it-k}}$ or ρ_0 denotes correlation coefficient between v_0 and θ_{it-k}). Otherwise, the model fits for the exogenous switching model (Maddala, 1986; Seng, 2018a). Furthermore, the signs of ρ_1 and ρ_0 provide an intuitive interpretation of the model which take the value between -1 and 1. For example, if the signs of ρ_1 and ρ_0 are the same, we would expect that the unobservable terms affecting borrowing decisions (Formal and informal borrowings) impact household migration decisions the same way; otherwise it would have an opposite effect on migration decisions if ρ_1 and ρ_0 have opposite signs (Khandker et al., 2012).

We also take into account a non-random assignment of migration. To correct self-selection bias in migration, we employ the Propensity Score Matching method by specifically estimating the propensity score for both migrant and non-migrant households using logit model (Liu, Feng, & Brandon, 2018; Roth & Tiberti, 2017). Therefore, households are clustered into five common support areas which the propensity score lie the value between 0 and 1, where $0 < Pr(M_i = 1|X_i) < 1$ and X_i is a set of exogenous factors affecting the decision to migrate M_i.[3]

Employing the dummies for land ownership certificates and the average number of MFIs at village level as the identification restriction as mentioned earlier, we simultaneously estimate the selection and outcome equations for the impact of both types of credit uptake on migration decisions. In the ESP model, it is necessary to gauge the conditional expected probability of a migrant household with borrowing and its counterfactual cases, in which the same household

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would not have borrowed from neither formal nor informal sources. Therefore, the conditional expected probability of migrant households with borrowing in equation (6) and its counterfactual scenario in equation (7) can be specified as follows (Khandker et al., 2012; Lokshin & Sajaia, 2011; Seng, 2018a).

$$E(M_{1it}|C_{i,t-k} = 1) = \alpha'_{1,1}X_{1it} + \alpha'_{2,1}X_{1it-k} + \sigma_{\nu_1\theta_{it-k}}\lambda \tag{6}$$

$$E(M_{0it}|C_{i,t-k} = 1) = \alpha'_{1,0}X_{0it} + \alpha'_{2,0}X_{0it-k} + \sigma_{\nu_0\theta_{it-k}}\lambda \tag{7}$$

The term $\sigma_{\nu_1\theta_{it-k}}\lambda$ corrects for sample selection bias in households access to formal and informal source of borrowings (Seng, 2018). $\sigma_{\nu_1\theta_{it-k}}\lambda$ can be obtained by computing regime selection equations (3.1) and (3.2) where $E(\nu_1|C_{i,t-k} = 1, Z_{i,t-k}, X_{1it}, X_{1it-k}) = \sigma_{\nu_1\theta_{it-k}}\lambda$ and $E(\nu_0|C_{i,t-k} = 0, Z_{i,t-k}, X_{0it}, X_{0it-k}) = \sigma_{\nu_0\theta_{it-k}}\lambda$. Therefore, the impact of borrowing on migration decisions can be calculated by subtracting the coefficient in equation (6) and (7). This method is also known as the average treatment on the treated (ATT), which can be described in the following:

$$ATT = E(M_{1it}|C_{i,t-k} = 1) - E(M_{0it}|C_{i,t-k} = 1) \tag{8}$$

$$ATT = \left(\alpha'_{1,1} - \alpha'_{1,0}\right)X_{it} + \left(\alpha'_{2,1} - \alpha'_{2,0}\right)X_{it-k} + \left(\sigma_{\nu_1\theta_{it-k}} - \sigma_{\nu_0\theta_{it-k}}\right)\lambda \tag{9}$$

5. Data and Variables
5.1. Data

This study uses a dataset collected from 422 households in 17 villages, covering three provinces in the northern part of Cambodia, namely, Banteay Meanchey, Battambang, and Siem Reap. The selected provinces account for more than 50 percent of the total international migrants from Cambodia (Dickson & Koenig, 2016; MoP, 2015). Probability proportional to size (PPS) sampling is used to determine the study area's sample distribution after the multi-stage random sampling is employed. The sample size is proportionally distributed according to the MoP (2017) data that state that overall, approximately 21 percent of households reside in the urban area and 79 percent in the rural area.

Table 1: Sample distribution by migration and borrowing status

Province	Number of Villages	Non-Migrant Households	Migrant Households	Total Samples
Banteay Menchey	6	90	52	142
Battambang	6	96	49	145
Siem Reap	5	89	46	135
Total		275	147	422

Migration Status	Formal credit		Informal Credit		Total
	Non-Borrower	Borrower	Non-Borrower	Borrower	
Non-migrant household	226	55	324	41	275
Migrant household	11	36	121	26	147
Observations	237	91	445	67	422

Source: Author's fieldwork

All collected information has been conducted via face to face interview, employing a questionnaire with sections exploring household demographic characteristics: household income and expenditure; migration history and experiences; the monetary cost of migration; household loan history before and after migration, and shock and coping strategy in cases where the household has experienced adverse shocks. After validating, we obtained 422 completed household questionnaires, of which 35 percent were migrant households and 65 percent non-migrant households. From our survey, among 422 households, 37 percent take out loans from both formal and informal lenders and out of those who take credit, about 57 percent access formal credit and 43 percent obtain credit from informal lenders.

5.2. Descriptive Statistics

This section outlines the descriptive statistical analysis results on household characteristics by borrowing status in Table 2, and Table A.1 in the Supplementary Materials presents additional results.

The summary statistics reported in Table 2 indicate significant differences between borrowing households and their non-borrowing household counterparts on the variables of interest. In particular, the results show that household heads who receive wages from on-farm occupation and have no formal education are less likely to access formal borrowings.[4] Moreover, there is a statistically significant difference between households with large size of agricultural land on borrowing status. The result shows that households with a larger agricultural land are less likely to access formal borrowing, implying that they are unlikely to confront liquidity constraints. It is also found that households residing in the village with an existing irrigation system are more likely to access a formal source of borrowing. This statistically significant difference implies that when a particular village possesses an irrigation system, it establishes favourable conditions for

cultivating paddy rice; therefore, farmers tend to receive a yield that could generate income, providing a greater ability to borrow money from formal money lenders and make repayments. Furthermore, Table 2 shows a statistically significant difference concerning households with land ownership certificates on borrowing status. Households with land ownership certificates are more likely to access formal borrowing since the ownership certificate is usually served as collateral to request formal loans from the financial institution.

In the informal sector, the result from Table 2 indicates a significant difference between non-borrowers and informal borrowers in terms of household head age, migration networks, and our instrumental variable- the average numbers of MFIs in the village. Household head age and its square term are statistically significant at 10 and 5 percent level, suggesting that the elder household head is less likely to access informal borrowing. Households connecting with previous migrants or return migrants are more likely to access informal borrowing. Finally, the instrumental variable, the average number of MFIs operated in the village, as a proxy for informal borrowing has a statistically significant difference at 5 percent level. This indicates that as MFIs expanded their services and operations, households would have greater access to formal financial services and are less likely to borrow from informal moneylenders.

Table A.1 in the Supplementary Materials reports additional results showing the statistically significant differences in the loan elements, particularly loan size, loan maturity, and interest rate per month, between formal and informal credits obtained by households. It is found that there is a statistically significant difference between the loan size in formal and informal credit uptake. Household informal borrowing is USD 764.75 on average at an interest rate of 3.03 per month, while the formal loan maturity is about 9 months. Regarding the formal credit, the result shows that the amount households obtained is relatively higher than the informal credit at USD 2831.6 on average, with an interest rate of 1.8 per month and 26 months of payment maturity.[5]

Table 2: Household characteristics by borrowing status

VARIABLES	Formal Borrowing					Informal Borrowing				
	Non-Borrower [a]		Borrower		Diff.	Non-Borrower [a]		Borrower		Diff.
	Mean	SD	Mean	SD	Mean	Mean	SD	Mean	SD	Mean
Migration decisions	0.3246	0.4691	0.39560	0.49168	0.0409	0.3246	0.4611	0.3880	0.4909	0.063
Household head characteristics										
Household head age	51.6530	13.2768	49.9890	11.9411	1.6640	51.653	13.277	48.478	11.817	3.175*
Household head age square	2843.646	1352.3120	2639.9230	1208.6060	203.7224	2843.64	1352.31	2487.64	1177.50	356.00**
HH female head	0.3657	0.4825	0.2967	0.4593	0.0690	0.366	0.483	0.269	0.447	0.097
HH head no formal education	0.2799	0.4498	0.1429	0.3519	0.137***	0.280	0.450	0.194	0.398	0.086
HH head on-farm occupation	0.4291	0.4959	0.3077	0.4641	0.1214**	0.429	0.496	0.478	0.503	-0.049
Household Characteristics										
Rural area	0.7127	0.4534	0.7253	0.4488	-0.0126	0.713	0.453	0.746	0.438	-0.034
HH dependency ratio	86.7964	95.2550	82.8599	80.3117	3.9365	86.796	95.255	95.896	121.926	-9.099
HH female earning	1.2313	0.7924	1.3516	0.8612	-0.1203	1.231	0.792	1.254	0.910	-0.022
Agricultural land (Hectare)	1.3257	2.5135	0.7746	1.4280	0.5510**	1.326	2.514	1.073	1.852	0.253
Agricultural land square	8.0516	56.1213	2.6168	7.2935	5.4348	8.052	56.121	4.531	17.307	3.521
Migration network	0.6866	0.4648	0.7253	0.4488	-0.0387	0.687	0.465	0.866	0.344	-0.17***
Village Characteristics										
Irrigation	0.3806	0.4864	0.4835	0.5025	-0.1029*	0.381	0.486	0.373	0.487	0.007
Instrumental Variables										
Land ownership certificate	0.3172	0.4662	0.5824	0.4959	-0.265***	0.317	0.466	0.239	0.430	0.078
Average numbers of MFIs per villages	0.2419	0.3104	0.1959	0.2819	0.0460	0.242	0.310	0.155	0.205	0.087**

*Note: a- households that neither borrow from formal nor informal sources of credit. The Wald test is performed to test the null hypothesis of equal means. * p<0.1, ** p<0.05, *** p<0.01. Source: Author's calculation*

6. Results
6.1. IV-Probit Results

Table 3 indicates the results from the IV-Probit model, which estimates the impact of formal and informal credit uptake in a separate equation. Our instrumental variables are statistically significant in both formal and informal reduced forms. The falsification test for the exclusion restriction and the weak instrumental variables show that the instruments are valid because they directly affect both formal and informal credit uptake and have an impact migration decisions only through borrowings, and reject the weak instrumental variables hypothesis (See Table A.2, A.3, A4, and A.5 in the Supplement Materials).

From columns 2 and 4 in Table 3, our variables of interest – formal and informal borrowing – indicate positive and statistical significance at 5 percent and 1 percent level, respectively. The results suggest that the relationship between credit uptake and migration decisions is complementary. Households obtaining formal and informal credit are more likely to have their family member migrate afterward. It is strongly and statistically suggested that relaxing credit constraints could induce out-migration, which contradicts the NELM's proposition.

Table 3 indicates that, in access to formal borrowing, some of our household control variables indicate statistical significance at 5 percent and 10 percent level. The head of a household with no education is less likely to borrow credit from formal institutions, which implies that complicated application forms to take out loans can be a challenge for such a person as it requires knowledge and a good understanding of loan requests. Furthermore, a household head who is a farmer is less likely to take out formal loans since incomes from agriculture can vary and be uncertain; therefore, a low return creates an inability to acquire a formal loan from a financial institution. However, we found a positive and statistically significant relationship between household head's age and the numbers of female family members contributing to household incomes and formal borrowings at 10 percent level. As expected the availability of irrigation systems within the village increases the likelihood of household access to loans from financial institutions. In the second stage estimation, several important findings reveal. Households resided in the rural area are more likely to have one or more migrants. Moreover, factors such as household dependency ratio, numbers of female members earning, and migration network remains positive and statistically significant at 1 and 5 percent level. Finally, the availability of irrigation systems within the village is more likely to stem out-migration.

In Table 3, columns 3-4, our second IV-Probit model estimates the effects of informal borrowing on migration decisions. Household characteristics such as head's age, occupation, education, household location, household dependency ratio, and female members are statistically insignificant. As expected, the migration networks remain essential in acquiring informal

borrowing, indicating positive and statistically significance at 5 percent level. This implies that the network effect might have impacted only the channel of informal credit rather than the formal because obtaining informal credit could be built on trust without collateral requirement, making it more accessible. The migration network effect does not determine the success of formal credit since taking out loans from formal financial institutions requires collateral, basic household knowledge, and credit evaluation done by credit officers prior to the loan approval.

Table 3: The Effects of Credit Uptake on Migration Decision (IV-Probit)

VARIABLES	Formal Borrowing		Informal Borrowing	
	First Stage	Second Stage	First Stage	Second Stage
	(1)	(2)	(3)	(4)
Formal borrowing		1.185**		
		(0.576)		
Informal borrowing				2.207***
				(0.610)
Instrumental Variable				
Land ownership certificate	0.175***			
	(0.0452)			
Average MFIs per village	-0.243***		-0.147**	
	(0.0722)		(0.0709)	
Household head characteristics				
HH head's age	0.0223*	0.0396	0.00932	0.0269
	(0.0114)	(0.0456)	(0.0106)	(0.0434)
HH head's age square	-0.000220*	-0.000255	-0.000106	-0.000137
	(0.000114)	(0.000447)	(0.000106)	(0.000415)
HH female head	-0.0174	-0.0341	-0.0261	0.0107
	(0.0454)	(0.156)	(0.0423)	(0.141)
HH head no formal education	-0.151***	0.251	0.00541	0.0177
	(0.0513)	(0.182)	(0.0478)	(0.158)
HH head farmer	-0.114**	0.149	0.0625	-0.134
	(0.0485)	(0.177)	(0.0452)	(0.155)
Household Characteristics				
Rural areas	0.00851	0.367**	-0.0292	0.296
	(0.0476)	(0.183)	(0.0445)	(0.192)
HH dependency ratio	-8.62e-05	0.00325***	0.000267	0.00157
	(0.000211)	(0.000853)	(0.000197)	(0.00131)
HH female earning	0.0421*	0.301***	0.000465	0.248*
	(0.0246)	(0.114)	(0.0228)	(0.136)
Agricultural land (Hectare)	-0.0225	-0.0610	-0.0277*	-0.00199
	(0.0172)	(0.0666)	(0.0160)	(0.0677)
Agricultural land Square	0.000758	-7.30e-05	0.000648	-0.000857

VARIABLES	Formal Borrowing		Informal Borrowing	
	First Stage	Second Stage	First Stage	Second Stage
	(1)	(2)	(3)	(4)
	(0.000754)	(0.00452)	(0.000702)	(0.00345)
Migration network	0.0334	0.477***	0.108**	0.132
	(0.0454)	(0.180)	(0.0422)	(0.259)
Village fixed effect				
Irrigation	0.0925**	-0.271*	0.0530	-0.189
	(0.0455)	(0.148)	(0.0426)	(0.139)
Provincial Dummies	YES	YES	YES	YES
athrho2_1		-0.471*		-1.060*
		(0.282)		(0.571)
lnsigma2		-0.957***		-1.028***
		(0.0355)		(0.0355)
Constant	-0.367	-3.204***	-0.000934	-2.490*
	(0.283)	(1.235)	(0.263)	(1.445)
Wald test of exogeneity	2.79*		3.45*	
Prob > Chi2		0.000		0.000
Observations	396	396	396	396

*Note: IV-Probit employed the maximum likelihood estimator. MFI, microfinance institute. Weak IV test and exclusion and restriction test are available in the appendix (See Table A.2, A.3, A.4, and A.5). * p<0.1, ** p<0.05, *** p<0.01*
Source: Author's calculation

6.2. Endogenous Switching Probit Model

Table 4 shows the result of FILM estimates of the ESP model for both formal and informal credit uptake and migration decisions estimation in columns 1-6. The estimated correlation coefficients of ρ_1 and ρ_0 are statistically significant, thereby provide an intuitive of the models in both sectors. It indicates that decisions to access formal and informal credit are not random distributed. Thus, there is the presence of endogenous selection bias in both formal and informal borrowings. Moreover, the signs of ρ_1 and ρ_0 are the same. Therefore, the unobservable factors might affect formal and informal borrowing decisions in terms of household migration decisions the same way. Furthermore, the likelihood test of the joint independents equations is statistically significant at 1 percent level in both sectors, rejecting the null hypothesis of the independent equations. Therefore, employing the ESP model is appropriate for the estimation.

Columns 1 and 4 in Table 4 presents the determinants of formal and informal credit uptake and the impacts on migration decisions of both borrowing regimes. Our instrumental variables remain substantial and statistically significant for both sectors with expected signs and consistent with earlier empirical estimations. Also, the determinants of borrowing in both sectors are consistent with the IV-Probit model, including household head's age, education, on-farm occupation, and household characteristics. Moreover, the availability of irrigation systems remains positive and statistically significant for formal loan uptake. Households with migrant networks are more likely to increase the likelihood of borrowing from informal moneylenders rather than access formal credit.

Based on the estimated results from Table 4, Table 5 shows the results of the estimation of the potential impact of microcredit borrowing on migration decisions. It is evident that households with formal and informal borrowing are more likely to have migrated family members than their non-borrower counterparts. Migrant households with formal borrowing have a conditional expected probability of 13.33 percent, whereas migrant households with informal borrowing have a conditional expected probability of 9.41 percent. In terms of counterfactual estimated probability, the conditional expected likelihood of migrant households if they did not borrow from formal sources is 7.61 percent and 6.19 percent if they did not borrow from informal sources. From Equation (9), taking into account the differences between the conditional expected probability of migration and borrowing and their counterfactual scenarios, households increase the likelihood of migration by 5.6 percent for formal borrowing and 3.2 percent for informal borrowing. Given the advantage of the counterfactual comparison, the findings implies that households who acquire credit before to migrating are more likely to migrate afterwards, refuting the notion of migration as a substitute for credit. These results are consistent with various studies that found borrowing induces migration (See Phan (2012), Cai (2020), Bylander and Hamilton (2015), and Tiwari and Winters (2019)).

Table 4 : The Impacts of Credit Uptake on Migration Decisions (Endogenous Switching Probit model)

VARIABLES	Formal Borrowing			Informal Borrowing		
	Formal Borrowing	Migration decision (Regime1)	Migration decision (Regime0)	Informal Borrowing	Migration decision (Regime1)	Migration decision (Regime0)
	(1)	(2)	(3)	(4)	(5)	(6)
Instrumental Variables						
Land ownership certificates	0.591***					
	(0.140)					
Average MFIs per village	-0.740**			-0.939***		
	(0.293)			(0.302)		
Household head characteristics						
HH head's age	0.0872*	-0.104*	0.0502	0.0564	0.0915	0.0542
	(0.0510)	(0.0578)	(0.0666)	(0.0478)	(0.0843)	(0.0491)
HH head's age square	-0.000901*	0.00121**	-0.000370	-0.000598	-0.000875	-0.000323
	(0.000525)	(0.000592)	(0.000657)	(0.000471)	(0.000832)	(0.000472)
HH female head	-0.0157	-0.0721	-0.000448	-0.139	0.187	0.0243
	(0.186)	(0.208)	(0.184)	(0.187)	(0.249)	(0.168)
HH head no formal education	-0.584**	1.791***	-0.0470	0.00542	-0.219	0.131
	(0.232)	(0.488)	(0.280)	(0.218)	(0.370)	(0.192)
HH head farmer	-0.456**	0.141	0.103	0.205	-0.666*	0.0570
	(0.198)	(0.243)	(0.257)	(0.186)	(0.354)	(0.173)
Household characteristics						
Rural areas	0.108	-0.322	0.485**	-0.103	0.679*	0.416**
	(0.218)	(0.285)	(0.237)	(0.181)	(0.360)	(0.180)
HH dependency ratio	-0.000428	0.00464**	0.00328***	0.00112	0.00315**	0.00275***
	(0.00088)	(0.0018)	(0.0009)	(0.000807)	(0.00159)	(0.00083)
HH female earning	0.178*	0.228	0.391*	0.0270	0.222	0.379***
	(0.0996)	(0.151)	(0.218)	(0.0858)	(0.140)	(0.0915)
Agricultural land (Hectar)	-0.0837	-0.174	-0.123	-0.113	0.0406	-0.101
	(0.0705)	(0.169)	(0.0966)	(0.117)	(0.256)	(0.0644)
Agricultural land Square	0.00206	0.0518	0.00119	-0.00237	0.0224	0.000747
	(0.00252)	(0.0316)	(0.00427)	(0.0163)	(0.0338)	(0.00246)
Migration network	0.138	0.665**	0.432*	0.541***	-0.995**	0.532***
	(0.187)	(0.272)	(0.237)	(0.198)	(0.503)	(0.175)
Village fixed effect						
Irrigation	0.300*	-0.424	-0.319*	0.310	-0.293	-0.238
	(0.172)	(0.353)	(0.177)	(0.190)	(0.231)	(0.163)
Provincial Dummies	YES	YES	YES	YES	YES	YES
Constant	-3.034**	1.766	-3.210**	-2.733**	-1.523	-3.998***
	(1.232)	(1.418)	(1.544)	(1.218)	(2.083)	(1.281)
Observations	396	396	396	396	396	396
/athrho1		-14.400			-15.329***	
		(1.7439)			(1.8255)	
Rho1		-1***			-1***	
		(2.14)			(3.54e-13)	
/athrho0		-3.6159**			-5.420	

VARIABLES	Formal Borrowing			Informal Borrowing		
	Formal Borrowing	Migration decision (Regime1)	Migration decision (Regime0)	Informal Borrowing	Migration decision (Regime1)	Migration decision (Regime0)
	(1)	(2)	(3)	(4)	(5)	(6)
		(1.546)			(8.2566)	
Rho0		-0.346			-.9999***	
		(1.3415)			(0.0006)	
Log Likelihood		-380.3330			-362.8064	
LR test of indep. eqns.		69.67***			70.60***	
Prob. > chi2		0.0000			0.0000	

Note: The estimations use the Full Information Maximum Likelihood (FIML) method to estimate simultaneously the borrowing status and migration decisions (Lokshin & Sajaia, 2011). Migration selection bias is corrected via PSM (See Oum et al., 2021). Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. Source: Author's calculation

Table 5: The impacts of formal and informal borrowing on migration decisions (Average Treatment Effect on the Treated)

	ATT	Std. Dev.
Formal Borrowing		
$E(M_1|Formal = 1)$	0.1333	0.01635
$E(M_0|Formal = 1)$	0.0761	0.00584
	0.056***	
Informal Borrowing		
$E(M_1|Informal = 1)$	0.0941	0.0108
$E(M_0|Informal = 1)$	0.0619	0.0039
	0.032***	

Note: ***p<0.01, **p<0.05, *p<0.1
Source: Author's calculation

Table A.6 in the Supplementary Materials, we present robust check estimations that take into consideration the coexistence of formal and informal borrowings in which households may have access to more than one loan. To account for such credit coexistence, we used the Seemingly Unrelated Bivariate Probit model and the simple Probit model. The findings are still consistent with our earlier empirical estimates, indicating that households that obtain formal loans prior to migrating are more likely to migrate later, exhibiting that migration is not a substitute for credit. However, households with informal borrowing are less likely to have migrants.[6] Second, we extend our understanding by including the purpose of loan variable measured by credit financing migration variable equal to 1 and 0 otherwise,[7] and the role of pre-existing debt. The result shows a significant positive impact of credit financing migration on migration decisions. It suggests that credit has been maneuverer to finance the migration journey. Furthermore, the formal and informal outstanding debt was divided into three categories: less than USD 250, between USD 251 and less

than USD 3,000, and greater than USD 3,000.[8] Our simple Probit estimation yields a strong and statistically significant result at the 1 percent level that households with such debts are more likely to send their family members abroad. This finding implies that debt systematically induces migration, which corresponds with anecdotal findings reported by international organisations such as the IOM (2019) and ILO (2020). Other explanatory variables have expected signs as migration determinants. For example, an uneducated farmer with a high dependency ratio is more likely to have a member migrate. Furthermore, households with a large amount of agricultural land and living in villages with irrigation infrastructure are less likely to have migrated family members.

Our empirical findings offer a fresh perspective on the Cambodian credit market and labour migration. It contradicts NELM's proposition on the credit-migration relationship. There could be a few possible explanations for this. First, recent works contributing to the microfinance literature in Cambodia such as Liv (2013), Bylander, Res, Jacoby, Bradley, and Pérez (2019), and Green (2020), explain that the expansion of financial services that maximize MFI's profit tend to increase indebtedness among borrowers, adding significant distress to households' livelihoods instead of mitigating it. Our findings confirm MFI's profit-oriented motive through modelling the determinants of household borrowings which diverges from a non-profit MFI's model in the 1990s. The financial institutions, particularly MFIs, have a tendency to target low default risk households with collaterals, so excluding poor and marginalized households from access to credit. Therefore, with the relaxing of credit constraints, households from the less affluent areas would increase the propensity to migrate.

Second, the positive association between formal credit and migration found could be linked to the loan repayment requirement, which oftentimes includes strict and inflexible repayment schemes (Bylander & Hamilton, 2015; Shonchoy, 2015). When formal borrowing does not generate substantial income to repay debts, households are more likely to opt for migration where remittances would serve as an additional income to pay off the debt. Additionally, households are vulnerable as a result of their overdependence on environmental conditions for agricultural activities because, in rural Cambodia, irrigation systems and other forms of agricultural infrastructure are scarce. Therefore, utilizing loans for a household's on-farm investment can be precarious and possibly generate a low return. To diversify their livelihoods and coping strategies, households would maneuver borrowings toward financing migration by sending one or more family members abroad.

Finally, when examined migration-microcredit relationship in a particular context, mainstream migration theory, particularly the NELM, which is commonly used to explain South-North labour movement, could have several shortcomings. Labour mobility of low- and semi-skilled workers may be impacted by dramatic changes in development patterns and structural transformation (for example, the rapid expansion of financial sector) in global south countries such as Cambodia

(Anich, Crush, Melde, & Oucho, 2014; Bylander & Hamilton, 2015; Nawyn, 2016). Moreover, structural differences in migration infrastructure in the SSM, which include the informal sector and irregular labour mobility, may add intricacies to labour migration. As a result, the NELM would be unable to adequately explain the relationship between microcredit and migration.

7. Conclusion

Although there is a substantial body of literature on the relationship between microcredit and migration, prior research has yielded ambiguous findings. Numerous studies that have viewed this link as either substitute or complementary have failed to distinguish between formal and informal credit and their respective effects on household migration decisions. Moreover, the structural differences between formal and informal borrowers and non-borrowers may have had a significant impact on migration decisions. Therefore, this study investigates the relationship between microcredit and migration decisions using a survey of 422 households in Cambodia, with a focus on Cambodia's credit market, which includes both formal and informal microcredit markets. The Endogenous Switching Probit model is primarily used in this study to assess the determinants of both formal and informal credit and their effects on labour migration decisions. A robust identification technique is used to investigate the credit-migration nexus, with instrumental variables being used to mitigate endogeneity issues caused by self-selection and omitted variable bias.

Our empirical findings show that households that obtained credit are more likely to have migrated family members. Households that obtain formal credit are 5.6 percent more likely to send a family member abroad, while households that access informal credit increase the probability to send a family member abroad by 3.2 percent. This result implies that formal credit is not a substitute for migration as suggested by the NELM. Furthermore, in our findings, migration networks still play an essential role in providing households access to informal borrowing and migration.

The positive relationship between credit and migration necessitates a reassessment of the policy on credit availability and labour mobility infrastructure. Policymakers should examine the contemporary context of microcredit, which has evolved from a poverty alleviation instrument to a commercial one. Furthermore, financial institutions should re-examine their financial products in order to encourage households to invest in productive investments. A better understanding of the microcredit-migration link will also help to reduce irregular migration, allowing migrants to travel more easily and enhance the welfare of their families and communities. Managing labour mobility and securing a positive return on migration will be difficult without this. In the future, researchers should pay greater attention to seasonal and temporary migration, which includes the informal sector and undocumented labour mobility.

Notes

(1) SSM and SNM characteristics can be seen in several points of divergence, including (1) insignificant wage differential, (2) sharing common borders, (3) gender-based migration, (4) temporary and seasonal migration, (5) remittance size, transaction cost, and remitting channel, (6) lessen immigration policy led to irregular migration (7) intra-ethnic or network migration; (8) environmental degradation, and (9) less selective migration (Anich et al., 2014; Ratha & Shaw, 2007).

(2) A recent study by Cambodia's MoP (2017) finds that majority of household borrowing are sourced from microfinance and credit operators (50.6 percent), followed by banks (27.5 percent), and the rest from moneylenders and relatives (13 percent). The average credit has been used for household consumption needs (29 percent) followed by agriculture activities 17.9 percent and improvements in dwellings (12.8 percent).

(3) The result of the Propensity Score Matching estimation can be found at Oum et al., 2021.

(4) Formal borrowings can be obtained from a formal institution such as banks, microfinance institutions and NGOs while informal credit is considered to be that received from informal moneylenders, relatives/friends, overseas employers, pawnshops, and the migrant's network

(5) According to MoP (2017), the loan a household borrowed from an informal money lender amounted to approximately 2,747,000 riel (USD 686) on average in 2013 and 3,492,000 riel (USD 873) on average in 2017, while households obtained credit from microfinance and credit operators was 7,310,000 riel (USD 1,827) in 2017 on average.

(6) We estimated the average marginal effect (AME) on the effect of both sources of debt on migration decisions (See Table A.8)

(7) 80 percent of the Vietnamese migrants in Malaysia had sought a loan to finance migrationt, 40 percent of those had sought loans from formal institutions, 60 percent informal lenders and relatives(ILO, 2018). Migrant survey in Thailand reported that they sell or pawn their household assets to fund their trip (Harkins, Lindgren, & Suravoranon, 2017; IOM, 2019). About 54 percent of Pakistani migrants have reported borrowing money from their family, friends, and informal moneylenders to finance their migration journey. More than half of Nepali migrants also use this source of borrowing to travel (Martin, 2017).

(8) The pre-existing debt before migration (defined as low debt if the debt is less than USD 250; medium debt if the debt is USD 250 to less than USD 3000 and high debt if the debt is more than USD 3000). These variable would allow use to commodate a concept of debt-induce migration (Bylander & Hamilton, 2015; Coleman, 2006; ILO, 2018; Loschmann & Siegel, 2014; Phan, 2012; Rahman, 2015).

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APPENDIX

Table A.1: Loan Size, Maturity and Interest Rate by Borrowing Status

Variables	Informal Credit		Formal Credit		Difference in Mean	
	Mean	SD	Mean	SD		
Loan size	764.754	698.1348	2831.604	3214.868	-2066.85	***
Loan maturity	9.333333	12.76209	25.97802	15.94573	-16.64469	***
Interest rate	3.035714	4.490249	1.840984	0.697227	1.194731	**

*Notes: The Wald test was performed to test the null hypothesis of equal means. ** denotes test statistically significant at 5 percent level. *** denotes test statistically significant at 1 percent level.*

Table A.2: Weak Instrumental Variable Robust Test (Formal Borrowing)

Test	Statistics		P-Value	Conf. Level	Confidence interval	
CLR	Stat (.)	3.06	0.0868	95%	-0.159988	3.39733
AR	Chi2(2)	4.25	0.1191	95%	-0.296808	3.44294
LM	Chi(1)	2.90	0.0885	95%	-0.159988	3.39733
J	Chi(1)	1.35	0.2447	95%	-0.251201	3.44294
Wald	Chi(1)	4.24	0.0396	95%	.056644	2.31417

Source: Author's calculation.

Table A.3: Weak Instrumental Variable Robust Test (Informal Borrowing)

Test	Statistics		P-Value	Conf. Level	Confidence interval	
AR	Chi2(2)	3.46	0.0630	95%	-.18494	4.59804
Wald	Chi(1)	13.08	0.0003	95%	1.01081	3.4023

Source: Author's calculation.

Table A.4: The Falsification Test of Exclusion Restrictions (Estimating the Impact of IVs on the Outcome Variable (Migration Decision)):

VARIABLES	Migration decisions (1)	Formal borrowing (2)
Instrumental variable (Land title)	0.109	0.658***
	(0.164)	(0.171)
Instrumental variable (Average MFI per village)	-0.336	-1.033***
	(0.298)	(0.295)
Household head characteristics		
HH head's age	0.0533	0.0892*
	(0.0497)	(0.0483)
HH head's age square	-0.000358	-0.000909*
	(0.000492)	(0.000494)
HH female head	-0.110	-0.0584
	(0.166)	(0.184)
HH head no formal education	0.108	-0.685***
	(0.211)	(0.234)
HH head farmer	-0.0187	-0.415**
	(0.171)	(0.197)
Household Characteristics		
Rural areas	0.420**	-0.00513
	(0.176)	(0.194)
HH dependency ratio	0.00313***	8.28e-05
	(0.000876)	(0.000839)
HH female earning	0.392***	0.116
	(0.0939)	(0.100)
Agricultural land (Hectar)	-0.0871	-0.0845
	(0.0623)	(0.0719)
Agricultural land Square	0.000299	0.00229
	(0.00259)	(0.00254)
Migration network	0.609***	0.0728
	(0.176)	(0.183)
Village fixed effect		
Irrigation	-0.126	0.374**
	(0.171)	(0.172)
Provincial Dummy	YES	YES
Constant	-3.537***	-3.020**
	(1.256)	(1.187)
Observations	396	396
Prob> Chi2	0.0000	0.0000
Pseudo R-square	0.1555	0.1340
Log likelihood	-11.631642	-9.6073094

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Household Sampling weight applied. MFI, microfinance institute.

Table A.5: The Falsification Test of Exclusion Restrictions(Estimating the Impact of IVs on the Outcome Variable (Migration Decision))

VARIABLES	Migration Decisions (1)	Informal Borrowing (2)
Instrumental variable (Land title)	-0.314	-0.881***
	(0.300)	(0.334)
Household head characteristics		
HH head's age	0.0539	0.0667
	(0.0497)	(0.0469)
HH head's age square	-0.000364	-0.000726
	(0.000492)	(0.000476)
HH female head	-0.115	-0.157
	(0.165)	(0.187)
HH head no formal education	0.106	0.0685
	(0.210)	(0.218)
HH head farmer	-0.0199	0.206
	(0.171)	(0.200)
Household Characteristics		
Rural areas	0.422**	-0.0853
	(0.175)	(0.195)
HH dependency ratio	0.00311***	0.00111
	(0.000878)	(0.000852)
HH female earning	0.398***	-0.0160
	(0.0927)	(0.0986)
Agricultural land (Hectare)	-0.0875	-0.0565
	(0.0623)	(0.131)
Agricultural land Square	0.000229	-0.00939
	(0.00259)	(0.0203)
Migration network	0.615***	0.547***
	(0.176)	(0.209)
Village fixed effect		
Irrigation	-0.121	0.288
	(0.172)	(0.188)
Provincial Dummies	YES	YES
Constant	-3.532***	-2.438**
	(1.261)	(1.149)
Observations	396	396
Prob> Chi2	0.0000	0.0024
Pseudo R-square	0.15.46	0.0943
Log likelihood	-11.37439	-8.37701

*Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Household Sampling weight applied. MFI, microfinance institute.*

Table A.6: The Impacts of Credit Uptake on Migration Decisions

VARIABLES	Formal Borrowing (1)	Informal Borrowing (2)	Migration Decisions (3)
Household head characteristics			
HH head's age	0.0766*	0.0842*	0.0291
	(0.0458)	(0.0453)	(0.0586)
HH head's age square	-0.000803*	-0.000887*	-0.000121
	(0.000473)	(0.000465)	(0.000590)
HH female head	-0.0603	-0.127	-0.0219
	(0.178)	(0.183)	(0.178)
HH head no formal education	-0.658***	0.0682	0.0950
	(0.226)	(0.213)	(0.266)
HH head farmer	-0.418**	0.209	0.0352
	(0.190)	(0.193)	(0.259)
Household characteristics			
Rural areas	-0.0357	-0.106	0.434**
	(0.186)	(0.198)	(0.184)
HH dependency ratio	-4.49e-05	0.00105	0.00302***
	(0.000839)	(0.000846)	(0.00104)
HH female earning	0.115	-0.0261	0.447***
	(0.0995)	(0.0950)	(0.112)
Agricultural land (Hectare)	-0.0833	-0.0723	-0.0943
	(0.0698)	(0.0667)	(0.0921)
Agricultural land Square	0.00239	0.00151	-0.000727
	(0.00234)	(0.00222)	(0.00927)
Migration network	0.0936	0.585***	0.532*
	(0.178)	(0.203)	(0.277)
Village fixed effect			
Irrigation	0.342**	0.271	-0.270
	(0.168)	(0.183)	(0.174)
Instrumental Variables			
Land ownership certificate	0.590***	-	-
	(0.168)	-	-
Average MFIs per village	-0.996***	-0.882***	-
	(0.288)	(0.338)	-
Formal			4.868***
			(1.125)
Informal			-5.101***
			(0.511)
IMR_1			0.0832
			(0.553)
IMR_0			0.652
			(1.297)
Formal (1= No outstanding debt)			-5.362***
			(1.152)
Informal (1= No outstanding debt)			4.922***
			(0.494)
Financing Migration			0.669**
			(0.335)

VARIABLES	Formal Borrowing (1)	Informal Borrowing (2)	Migration Decisions (3)
Amount of formal debt			
Loan of USD 250- USD3000			1.545**
			(0.745)
Loan of > USD 3000			1.636**
			(0.832)
Amount of informal debt			
Loan of USD250- USD3000			4.883***
			(0.832)
Province Dummies	YES	YES	YES
Constant	-2.631**	-2.908***	-3.369**
	(1.110)	(1.096)	(1.338)
\athrho	-0.472***		
	(0.138)		
Rho	-0.4402		
	(0.111)		
Wald test of rho	11.7277***		
Log pseudolikelihood	-18.255721		-10.685805
Adj. R-Squared			0.2058
Prob > Chi2	0.000	0.000	0.000
Observations	407	407	407

Note: We employed the propensity score estimates to attain only samples situated in the common support areas. Household sampling weight applied based on Deaton (1997). MFIs, microfinance institutes. Robust standard error in the parenthesis. * p<0.1, ** p<0.05, *** p<0.01

Table A.7: Correlations Matrix between Variables of Interest and Predicted Probability of Household Formal and Informal Borrowings

VARIABLE	Migration Decisions	Formal Borrowing	Informal Borrowing	(1)	(2)	(3)	(4)
Migration Decisions	1						
Formal Borrowing	0.0520	1					
Informal Borrowing	0.0362	-0.1647***	1				
(1)	0.0572	0.3630***	-0.0587	1			
(2)	0.1004**	-0.0339	0.265***	-0.1098**	1		
(3)	0.1895***	0.2264***	0.0651	0.630***	0.3580***	1	
(4)	-0.1222**	-0.2949***	-0.1053**	0.804***	-0.4973***	-0.8109***	1

Note: (1) $P_{10t-k} = \Phi_2(\gamma_1 Z_{1t-k}, -\gamma_0 Z_{0t-k}, -\rho)$: Predicted probability when households access for formal borrowing and do not access to informal borrowings.

(2) $P_{01t-k} = \Phi_2(-\gamma_1 Z_{1t-k}, \gamma_0 Z_{0t-k}, -\rho)$: Predicted probability when households access to informal borrowing and do not access to formal borrowings.

(3) $P_{11t-k} = \Phi_2(\gamma_1 Z_{1t-k}, \gamma_0 Z_{0t-k}, \rho)$: Predicted probability when households access to both formal and informal borrowings.

(4) $P_{00t-k} = \Phi_2(-\gamma_1 Z_{1t-k}, -\gamma_0 Z_{0t-k}, \rho)$: Predicted probability when households access to neither formal nor informal borrowings.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Author's calculations

Table A.8: Average Marginal Effects of Variables of Interest

VARIABLES	Delta-method					
	dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
Financing migration	0.1902	0.093	2.04	0.042	0.0072782	0.3731887
Amount of formal debt						
Loan of USD 250-USD 3000	0.4643	0.17997	2.58	0.01	0.1115947	0.8170791
Loan of > USD 3000	0.4859	0.1906	2.55	0.011	0.112243	0.8597416
Amount of informal debt						
Loan of USD 250-USD 3000	0.6602	0.021	30.77	0	0.6182213	0.7023428
Migration network	0.1513	0.0788	1.92	0.055	-0.003283	0.3059875
Rural area	0.1235	0.05073	2.44	0.015	0.0241288	0.223005
HH head's age	0.0082	0.01663	0.5	0.618	-0.0243202	0.0409064
HH head's age square	-0.00003	0.00016	-0.21	0.837	-0.0003635	0.0002946
HH female head	-0.0062	0.05056	-0.12	0.902	-0.1053511	0.0928744
HH head no formal education	0.0270	0.07586	0.36	0.721	-0.1216518	0.1757382
HH head farm occupation	0.0100	0.07382	0.14	0.892	-0.134681	0.1547247
HH dependency ratio	0.0008	0.0002	3.04	0.002	0.0003042	0.0014134
HH female earning	0.1272	0.0296	4.3	0	0.0692399	0.1853301
Agriculture land (hectare)	-0.0268	0.0259808	-1.03	0.302	-0.0777551	0.0240877
Agriculture land square	-0.0002	0.0026393	-0.08	0.938	-0.0053796	0.0049661
Irrigation	-0.0768	0.0494399	-1.56	0.12	-0.173788	0.020013

Source: Author's Calculations

Table A.9: Summary of Variables Employed in the Analysis

Variables	Definition
Dependent variables	
Migration decision	=1 if one or more household members migrate
Formal borrowing	=1 if household takes up microcredits from MFI prior to migration
Informal borrowing	=1 if household takes up informal credit prior to migration
Household head characteristics	
Household head's age	Natural log of household head's age
Household head's gender	=1 if household head is female
Household head's no education	=1 if household head has no formal education
Household head farmer	=1 if household head is a farmer
Household characteristics	
Rural Area	=1 if household is located in a rural area
Household dependency ratio	The ratio of non-income household members to household members who contribute income to the household
Number of household female earning	Number of female household members earning before migration
Agricultural land before migration	Total agriculture land in hectares household possesses before migration
Agricultural land before migration in square term	Total agriculture land in hectares household possesses before migration in square term
Migration network	=1 if household has a network with migrants/migrant household in the village
Household outstanding debt before migration	
Outstanding of < USD 250	=1 if household has outstanding debt less than USD 250
Outstanding of USD 250-USD 300	=1 if household has outstanding debt between USD 250 and USD 3,000
Outstanding of > USD 3,000	= 1 if household has outstanding debt of more than USD 3,000
Agricultural land before migration	Total agriculture land in hectares household possesses before migration
Instrumental Variables	
Land ownership certificate	=1 if household has a hard land title
Average MFIs per village	The total numbers of MFIs operate at commune level divided by the total numbers of village within the commune.
Village characteristics	
Irrigation system	=1 if household resides in a village that has proper irrigation system

Household Sampling Weight

Household weight W_i^h is constructed based on Deaton (1987):

$$W_i^h = \frac{W_i^v}{H_i^s \sum_{i=1}^n W_i^v}$$

Where W_i^v denotes the gross weight for the village while H_i^s is the total number of surveyed households in village i. W_i^v is calculated as:

$$W_i^v = \frac{T_i^v}{H_i^s} \cdot \frac{\sum_{j=1}^n T_i^v}{\sum_{i=1}^n H_i^s}$$

Where T_i^v denotes the total number of households located in the village i and H_i^s is the number of households from which information has been collected information in village i. Household weights are standardized sum to one.