The Use of Mobile Phones and Financial Inclusion

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Main Focus

- ✓ The Use of Mobile Phones and Financial Inclusion: Evidence from the 2014 Cambodia Socio-Economic Survey (CSES)

- ✓ The Use of Mobile Phones and Financial Inclusion: Evidence the 2015 FinScope Surveys of Cambodia

The Use of Mobile Phones and Financial Inclusion: Evidence from the 2014 Cambodia Socio-Economic Survey

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Outline

- Introduction
- Background of the Study
- Empirical Analysis
- Results and Discussion
- Conclusion

Introduction

- The major barriers to access to formal financial accounts and credit are costs, distances and bureaucracy (WB, 2014), causing credit market failures.

- Market failure prevent the poor from gaining access to financial services such as bank account deposit and borrowing etc.

- Modern information and communication technology (ICT), in particular mobile phones, is very likely to address this market failure, allowing the poor to have access to financial services they need.

- Increasing literature on the evaluation of factors promoting the financial inclusion in the developing world has been paying more attention to the effects of modern ICT such as mobile phones (e.g., Mihasonirina & Kangni, 2011; William, & Tavneet, 2011; Ahmed, et al., 2012; Mihasonirina & Kangni, 2012; Maria & Frida, 2014). Their findings suggest that mobile phones promote the access to financial services such as bank account deposit and borrowing, then enhancing economic growth.

- Alongside phone market development, Cambodia's financial sector has developed rapidly, playing a central role in the economy (Seng, 2017). These trends, plus recent financial technology developments, have a great potential to promote financial services to the most vulnerable groups at a low cost.

- To further promote and facilitate mobile phone development and its related financial services in Cambodia, there is a need for more plausible evidence on the wanted effects on financial inclusion.

Introduction (Cont')

- The objective of this paper is to analyse the effects of mobile phones on financial inclusion in terms of access to microcredit and borrowed amount at the household level in Cambodia, with a particular attention to the issues of sample selection or endogeneity regarding the use of mobile phones using the CSES conducted in 2014.

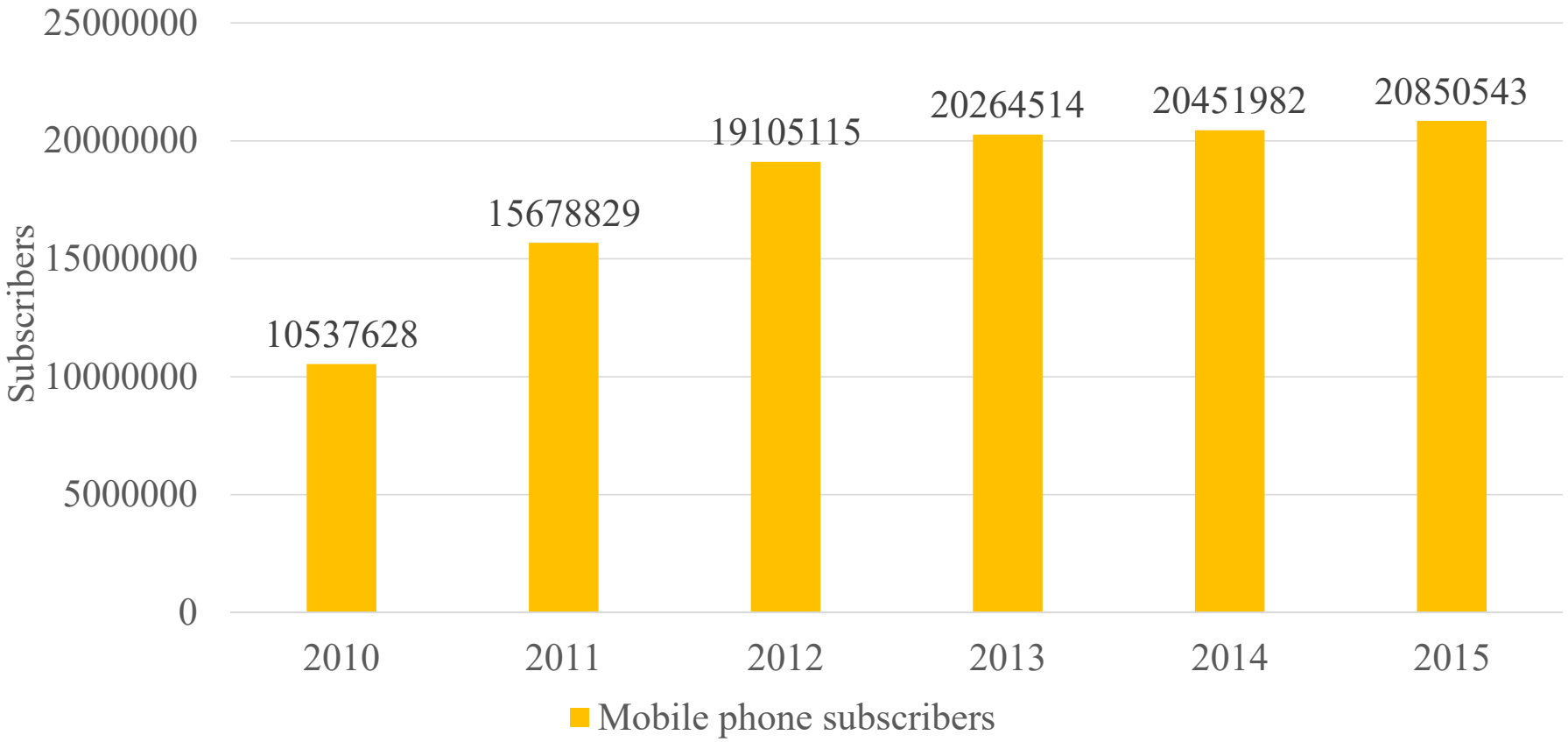
- The study uses a propensity score matching (PSM) method to control for the endogeneity of the decisions concerning the use of mobile phones, which arises from observed confounders.

- The study concludes that households using mobile phones are very likely to take up microfinance loans, in particular to invest in non-agricultural investment activities, but to be discouraged from using credit for non-productive activities. Moreover, they are more likely to have access to larger borrowed amounts than those that do not use mobile phones.

- This study contributes to earlier studies by quantifying the effects at the household level and particularly showing that mobile phones promote the uptake of credit for investment in productive activities and reduce the use of credit for non-productive activities.

Study Background

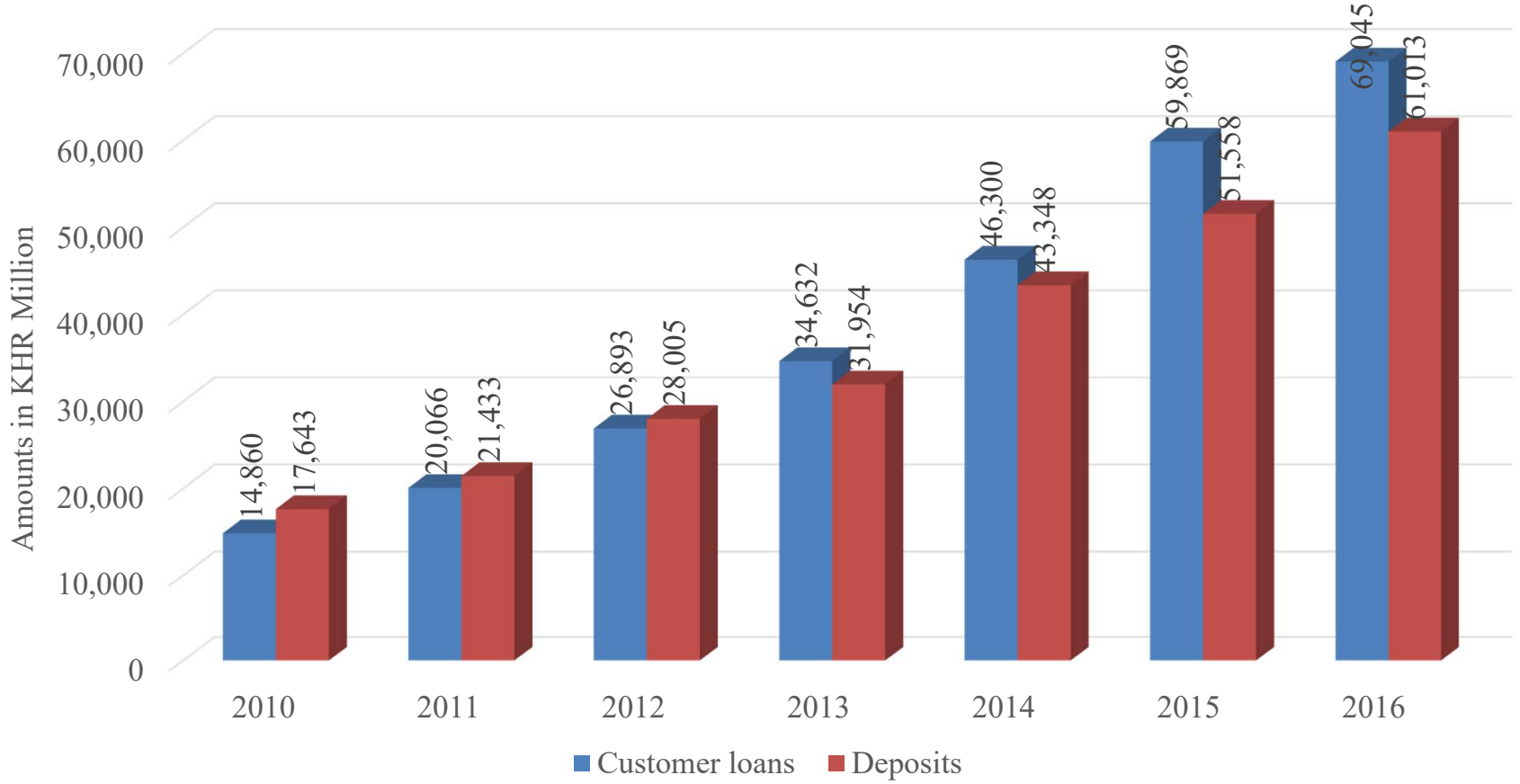
Mobile phone subscriptions 2010 – 2015



Source: Telecommunication Regulator of Cambodia (2017)

Study Background (Cont')

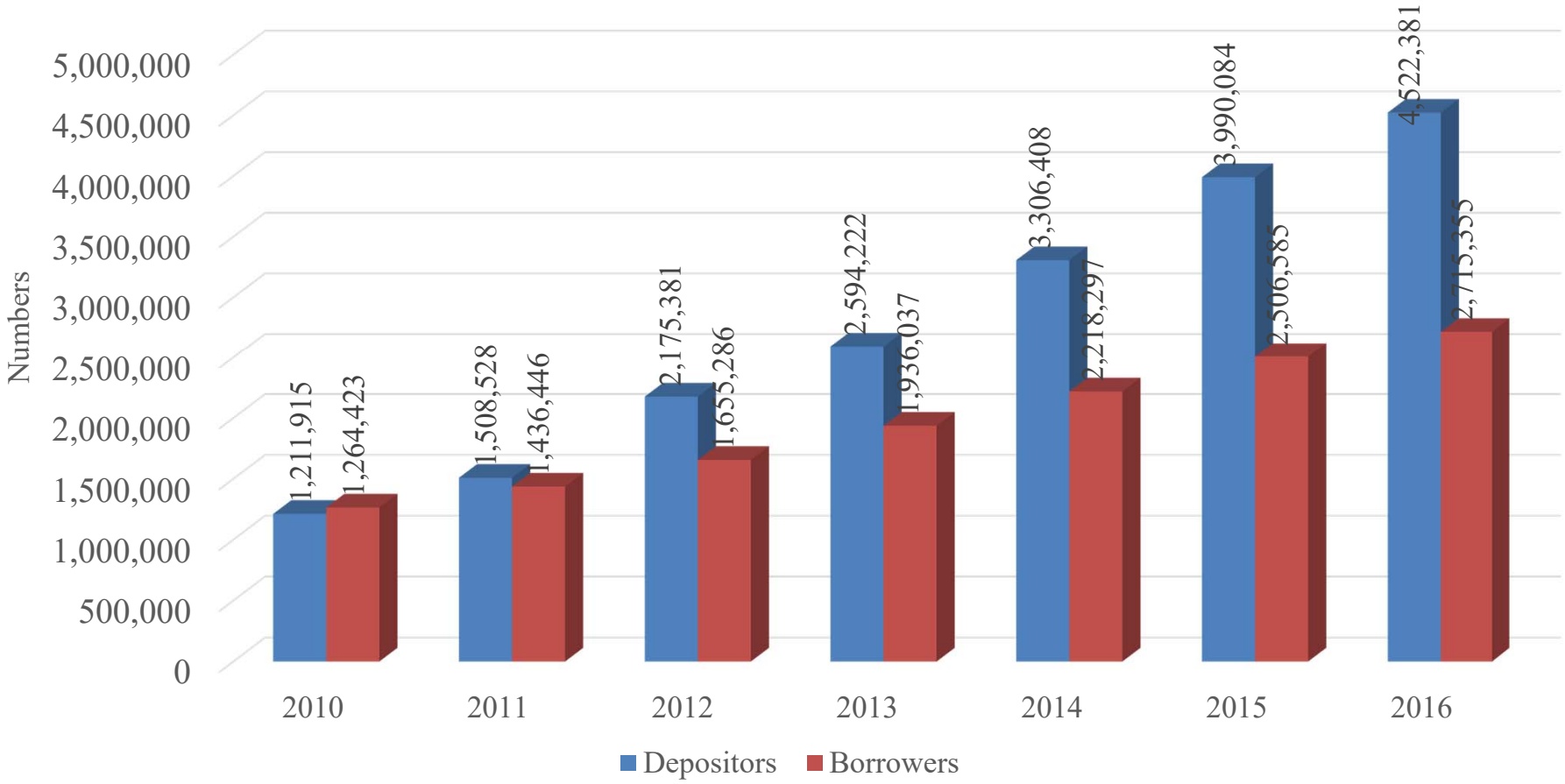
Customer loans and deposits of banks and financial institutions, 2010 – 2016



Source: NBC (2017)

Study Background (Cont')

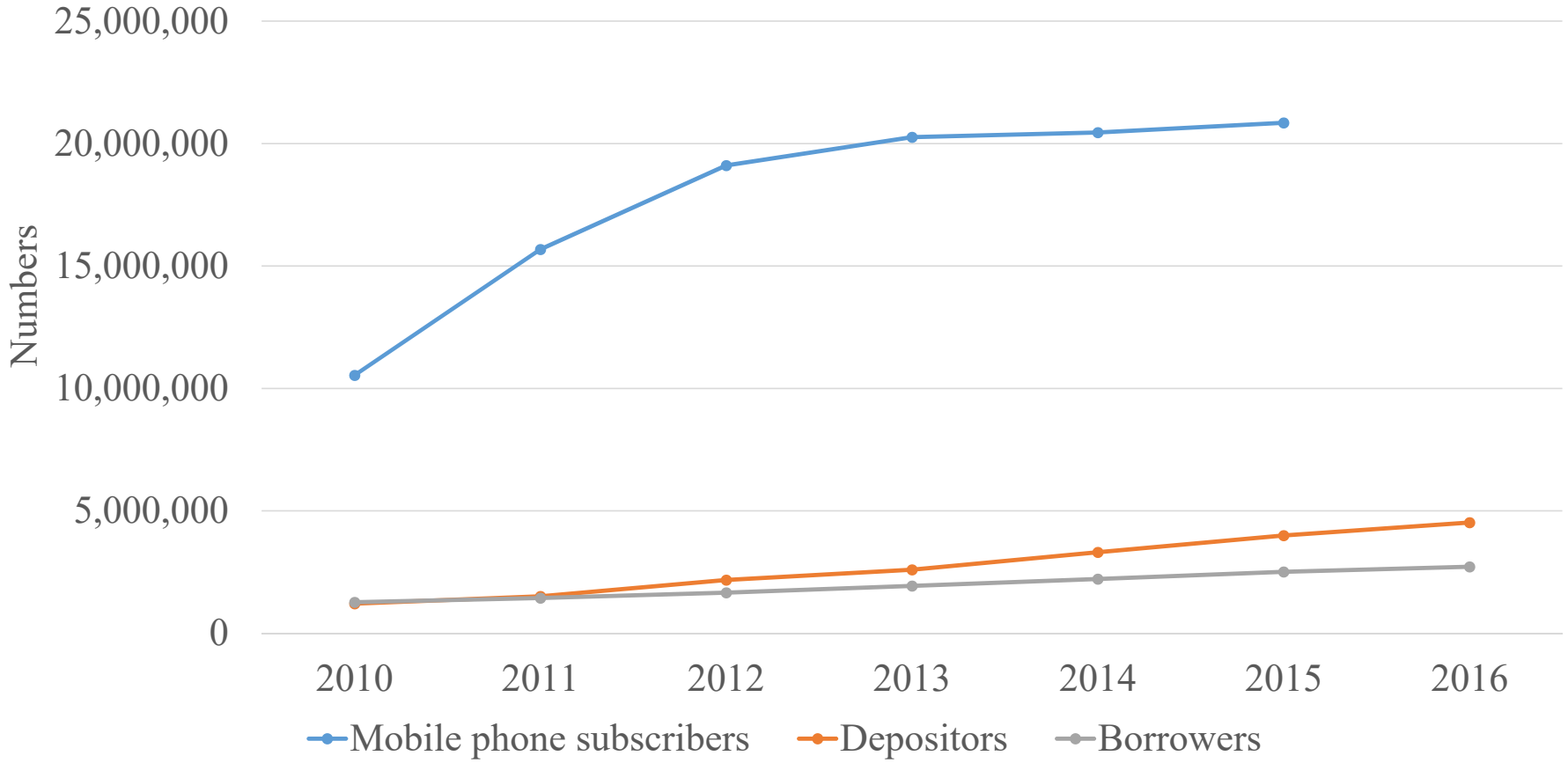
Numbers of depositors and borrowers of banks and financial institutions, 2010 – 2016



Source: NBC (2017)

Study Background (Cont')

Numbers of mobile phone subscribers, depositors and borrowers, 2010 – 2016



Source: Author's Compilation from NBC (2016) and WDI (2017)

Empirical Analysis

- Econometric Approach: the effects are quantified with PSM approach

✓ Determinants of the use of mobile phones

✓PSM Approach: estimation of the average treatment effects on the treated (ATT)

- Data used in the analysis: 2014 CSES

Determinants of mobile phone use

$$M_i^* = \alpha Z_i + v_i$$

$$M_i = \begin{cases} 1, & \text{if household uses mobile phone} \\ 0, & \text{if household does not use} \end{cases}$$

M_i^* is the probability that household *i* uses mobile phone (also known as the latent variable).

α is the vector of parameters to be estimated, and v is error term under the assumption that $v_i \sim N(0,1)$.

Z_i includes household characteristics that can capture household characteristics, head household characteristics, and household assets.

PSM Approach: estimation of the average treatment effects on the treated (ATT)

$$\Delta_i = Y_{1i} - Y_{0i}$$

- Y_{1i} is the potential outcomes of the treated households ($M_i = 1$).
- Y_{0i} is the potential outcomes of the control households ($M_i = 0$).

- The parameter that has attracted the most attention in the literature on effect evaluation is the average treatment effects on the treated *T* (ATT), which is defined as:

$$ATT = E^T(\Delta_i | M_i = 1, Z_i) = E(Y_{1i} | M_i = 1, Z_i) - E(Y_{0i} | M_i = 1, Z_i)$$

- With $E(Y_{0i} | M_i = 1, Z_i) = E(Y_{0i} | M_i = 0, Z_i)$ being estimated by using PSM. And ATT is estimated using KM and NNM approaches

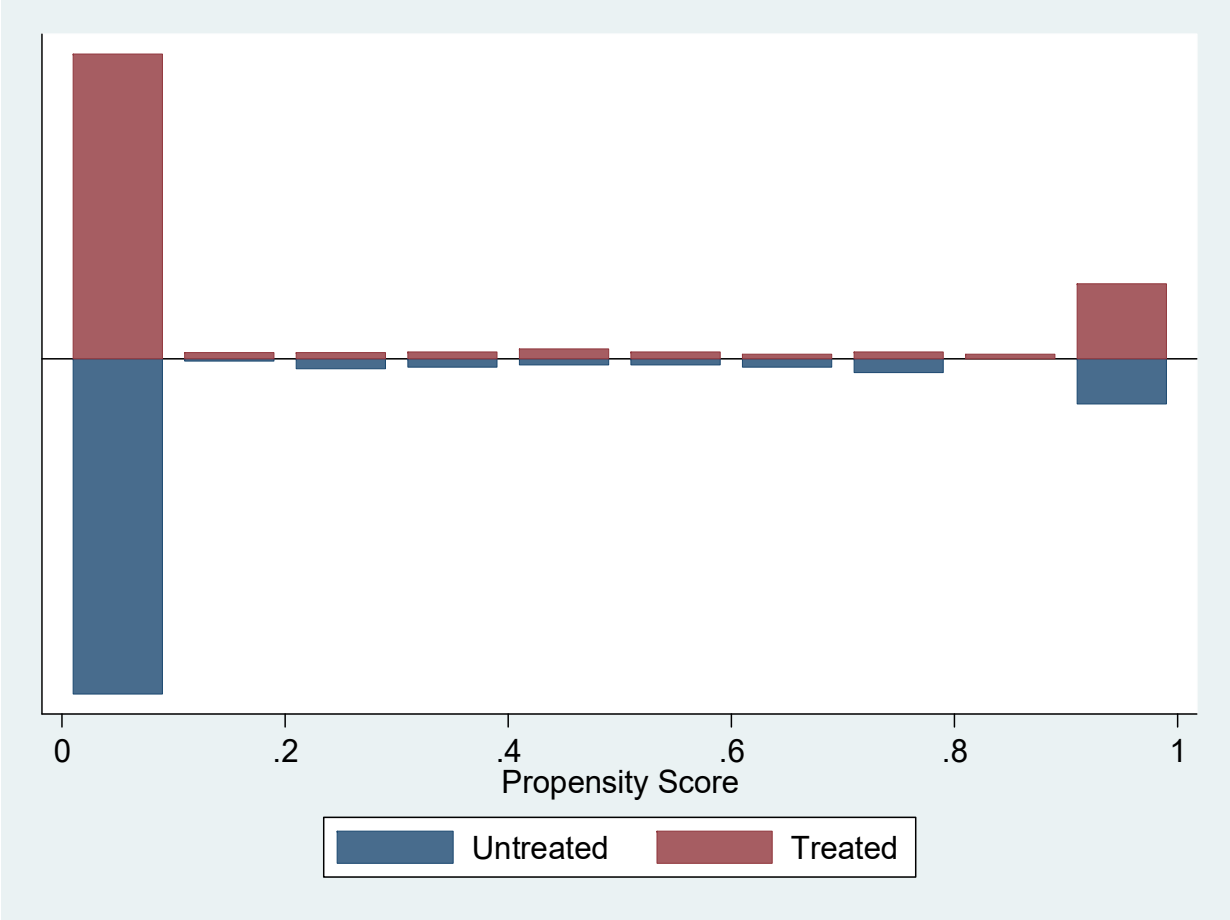
Variables	Definition
Dependent	
- Mobile phone	=1 if the household uses mobile phone(s)
- Formal borrowing	=1 if the household takes up microcredit from MFIs and/or NGOs
- Formal productive borrowing	=1 if the household takes up microcredit from MFIs and/or NGOs for income-generating activities
- Agricultural borrowing	=1 if the household takes up formal microcredit for investment in agricultural activities
- Non-agricultural borrowing	=1 if the household takes up formal microcredit for investment in non-agricultural activities
- Consumption borrowing	=1 if the household takes up formal microcredit for household consumption expenditure
- Other non-productive borrowing	=1 if the household takes up formal microcredit for other non-productive activities s
- Borrowed amount	The amount the household borrowed in Riel from MFIs and/or NGOs
Independent	
- Household head's age	Natural log of household head's age
- Household head's gender	=1 if the household is female-headed
- Primary education	=1 if the household head completed primary education
- Secondary education	=1 if the household head completed secondary education
- Higher education	=1 if the household head completed higher education
- Household head's ethnicity	=1 if the household head is Khmer
- Farmer	=1 if the household head is farmer
- Agricultural wage worker	=1 if the household head is agricultural wage-paid worker
- Non-agricultural wage worker	=1 if the household head is non-agricultural wage-paid worker
- Professional	=1 if the household head is professional
- Other career	=1 if the household head is not in these occupational categories
- Household members < 15	Total household members under the age of 15 years
- Household members > 64	Total household members over the age of 64 years
- Working-age household members	Total household members of 15 – 64 years of age
- Landholding	Natural log of landholding in hectares owned by the household

	Users			Non-users		Difference
Variables	Mean	SD		Mean	SD	in Mean
Formal borrowing	0.172	0.378		0.185	0.388	-0.013*
Formal productive borrowing	0.078	0.269		0.078	0.268	0.001
Agricultural borrowing	0.086	0.280		0.117	0.321	-0.031***
Non-agricultural borrowing	0.053	0.225		0.026	0.160	0.027***
Borrowing for consumption	0.111	0.314		0.176	0.381	-0.065***
Other non-productive use borrowing	0.081	0.274		0.105	0.307	-0.024***
Formal borrowed amount	4,203,060	9,993,676		1,407,796	3,299,428	795,264***
Household head's age	46.242	12.715		44.952	15.055	1.291***
Household head's gender	0.175	0.380		0.250	0.433	-0.074***
Primary education	0.403	0.491		0.476	0.499	-0.073***
Secondary education	0.422	0.494		0.185	0.388	0.237***
Higher education	0.031	0.173		0.007	0.086	0.024***
Household head's ethnicity	0.962	0.191		0.957	0.202	0.005
Farmer	0.409	0.492		0.716	0.451	-0.307***
Agricultural wage worker	0.016	0.126		0.068	0.252	-0.052***
Non-agricultural wage worker	0.206	0.405		0.042	0.201	0.164***
Professional	0.114	0.318		0.018	0.134	0.096***
Other career	0.020	0.141		0.019	0.137	0.001
Household members < 15	1.454	1.215		1.588	1.341	-0.135***
Household members > 64	0.185	0.464		0.234	0.511	-0.050***
Working-age household members	3.437	1.640		2.701	1.380	0.736***
Landholding	2.257	10.536		1.449	4.692	0.808***

Results: Determinants of mobile phone use (logit)

Variables	Coef.	SE	P-value
Household head's age	10.957***	3.192	0.001
Household head's age squared	-1.467***	0.432	0.001
Household head's gender	-0.200*	0.110	0.070
Primary education	0.615***	0.101	0.000
Secondary education	1.197***	0.116	0.000
Higher education	0.156	0.409	0.703
Household head's ethnicity	-0.211	0.224	0.346
Farmer	-1.019***	0.142	0.000
Agricultural wage worker	-1.578***	0.382	0.000
Non-agricultural wage worker	0.777***	0.254	0.002
Professional	0.690**	0.287	0.016
Other career	-0.316	0.440	0.472
Household members < 15	-0.079**	0.032	0.013
Household members > 64	0.040	0.103	0.696
Working-age household members	0.258***	0.030	0.000
Landholding	0.134***	0.036	0.000
Constant	-21.144***	5.835	0.000
Observation	3496		
Prob > chi2			0.000
Pseudo-R^2	0.113		

Common support region



Results: Mobile phones' effects

		Outcome Means				
PSM Methods	Outcome Variables	Users	Non-users	Difference (ATT)	Std. Err.	*t*-Statistic
KM						
	Formal borrowing	0.54	0.47	0.07***	0.02	3.32
	Formal productive borrowing	0.27	0.21	0.06***	0.02	3.26
	Agricultural borrowing	0.35	0.33	0.02	0.02	0.98
	Non-agricultural borrowing	0.12	0.06	0.06***	0.01	5.36
	Borrowing for consumption	0.31	0.38	-0.07***	0.02	-3.17
	Other non-productive credit use	0.24	0.26	-0.02	0.02	-0.84
	Formal borrowed amount	3,544,364	1,639,974.9	1,904,389.09***	265,045.71	7.19
NNM						
	Formal borrowing	0.55	0.52	0.03	0.05	0.63
	Formal productive borrowing	0.29	0.21	0.08	0.04	1.86
	Agricultural borrowing	0.35	0.30	0.05	0.05	1.03
	Non-agricultural borrowing	0.13	0.05	0.08**	0.03	2.92
	Borrowing for consumption	0.32	0.41	-0.09	0.05	-1.86
	Other non-productive credit use	0.22	0.26	-0.04	0.04	-0.84
	Formal borrowed amount	4,348,098	2,745,061.4	1,603,036.6	870,956.75	1.84

Matching quality before and after matching

	Pseudo-R^2 before matching	Pseudo-R^2 after matching	$p > \chi^2$ before matching	$p > \chi^2$ after matching	Mean bias before matching	Mean bias after matching	Var. before matching	Var. after matching
KM	0.113	0.001	0.000 (513.95)	1.000 (3.05)	17.8	1.7	81	31
NNM	0.113	0.025	0.000 (513.95)	0.277 (17.73)	17.8	9.1	81	44

- The pseudo-R^2 is significantly reduced, from approximately 11.3% before matching to approximately 0.1% and 2.5% for the KM and NNM methods, respectively, after matching.

- There is a substantial reduction in total bias through matching; however, the KM method is more plausible in terms of bias reduction and variance after matching.

Result Explanation

- Mobile phones are likely to promote formal borrowing; borrowing for productive purposes, in particular for non-agricultural activities; and reduce borrowing for non-productive purposes.

- *Why?*

✓Mobile phones can reduce transaction costs. Users of mobile phones can have easier access to a large amount of information, in particular on the process of applying for credit and on financial knowledge through by-phone communication and social networks.

✓Users are very likely manage business financed by credit more efficiently and then reducing business risk.

✓Therefore, with such information, the users are very likely to be induced to take out credit to undertake investments in income-generating activities, especially non-agricultural investment as evidenced by the study results.

✓Mobile phones can help banks reduce their transaction costs associated with operation cost, increase customer reachability and improve business risk management. Then, they provide credit at a lower cost

✓Beyond reducing such costs, mobile phones also permit customers to interact more directly with their banks, checking balances and initiating transactions from wherever they are.

Conclusion

- The analysis is carried out with the PSM approach using the 2014 CSES to address endogeneity issues of the use of mobile phones and to evaluate the effects.

- Households that use mobile phones are very likely to take up credit offered by microfinance institutions, in particular to invest in non-agricultural investment activities, but to be discouraged from using credit for non-productive activities such as purchase of durable goods, dwelling purchase, building and so forth.

- Households using mobile phones are more likely to have access to larger borrowed amounts than those that do not. These results reveal that the use of mobile phones is very likely to promote financial inclusion in terms of households' access to credit and borrowed amount.

- Finally, the current study is limited by unobserved confounders that cannot be accounted for by the PSM approach. Furthermore, it has its limitations in the data because the panel data is unavailable and the data used in the analysis is not ideal for estimating treatment effects.

- Moreover, the data cannot allow the analysis to distinguish between smartphones and non-smartphones.

- Other financial services including deposit bank accounts, money transfer, e-money and so forth should be also included in the analysis of financial-inclusion-promoting effects of mobile phones.

Policy consideration

- Consider enhancing mobile money services through:

✓Promoting financial transaction via mobile phones.

✓Promoting financial information via mobile phones, in particular information on borrowings for the productive purposes.

✓Promoting financial knowledge via mobile phones.

- The financial transaction via mobile phones may requires phone users to have any accounts at banks, thus mobile phones are very like not only to reduce transaction costs but also to mobilise domestic financial resources through promoting domestic savings at banks.

Thank you very much!

Q & A

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