ІНФОРМАЦІЙНІ СИСТЕМИ І ТЕХНОЛОГІЇ В ЕКОНОМІЦІ

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T.O. PODVYSOTSKA
National University "Kyiv-Mohyla Academy", Kyiv

ECONOMETRIC MODELLING OF PERSPECTIVES FOR MOBILE MONEY ADOPTION IN UKRAINE: ROOM FOR EFFICIENCY IMPROVEMENT

This study aims to extend understanding of factors that affect adoption of m-banking technologies in Ukraine among various population groups.

We plan to use cross-section OLS and binary dependent variable ('Probit') methodology to estimate of the Technology Acceptance Model using survey data in order to clarify the peculiarities of mobile banking adoption by different population groups in Ukraine. This could be useful to identify the areas of possible gains from m-money, including remittances, entrepreneurship, government safety nets, public utilities that should be pursued without delay. Implications from the research might be useful to banking institutions, the government and telecom operators to strategically frame their service model for broader mobile banking adoption.

Keywords: mobile banking, mobile money technologies, transition economy

Т.О. ПОДВИСОЦЬКА
Національний університет «Києво-Могилянська академія», м. Київ

ЕКОНОМЕТРИЧНЕ МОДЕЛЮВАННЯ СЦЕНАРІЇВ ВПРОВАДЖЕННЯ МОБІЛЬНИХ БАНКІВСЬКИХ ТЕХНОЛОГІЙ В УКРАЇНІ

Мета статті - розширити розуміння факторів, що впливають на прийняття і поширення мобільних банківських технологій в Україні серед різних груп населення. У дослідженні використаний метод найменших квадратів і probit-методологія для оцінки моделі прийняття технологій (Technology Acceptance Model) на основі даних опитувань з метою уточнення особливостей прийняття мобільних банківський технологій різними групами населення в Україні. Це може бути корисно, щоб визначити області можливих вигод від мобільних грошей, у тому числі при здійсненні грошових переказів, для осіб дрібного і середнього бізнесу, державних систем соціального захисту, при оплаті комунальних послуг. Результати дослідження можуть бути корисні банківським установам, державним структурам і операторам зв'язку для розробки стратегії і подальшого удосконалення моделі використання мобільних банківських послуг.

Keywords: мобільний банкінг, мобільні грошові технології, перехідні економіки

Introduction

Nowadays mobile money spreads rapidly across the globe. According to the Global Mobile Money Adoption survey, number of registered m-money users globally was 81.8 million in 2012 and has been growing by more than 35% per year; during one month m-money transactions comprised $4.6 billion, which is more than 20 times higher than transactions performed by PayPal customers in a given month (GSMA, 2012). Almost 50% of all m-money users reside in Kenya, because of the success of its SMS-based money-transfer system M-PESA (Yousif et. al, 2011).

Ukraine is a transition economy and has a much more developed banking system than countries like Kenya (e.g. number of ATMs per 100 000 adults is 10 times higher, number of deposit account with commercial banks per 1,000 adults – 7 times higher in Ukraine than in Kenya – (FAS, 2012), but development of m-money could still have a positive effect for socio-economic development of Ukraine. Interestingly, that amount of unbanked population in Ukraine exceeds 24 million, which is more than a 50% of work-age population (EBRD, 2013).

Currently, mobile financial services available in Ukraine include: Cash-to-Mobile (developed, via mobile banking or payment terminals), Mobile-to-Mobile (developed, for subscribers of same operator, only for prepaid subscribers), Mobile-to-Cash (developing, few operators) (EBRD, 2013). There is room for more mobile financial services, which could increase efficiency of the economy – decrease transaction costs, raise financial inclusion etc. In our opinion, such efficiency improvements could have the most influence in such areas as workers' remittances, entrepreneurship, improved targeting by governmental safety nets, and public utilities sector.

According to Migration and Remittances Factbook 2011, stock of emigrants from Ukraine was 6.56 million (11.6% of Ukraine's population) in the end of 2010, and related inward remittance flows equaled US$7.02 billion (4.3% of GDP) in 2011, which is over 60% of inward FDI for this year. Total amount of remittances was channeled in the following way: 46% - through bank account, 40% - through international payment systems, 14% - through informal channels (EBRD, 2013). According to some estimates, due to high share of unofficial channels of remittances transfer, amount of remittances could comprise as much as 20% of GNI (Markov, 2009). An interesting feature is that Ukrainians tend to remit lower fraction of their income compared to representatives of other nations (Strielkowski, 2012).

Mobile money might be useful to stimulate entrepreneurship through an increase of access to finance for small enterprises, persons with low income levels, and residents of rural areas (31.1% of Ukraine's population).

Targeting of government safety nets is very low nowadays in Ukraine – many people receive subsidies and other benefits without a real need for it. M-money has the potential to change this situation by increased transparency and improved targeting of safety net policies. This may subsequently lead towards poverty reduction in

the country. Population indebtedness for public utilities equaled US$ 1.4 billion in October, 2013, and average payment period was 3.8 months[1]. Usually, it is younger population who is least disciplined. In this situation SMS-reminders and opportunity to make a payment via mobile phone could bring an improvement.

Highly supportive to wider adoption of m-money in Ukraine is the fact that it already has the highest level of mobile financial services penetration compared to other CIS[2] countries (Findex database, 2012).

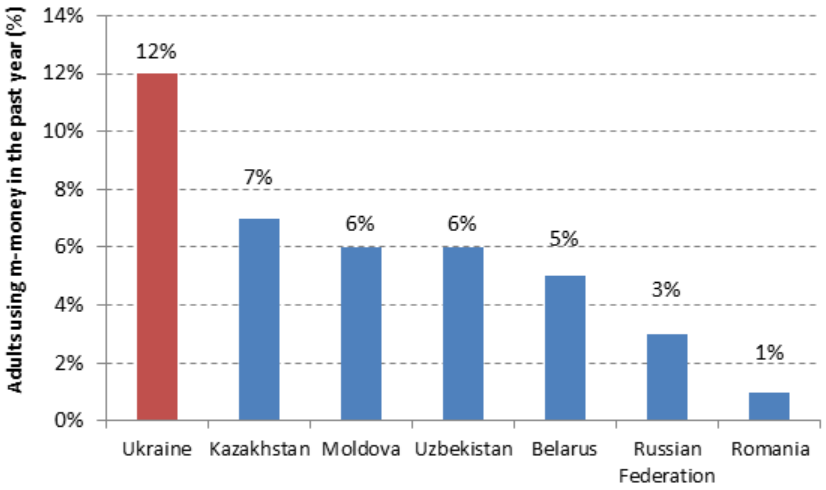

Fig. 1. Usage of mobile money among adults in selected CIS and CEE countries

Therefore, there is need to analyze mobile money adoption in Ukraine through examining the relevant factors for those subsets of population, involved in receiving or sending remittances, entrepreneurship, receive government subsidies etc. This may lead to identification the segment best-suited for wider introduction of mobile money and may guide strategic planning in this area.

Research question

With our research we are going to answer the following interrelated questions:

To what extent are the target population groups in Ukraine ready to adopt and use m-money? How feasible are the potential benefits from m-money adoption including growth of remittances, increased savings, rise in financial inclusion, improved access to finance, poverty reduction etc.?

Literature review

Statistics analysis for the last five years shows that adoption of mobile banks services is escalating. More than 60% percent of banks worldwide have planned to offer mobile banking services in 2010, nowadays around 90% of banks offer mobile banking services. In a dynamic environment, many banks seek new strategies that facilitate online information sharing and transactions. Linking banking services to customers through mobile devices is one of these competitive strategies. While mobile becomes a popular access point, there are many emergent benefits of mobile banking for both banks and customers. *For banks* benefits include reducing operation costs, minimizing transaction errors and potential for fraud, generating additional revenue through commission and additional fees, and improving customer retention and brand loyalty (Luo, Li, Zhang and Shim, 2010). *For customers* the advantage is in immediate and interactive banking services anytime and anywhere which, in turn, initiate great value for them (Mallat et al., 2004). Adoption of mobile banking can also reduce costs and facilitate changes in retail banking along with increase in the amount of data processing and improvements in operational performance.

Cruz et al. (2010) and Dasgupta et al. (2011) suggested that mobile banking has great potential to provide reliable services to people living in remote areas where internet facility is limited.

Another stream of research on m-banking is to understand the socio-economic and technological impacts of m-banking adoption in developing countries. This is important for such countries as Ukraine. Ukraine is a country with well developed banking sector and m-banking could be a complementary service (additional platform for managing financial transactions) offered by financial institutions in addition to ATMs and Internet banking. The logic of such researchers as Donner and Tallez (2008) applied for developing countries may be applied for Ukraine. Factors such as convenience and ease of use may become an important criteria when consider adopting m-banking in urban parts of Ukraine. However, for consumers in the rural areas, the appeal of m-banking may be less about convenience, but more about accessibility and affordability due to network coverage, quality connection, and costs.

A study by Sripalawat et. al (2011) examined positive and negative factors affecting m-banking acceptance in Thailand. Grabbe et al. (2009) examined the impact of social and cultural characteristics on m-banking adoption in Ghana. Sudhir K et al. (2012) researched the barriers and mobile banking triggers based on the survey across five Indian cities. Laforet and Li (2005) investigated the barriers to Chinese consumer adoption of online banking. They found perception of risk, computer bad technological skills, lack of awareness and understanding of the benefits and Chinese traditional cash-carry banking culture as the main barriers to adoption.

[1] Public utilities portal: http://statistic.jkg-portal.com.ua/ua/statistic

[2] CIS - Commonwealth of Independent States

There is quite a comprehensive research on consumer acceptance of m-commerce and m-banking in Taiwan, Korea, Bangkok, Kenia etc. A summary of relevant literature on consumer acceptance of m-banking is shown in Table 1, but there are few research papers devoted to that problem in CIS countries and in Ukraine.

Table 1

Selected Literature on Consumer Acceptance of M-Commerce and M-Banking

Authors	Context	Region	Factors considered in the study							
			Facilitating Conditions	Risk	Social Norm	Ease of Use	Usefulness	Credibility	Self-efficacy	Financial Cost
Crabbe et al.	M-banking	Ghana	+			+	+	+		
Sriapalawat et. al.	M-banking	Bangkok		+	+	+	+			
Wu and Wang	M-commerce	Taiwan		+		+	+			
Laurn and Lin	M-banking	Taiwan				+	+	+	+	+
Wang et al.	M-service	Taiwan				+	+	+	+	+
Cheong et al.	M-payment	Korea	+			+	+			+
Gu et.al	M-banking	Korea	+		+	+	+		+	
Yang	M-commerce	Singapore				+	+			
Bong-Keun Jong et al.	M-banking	Singapore				+	+	+	+	+
EBRD Country Report (2013)	Mobile Money	Ukraine and other CIS&CEE countries				+	+			

Source: Adopted from Bong-Keun Jeong & Tom E Yoon. (2013). **Empirical Investigation on Consumer Acceptance of Mobile Banking Services**. Business and Management Research.– Vol. 2, No. 1, pp.31-40.

As the Table 1 shows, some of these adoption factors are common to all studies while others are only used in a particular region. It is also important to note that the significance of factors influencing m-baking adoption varies widely across different countries (Sripalawat, Thongmak and Ngramyarn, 2011). This indicates that consumer acceptance of m-banking is extremely context-dependent, so a particular dimension may not make a significant contribution or not even be applicable depending on the context. This could be due to the peculiar differences in cultures, infrastructural conditions, and economic/political conditions prevailing in different regions.

Over the past decade, researchers have focused on internet and mobile banking in emerging countries, but in most of CIS countries and particularly in Ukraine this question received little attention. Considering for the post-soviet economic development peculiarities and lack of research on the above mentioned issue, the current study provides a basis for further refinement of models through integrating constructs of technology acceptance model (TAM) to predict mobile banking adoption in Ukraine.

Methodology and data

Estimation methodology

We are going to undertake two approaches for empirical analysis, both are based on technology acceptance model (TAM) methodology. First approach is a 'mainstream' TAM method with dependent variable representing a behavioral intention to use the technology. Second approach is the TAM method with dependent binary variable, which allows analysis of probability relations regarding the wider acceptance of the m-money technology.

Approach 1. TAM regression with dependent variable- intention to adopt m-money technology, being a principal component analysis construct, based on a set of variables ranging from 1 "Strongly disagree" to 5 "Strongly agree", with 3 being "Neither agree nor disagree" (adapted from Davis, 1989). Estimation of equation (1) would result in obtaining parameters estimates for this model.

$$y_i = \beta_0 + \sum_k \beta_k D_{k,i} + \sum_j \alpha_j x_{j,i} + \varepsilon_i \quad (1)$$

Where y_i – behavioral intention to use mobile money by respondent *i*;

D_k – population subgroups parameters – persons with regular experience of remittances, entrepreneurs etc; as well as age, income level, education;

x_j – attitudes towards using m-money, grouped into 5 categories: attitude, perceived ease of use, perceived usefulness, behavioral control, subjective norm (as in Aboelmaged, 2013). These categories should be obtained from application of principal component analysis (PCA) methodology to the set of variables per each category (Appendix B);

ε_i - error term.

Approach 2. Binary regression model (the 'Probit' model, as developed by McFadden, 1973) with sample dependent variable being a binary variable – '1' if a person used his mobile phone in the last year for making a payment and '0' if a person did not. Population dependent variable in the model is an unobservable utility index I_i , that is determined by explanatory variables. The index I_i is the inverse of the normal CDF of the probability of using mobile phone for making or receiving payments. Estimation of equation (2) would result in obtaining parameters estimates for this model.

$$I_i = F^{-1}(P_i) = \beta_0 + \sum_k \beta_k D_{k,i} + \sum_j \alpha_j x_{j,i} + u_i \quad (2)$$

Difference between the two approaches is the following: estimation of equation (1) will provide estimates on show us how intensity of intention to adopt m-money technology depends on the set of explanatory variables, while estimation of equation (2) will help us understand how probability to use m-money technology depends on the set of explanatory variables. Using too approaches will help us double-check the estimation results to be obtained.

There is a disadvantage of both approaches due to use of cross-section data for the analysis. Cross-section analysis gives a snapshot, but does not consider dynamics of the phenomenon. In case a panel dataset is available, it would help overcome this problem.

Data for analysis

We are going to use data from survey of the population regarding use of mobile phone to make or receive payments, and other parameters (see Appendix B for the draft list of questions).

It is planned to develop sample, which is representative of population with regard to its age, gender and geographical structure.

About 800 respondents are planned to be selected and surveyed over the telephone. Approximate interview length is estimated at 15 minutes.

Our intended sample size is larger, compared to similar empirical studies in other countries:

Table 2

Literature Review on Mobile Banking Technologies Studies

Country	Sample size	Country population, thousands	Relative sample size, % of population	Author
Malaysia	175	28,330	0.0006%	Cheah et al, 2011
Singapore	165	5,312	0.0031%	Jeong, Yoon, 2013
Morocco	338	32,000	0.0011%	Abdelghani, Aziz, 2012
Zimbabwe	275	13,724	0.0020%	Chitungo, Munongo, 2013
UAE	119	9,200	0.0013%	Aboelmaged, 2013
India	1614	1,270,000	0.0001%	Sudhir et al, 2012
Ukraine	800	46,000	0.0017%	Podvysotska, Podvysotskiy, 2014

Expected contribution of our research, apart from its concentration on a transition economy, is the intention to employ a data-set of a relatively large size being representative of the Ukraine's population, combination of the Technology Acceptance Model estimation approach with binary regression methodology, as well as inclusion of user-specific features into the model; all these for the goal of obtaining a range of insightful policy implications regarding areas for m-money adoption in Ukraine.

Discussion and policy implications

The goals of current research proposal include estimating the effect of attitudes towards using m-money on intention to use it for several targeted population groups, as well as estimating probability that a person will use m-money based on her attitudes, and personal characteristics such as age, education, occupational status etc. for the same population groups.

We are interested in studying the population groups which could be associated with significant future benefits from implementation and wide acceptance of m-money: persons sending or receiving remittances, persons having problems to pay for public utilities in a timely manner due to the lack of free time, small entrepreneurs and self-employed individuals especially in remote rural areas, and the poor who are in a need for better tailored and better targeted state safety nets.

We expect that some population group could show relatively higher intention to use m-money and/or higher probability to start using the technology compared to the general sample. This would motivate suggestion to implement m-money with an emphasis on that specific sector or population group. Conversely, in case implementation and wide adoption of m-money looks promising in some sector, e.g. entrepreneurship in rural areas, but that population group would have very low probability of adopting the new technology, our suggestion might be not to proceed with such an initiative on the first stage.

The result of the research would be useful for several stakeholders. First, understanding the peculiarities of m-money perception would allow an increase of financial inclusion in rural areas. More importantly, m-money could provide improved access to capital (remittances, micro-credit) enabling rural dwellers to build-up assets and conduct business. Second, m-money could become a channel for interaction between government and its citizens, facilitating cost- and time-efficient welfare and subsidy disbursement. Third, as Ukraine suffers of significant shadow economy (30% of GDP), an effective m-payment systems could make participating in the shadow economy more difficult, as it would produce documentation of the transactions enabling authorities to track those activities. Fourth, for telecom operators the advantage is in better involvement of customers and increased revenue from direct or cross-selling.

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