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Full length article

Mobile financial services and financial inclusion: Is it a boon for savings mobilization?

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Abstract

The adoption of mobile telephony to provide financial services in Africa has become instrumental in integrating the hitherto unbanked segments of the population to the mainstream financial systems. This study sought to establish this linkage by examining whether the pervasive use of mobile telephony to provide financial services is a boon for savings mobilization in selected countries in sub Saharan Africa. The findings show that availability and usage of mobile phones to provide financial services promotes the likelihood of saving at the household level. Not only does access to mobile financial services boost the likelihood to save, but also has a significant impact on the amounts saved, perhaps due to the frequency and convenience with which such transactions can be undertaken using a mobile phone. Both forms of savings, that is, basic mobile phone savings stored in the phone and bank integrated mobile savings are likely to be promoted by use of mobile phones. Thus, growing and deepening the scope for mobile phone financial services is an avenue for promoting savings mobilization, especially among the poor and low income groups with constrained access to formal financial services.

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JEL classification: G20; G21; O30; E21

1. Introduction

Financial inclusion has become a key pillar of development policy in most countries around the world. This emanates from the realization that inclusive financial system is critical in reducing extreme poverty, boosting shared prosperity, and promoting sustainable inclusive economic growth and development (World Bank, 2014; IMF, 2014; Demirguc-Kunt et al., 2008). Inclusive financial systems enable poor people to save and borrow, allowing them to build their assets, invest in education

and entrepreneurial ventures, and thus improve their livelihoods (Demirguc-Kunt and Klapper, 2012). In addition, the poor can smooth their consumption and insure themselves against socio-economic vulnerabilities.

Whereas developed economies have enhanced access to and provision of quality and sustainable formal financial services like credit, savings, payment systems, insurance and pension among others, in most of the developing economies, the bulk of the adult population still lack access to basic financial services. In SSA, 80% of the adult population has no access to basic financial services and only 34% have an account at a formal financial institution (CGAP, 2011; Demirguc-Kunt et al., 2014). Despite the low penetration, majority of the population still save in informal ways and often employ fairly sophisticated methods to manage their finances and plan for the future. Existing evidence reveals various savings behavior by most poor households. These include stockpiling seeds and grains, keeping small amounts of money in tin-cans, under mattresses, in a hole underground, saving with Rotating Savings and Credit Associations (RoSCAs) and Accumulating Savings and Credit Associations (ASCAs), keeping livestock and jewelry, and lending to others (Zimmerman and Bargee, 2009; Collins, 2005; Rutherford, 2003, 2000).

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The varied savings mechanism using informal channels could be attributed to banks' product designs that have not been able to target specific saving behavior of the majority of the poor population, or lack of flexibility to allow clients to tailor their usage of accounts to meet different savings needs. It is only until recently, that the use of mobile phone technology has exploded into the African market, providing the most effective way of integrating the unbanked population into the mainstream financial system. Technological advances such as mobile money transfer, payments, savings and credit, and the creation of new delivery channels such as mobile branches or banking services through third-party agents are currently playing an important role in providing greater financial access in Africa.

The advances in technology and especially mobile phones have revolutionized financial services provision and introduced new models of serving the poor. An estimated 12% of the adult population in SSA have a mobile money account compared to only 2% worldwide (Demirgüç-Kunt et al., 2014). The mobile financial services are relatively cheap, secure, reliable and accessible and have seen majority of the poor and low income earners expand their financial platforms to include mobile banking, agency banking and other forms of financial services. In particular, the wide-spread use of mobile phone technology has opened new markets across SSA and has necessitated financial services to reach consumers in remote areas where banking services is lacking.

It is in this regard that this study analyzes the role of mobile financial services in expanding financial inclusion and promoting savings in selected SSA countries based on data from Kenya, Uganda, Malawi and Zambia. Specifically, the study examines the extent to which adoption of mobile phones has helped promote financial inclusion, and empirically analyze the role of mobile phone financial services usage on savings mobilization. Given its comparatively more developed state of financial innovation and usage of mobile financial services, an in-depth empirical analysis of the latter is conducted using Kenya's financial access survey data of 2013.

2. Literature review

Theoretical literature has long emphasized the importance of financial sector development for economic growth. Earlier theoretical literature emphasized financial liberalization through market determined interest rates that are conducive for higher growth path as opposed to financial repression which involve interest rate ceilings, restrictions on competition of financial institution and market inefficiencies (McKinnon, 1973; Shaw, 1973; Stiglitz and Weiss, 1981; Diamond and Dybvig, 1983). Other theories have argued that a developed financial system broadens access to funds through efficient allocation of capital across different investment alternatives including production technologies and entrepreneurial innovative activities (Banerjee and Newman, 1993; King and Levine, 1993; Aghion and Bolton, 1997), pooling of funds and facilitating risk management, and diversification that leads to enhanced asset liquidity (Bencivenga and Smith, 1991; Levine, 1991; Rajan and Zingales, 1998; Levine, 2004).

Empirical literature on financial sector development and economic growth has evolved alongside the theoretical literature. Initial contributions used the household survey data to analyze the methods and extent to which households in developing countries are able to insure themselves against risk through mechanisms such as informal inter-household transfers, state-contingent loan repayments, marriage and precautionary saving (Rosenzweig and Wolpin, 1982; Deaton, 1991, 1992; Townsend, 1994; Udry, 1996). Other recent empirical studies have also revealed that the poor families in the informal economies of developing countries actively manage their financial lives by engaging in precautionary and commitment savings (Dupas and Robinson 2013a, 2013b; Brune et al., 2011).

Empirical analysis using micro based financial sector survey data has revealed widespread adoption of mobile phones that has advanced from a simple communication gadget to a savings tool by both the wealthy and poor households (Jack and Suri, 2014, 2011; Honohan and King, 2012; Shem et al., 2012; Mbithi and Weil, 2011; Wilson et al., 2010; Collins et al., 2009; Comminos et al., 2009).

Jack and Suri (2014) examined the impact of reduced transaction costs of mobile money on risk sharing in Kenya. The findings showed that M-PESA users were able to fully absorb large negative income shocks (such as severe illness, job loss, livestock death, and harvest or business failure) without any reduction in household consumption. By contrast, consumption for households without access to M-PESA fell on average 7% in response to a major shock. Honohan and King (2012) used fin-scope survey dataset to analyze causes and effects of financial access. The results confirm that income and education are key demand side determinants of access to formal banking. They found that the more sophisticated an individual's financial sector knowledge is, the higher the likelihood of being formally banked and that trust in banks is associated with significantly higher chances of being formally banked.

Demombynes and Thegeya (2012) examined mobile savings phenomenon in Kenya, using survey data collected in 2010. Study findings revealed that the usage of bank integrated mobile savings products remain limited and largely restricted to the wealthy group. In the rural areas they found that individuals who are male and married are more likely save and that majority of the population use mobile phones as a depository for funds especially among those who are unlikely to save using formal channels. They also found that those with registered M-PESA accounts were 32% more likely to have some savings. The evidence that M-PESA increases savings even though it does not pay interest is not surprising given that the convenience and safety derived may far outweigh interest payment considerations.

Mbithi and Weil (2011) analyzed the impact of M-PESA on a number of economic and social outcomes using a balanced panel of 190 sub-locations in Kenya. The study findings revealed little evidence linking use of M-PESA accounts as a place to store wealth. Instead, M-PESA improved individual outcomes by promoting banking and increasing transfers. In addition the study findings revealed that increased use of M-PESA had lowered the propensity of people to use informal savings mechanisms such

as RoSCAS, but raised the probability of them being banked [Jack and Suri \(2011\)](#) found similar findings which revealed that M-PESA users with a bank account are much more likely to save on M-PESA due to ease of use and safety.

3. Research design and methodology

3.1. Research design and data

The study employs both descriptive and empirical analyses to establish a relationship between mobile phone money usage and savings mobilization, while controlling for other factors that influence the latter. The study broadly hypothesizes that mobile phone money usage encourages savings. Key factors in increased use of mobile financial services range from convenience to accessibility both in terms of (transaction) costs, speed and distance, given the wide coverage and usage of mobile phones. The convenience availed to mobile phone financial services users enables them to access banking and other financial services at their comfort even in remote locations. Moreover, for the poor and rural folks, saving mobilization is not only restricted to saving in a bank account but also being able to mobilize short term savings to meet specific demands such as acquisition of household assets and mitigation against calamities (precautionary motives).

Although the study is based on four African countries that recently conducted financial access surveys, namely Kenya, Uganda, Malawi and Zambia, the FinAccess survey for Kenya had the most comprehensive data on mobile phone-based financial services. This, however, is not surprising given Kenya is much ahead in this area, having championed mobile phone-based financial services since early 2007. In light of this reality, the empirical regression model for the savings equation was estimated only for Kenya. However, descriptive analysis cuts across all the countries sampled.

The study utilizes the FinAccess national survey data for Kenya 2013, FinScope national survey data for Uganda 2013, Malawi 2014 and Zambia 2009. The FinAccess and FinScope surveys were carried out using broadly similar stratified random sampling and a common methodology in defining financial access strands.

3.2. Empirical model

The empirical model draws from the theoretical foundations on savings ([Modigliani and Ando 1957](#); [Friedman 1957](#); [Deaton 1992](#)). The model also makes use of institutional theories ([Sherraden, 1991](#); [Beverly and Sherraden, 1999](#); [Beverly et al., 2008](#)), which relate to innovations in the financial sector that has seen the use of mobile phone financial services promoting access and use of financial services. The model to be estimated is specified as follows:

$$s_i = \alpha_i + X_i\beta + Z_i\gamma + \varepsilon_i \quad (1)$$

where s_i is the proxy for savings or the savings ability for individual i and Z_i is access to or usage of mobile financial services by

individual i . The model also controls for a set of other factors that influence saving at the household level, which include education and income (see [Schmidt-Hebbel et al., 1991](#); [Butelmann and Gallego 2000](#); [Zhan and Grinstein-Weiss 2005](#), among others). X_i is a vector of control variables such as income and personal characteristics such as gender, age and level of education, as well as location (urban vis-à-vis rural), while ε_i is the statistical disturbance term.

For robustness, two variants of the savings variable are considered: that is, the amount saved (continuous variable) and whether the respondent saves or not (discrete variable). For the latter, a logistic regression model is estimated. In this case, the dependent variable is a binary outcome variable indicating whether an individual saves ($s = 1$) or not ($s = 0$). If p is the probability of $s = 1$, the logistic regression of s on a set of predictor variables $x_1, \dots, x_k$ estimates parameter values for $\beta_0, \beta_1, \dots, \beta_k$ via maximum likelihood method of the following equation:

$$\text{Logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1 \times x_1 + \dots + \beta_k \times x_k \quad (2)$$

In terms of probabilities, the equation above is translated into

$$p = \exp(\beta_0 + \beta_1 \times x_1 + \dots + \beta_k \times x_k) / (1 + \exp(\beta_0 + \beta_1 \times x_1 + \dots + \beta_k \times x_k)) \quad (3)$$

In a logit model, the coefficients can be interpreted in terms of relative changes in odds, which in this case is the ratio of the probability that an individual saves divided by the probability the individual does not.

The description and hypothesized relationship of the variables in relation to the dependent variable are given below:

Age influences savings patterns. As people age towards most productive lives, they would tend to save more, but the savings are bound to dwindle as they approach their retirement age and eventually retire from productive work, in line with Life Cycle Hypothesis (LCH). Therefore, age and age squared are included in the estimation in order to account for the non-linear relationship between age and saving over the life cycle. **Mobile phone financial services usage** represents those who use their mobile phones for financial services, e.g., to make payments, transfers, savings, etc. Those whose mobile phones are registered with the telecommunication service providers for such services are likely to use the opportunities offered by the mobile financial services to mobilize money or savings for personal or family use as well as entrepreneurship. Savings take different modes including basic mobile savings and bank integrated mobile savings. **Education** refers to the level of education of the respondent, coded as 0 if the respondent has no formal education or only acquired some limited primary education and 1 otherwise. Literature has demonstrated that those with higher levels of formal education tend to save more. **Gender** of respondent is also presumed to influence savings patterns. Arguably, men tend to save formally while women tend to save informally in the merry go

rounds and/or women groups, especially in rural and low-income areas. **Location** is the rural-urban variable. Savings patterns differ regionally. In urban areas where formal financial institutions tend to be dense, people are likely to save more compared to the rural areas. **Family size** refers to the number of members in the household. A bigger family size is bound to have negative impact on savings or ability to save. Lastly, **Marital status** refers to whether one is married or not. Literature suggests that the saving patterns between married men and women are different.

4. Results and discussion

4.1. Descriptive analysis

According to the Fin-scope survey data, financial inclusion landscape has increased over time in all the four sampled countries. In Uganda, 85% of the adult population was financially served in 2013 compared to 70% in 2009, while the adult population which was excluded from the financial services reduced by half to 15%. In Kenya those who were financially served increased to 75% in 2013 and those excluded from accessing financial services declined by 8% to 25% in 2013. In Malawi and Zambia, slightly more people have been brought into the formal financial system, by about 8% points, from 26% in 2008 to 34% in 2014 in Malawi and 3.6% points from 33.7% in 2005 to 37.3% in 2009 in Zambia. Zambia and Malawi also registered higher levels of financial exclusion at 63% and 51% respectively, which could imply large size of the informal sector in these countries. Even though Uganda recorded a relatively small share of the adult population who are financially excluded, it has also a larger share of adult population accessing the informal financial services (31%) compared to Kenya (8%).

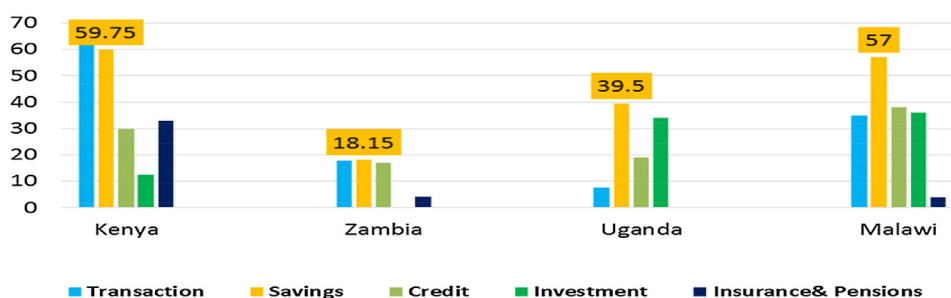
Farming remains one of the most important sources of income in all the sampled countries. Almost 70% of all households (rising to more than 90% in rural areas) are involved in agriculture or fishing in some way. Farming activity is extremely relevant when considering financial inclusion, as agriculture is a partial or full income earning activity and the use of mobile phones for transfer of money, payment and savings becomes relevant to this category of income earners, especially in rural areas. Households who source their income from self-employment is the second most important economic activity, and this could also explain the growing importance of other formal and informal channels

of financial inclusion, given the growth in MFI's, SACCOs's, ASCAs and RoSCAs. A significant number of households in Kenya, Malawi and to some extent Uganda depend on transfers from others mainly made from the urban wage income earners, which represent about 15%.

Ownership of mobile phones has increased with time. 66% of the adult population own mobile phones in Kenya, 58% in Uganda and 54% in Zambia. The higher up take of mobile phones is attributed to the relative affordability, convenience and accessibility and it is for this reason that the gadget is mainly used for cash transfers, cash withdrawals and deposits. In addition, financial behavior could be shaped by proximity of Mobile Phone Money Agents. Using the example from Kenya, which would not be very different from the other countries, for both rural and urban areas, Mobile Phone Money Agents have the closest proximity to the majority of the population at over 75%. Across gender, Mobile Phone Money Agents also remain the most reachable to both females and males, again in excess of 75% for both. Mobile phone financial services, therefore, serve most of the financial needs of the population without discernable gender or rural-urban biases. They transcend geographical distances, reduce transaction costs and time remarkably and also are relatively secure. The majority of the adult population in these countries walks to the Mobile Phone Money Agents, more so in urban areas (89%) than in rural areas (67%), which could reflect the expansiveness of rural regions where some rely on public bicycles or motorcycles (10%) or use buses or taxis (9%).

In all the countries sampled, mobile phone usage for financial transactions is skewed towards savings products. In Kenya and Malawi for example, over 55% of the respondents reported to have saved their income, compared to 40% of the households in Uganda and 18% in Zambia (Chart 1). This is an indication that most households are aware of the importance of savings. Investment products are also significant, and this is especially important for households who have invested in agriculture.

Analysis of saving decisions across different segments of the population reveals that most individuals especially in Uganda, Zambia and Kenya save at home, while in Malawi, a significant category of individuals do not save. This outcome could be explained by the fact that still a higher category of individuals are financially excluded. Saving through informal channels is also common in all the countries, while saving in formal financial institution is higher in Zambia, relative to the other countries in



Source: FinScope and FinAccess Survey Data, different survey years.

Chart 1. Mobile phone usage and financial products.

the sample. In terms of frequency of saving, however, the majority of the adult populations across the countries do save at least monthly. It is important to note that some do so even weekly. The high frequency of saving across the countries with more than 50% of their adult populations having indicated they save at least monthly shows that mobile phones would be an important channel through which they can increase savings. This is particularly so given they enhance efficiency by cutting on transactions costs, reducing distances and affording savers the convenience of saving from the safety and comfort of their homes or vicinity of their businesses.

Other than savings, most households use mobile phones for payments and transfer purposes. In Uganda for example, majority of the adult population mainly used mobile money services for cash withdraws (56%), followed by receiving (54%) and sending money (46%). Usage of the other products and services like payment for utilities, school fees is still minimal. In Malawi, majority of the adult population use mobile phone services for cash withdrawals (30%), cash deposits (17%), purchase air time (42%), send money (18%) and receive money (23 per cent).

4.2. Empirical evidence

The empirical results are based on the 2013 FinAccess survey data for Kenya as aforementioned. The savings variable was captured both as a discrete variable (1 = whether the respondent reported saving using any or a combination of different modes of savings such as savings account at SACCO, microfinance institution etc., and 0 otherwise) and a continuous quantitative variable (amount of money saved). Besides estimating a logit regression equation for the latter, we also fitted a savings equation using ordinary least squares (OLS) with savings defined in terms of the amount saved. Respondents are defined to be users of mobile financial services if they reported use of mobile financial services (M-PESA, Airtel Money, YuCash, etc). A similar question asked was whether they had used the mobile services or products in the last 12 months. However, given that the response to the two questions was more or less the same on average, there was no much difference in the results obtained using either. To ensure validity of the empirical results, the reported regression results were obtained using estimation options that provide robust standard errors for the parameter estimates.

The empirical results for the logit model are given in Table 1. The impact of mobile financial services on savings is positive and highly significant. The coefficient for mobile financial services (0.7794) is the log of odds ratio between the saving group and non-saving group. Hence, we can get the odds ratio by exponentiating the coefficient to obtain 2.18. Consistent with what we expect, the results indicate that those who utilize or have access to mobile financial services are far more likely to save than those who do not, thereby confirming the role of mobile financial services in mobilizing savings. Access to mobile financial services makes saving simpler by reducing both distance and transaction costs. Consistent with the behavioral theories that shape financial behavior, the more convenient and simpler the activity, the more it is done—the tendency to form saving habits. The non-monetary costs associated with formal banking can be

Table 1
Results of the logit model.

Variable	Coefficient
Mobile financial services	0.7794*** (11.5)
Age	0.0227*** (3.60)
Age squared	−0.0002*** (−2.83)
Education	0.4806*** (7.65)
Family size	−0.0615*** (−5.33)
Income	0.0004*** (9.96)
Gender	−0.2478*** (−4.16)
Marital status	0.2397*** (3.90)
Constant	−0.8374*** (−5.05)
Pseudo R ²	0.11
No. observations	6008

Statistical Z-values in brackets.

*** Denotes significant at 1% level of significance.

large enough to discourage the poor from using formal savings services (Karlan et al., 2014).

The results also show that the control variables have the hypothesized effect on savings and are significant. Education plays a critical role as those with formal education are more likely to save than those without. Individuals with higher levels of education are more likely to have access to financial education and thus have higher financial literacy levels, which can help enhance decision making relating to financial issues, including saving decisions. Income has a positive impact, consistent with the theoretical expectations and other findings in the literature (e.g. Schmidt-Hebbel et al., 1991; Pan 2016; Butelmann and Gallego 2000). Family size is negatively related with saving as expected. The high dependency ratio associated with big families constrains the ability to save due to high demand for resources. In terms of gender, women are more likely to save than men. Women tend to join women groups that offer a range of functions including saving and borrowing. However the amounts saved may be comparatively small compared to men's savings. Interestingly, those who are married are more likely to save than those who are not married, perhaps due to more responsibilities and family obligations they need to provide for by saving. Age and age squared have the expected sign and significantly influence the likelihood of saving consistent with the LCH. Family size was found to be highly correlated with urban/rural variable and hence the latter was not included in the model results reported.

The OLS regression results with the amount saved as the dependent variable are reported in Table 2. Savings, income and family size are in logs. The results are largely consistent with the ones analyzed previously. Mobile financial services have a significant impact not only on the likelihood of saving as previously analyzed but also on the amount saved. This is

Table 2
Results of the OLS regression (amount saved).

Variable	Coefficient
Mobile financial services	0.2446*** (3.35)
Age	0.0283*** (5.25)
Age squared	−0.0021*** (−4.54)
Education	0.3458*** (6.04)
Log of family size	−0.1628*** (−4.27)
Log of income	0.4361*** (19.8)
Gender	0.3448*** (6.84)
Constant	2.1243*** (6.20)
Adjusted R ²	0.24
No. observations	3376

Statistical t-value in brackets.

*** Denotes significant at 1% level of significance.

a very insightful finding, given the dearth of similar empirical evidence and the increased adoption of mobile financial services innovations in Africa. The impact of the other variables namely education, age, income, family size and marital status on savings is also significant. Other studies that have found a positive impact of education on savings include one by Zhan and Grinstein-Weiss (2005). The gender variable has a significant positive impact, implying that although women are more likely to save than men as shown by the logit regression results, men save more in amounts than women. This probably reflects the fact that men tend to have better paying jobs or access to family assets, which enable them save higher amounts. On the other hand, women tend to dominate employment in the informal sector where incomes are generally low and irregular, and consequently, save small amounts of money. Similarly, although those who are married were more likely to save, this variable was found to be insignificant in terms of the amount saved given the daily demands of family expenditures.

5. Conclusion and policy implications

Financial inclusion landscapes of African countries are changing rapidly thanks to the growing mobile phone financial services. The change is positive given that hitherto unbanked or under-banked segments of the population are being reached by affordable, accessible and sustainable financial services through mobile phones which are ubiquitous in the continent. Mobile Phone Money Agents are the most accessible to both men and women living in urban and rural areas. They are just walking distances away to their users.

Besides the mobile money transfer services, usage of mobile financial services is skewed towards savings, proving the earlier literature right that previously unbanked segments of the population need not only credit facilities, but also savings facilities

that suit their lifestyles and entrepreneurial practices (Aryeetey 1995; Shem and Rösner, 2003). Mobile phones are bridging this gap by enabling them save conveniently from the comfort of their homes or the vicinity of their business sites, solving both the problems of distance and transaction costs that have hindered traditional financial services providers in the past from tapping the resources of these market segments. Use of mobile phones financial services should therefore be encouraged and enhanced throughout the continent.

The empirical results based on Kenya provide evidence regarding the impact of mobile financial services on savings. Those who utilize mobile financial services are more likely to save than those who do not. Besides enhancing the likelihood of saving, the amounts saved are also increased. Both forms of mobile savings are bound to be promoted, i.e., basic mobile phone savings stored in the phone and bank integrated mobile phone savings. Consequently, deepening and expanding the scope of mobile financial savings is an avenue for promoting and mobilizing savings particularly for the poor and low income earners who have limited access to the formal banking system. The accessibility, convenience, affordability and the safety associated with mobile financial services is a major catalyst in the expansion and growth of mobile financial services.

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