

Does Financial Literacy Influence Use of Mobile Financial Services in Malawi? Evidence from Malawi Household Survey Data

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Abstract

Mobile financial services are gaining prominence and could be a possible avenue for fast-tracking financial inclusion in developing countries, including Malawi. However, adoption and usage of such services remains low among the Malawi population. This study investigates the influence of financial literacy on financial behaviour of individuals in Malawi, specifically use of mobile phone-based financial transactions. Descriptive and econometric analyses were conducted using cross-sectional data obtained from the Reserve Bank of Malawi. Findings reveal that the likelihood of using mobile financial services increases with increasing levels of financial literacy, type of employment and peri-urban residence. Furthermore, men are more likely to transact on mobile phones than females and that although income levels matter in the use of mobile financial transactions, the magnitude of effect is negligible. Results suggest opportunities for expanding access to financial services and products such as differentiation in financial literacy education by characteristics of population including gender of users. Informal settings do not preclude expansion of digital payments, and therefore financial product innovation and addressing rural resident's constraints to access mobile financial services is crucial.

Key Words: Financial Literacy, Mobile Financial Transactions, Malawi

1. Introduction

The financial sector plays a crucial role in economic growth and development. Through financial mediation, an economy expands and diversifies access to financing and ensures risk sharing among financial players. Further, the day-to-day management of buying and selling of goods and services is made easier through an effective payment system. Ndulu et al. (2007) and Sarma and Pais (2011) concur that merits offered by a vibrant and inclusive financial sector demonstrate the crucial role of financial sector for growth and development of African economies.

The financial industry in Africa is being revolutionized with the emergence of mobile financial services that provide a convenient platform for conducting financial transactions. The use of mobile phone-based financial transactions is increasingly gaining ground especially in regions with low levels of financial inclusion. For instance, about 8.8% of Sub-Saharan region's adult population had mobile money accounts compared to 1.4% in Latin America (Nyantakyi and Sy, 2015). This penetration of mobile money is happening amid limited financial inclusion at only 165 individuals for every 1,000 adults owning bank accounts in Sub-Saharan Africa compared to 747 people per 1,000 adults in Latin America (Demirguc-Kunt et al., 2015). The Global System for Mobile Communications Association (GSMA) reported that about two-thirds of Sub-Saharan African countries have put in place enabling regulation for mobile money operations, which has increased penetration (GSMA, 2017). Ntwiga (2016) observes that mobile phone network facilitates financial inclusion in Kenya, especially for the unbanked segment of the population who own or have access to a mobile phone. Evidence elsewhere shows that mobile financial services are effective in increasing circulation of money, making capital available when most needed, improving local farm employment and savings, and reducing time and distance to financial service providers (Chipeta and Kanyumbu, 2017; Ouma, et al., 2017; Demombyens and Thengeya, 2012). Mobile financial services can either be bank-led or non-bank led. Whereas the former uses an application of m-commerce, which enables customers access bank accounts through mobile devices (Kim et al., 2012), the latter is operated by mobile network providers and does not require one to have a bank account.

In recognition of the role of mobile financial systems in increasing financial inclusion, the Government of Malawi included expansion of digital payment systems as a key priority area in its National Financial Inclusion Strategy. In Malawi, penetration

of mobile phone technology has remarkably increased from as low as 1.8% of the population in 2004 to over 42.5% in 2016. However, despite the increased access to mobile phone technology, adoption and active use of mobile financial services remains low. Recent data indicates that mobile money subscription stands at 3.7 million, representing 51.7% of total mobile phone subscription in Malawi (Reserve Bank of Malawi [RBM], 2017). However, active subscription remains low at 23.3% over a 30-day period and 34.0% over a 90-day period. Similarly, subscription for bank integrated mobile services is growing at a slow pace, from an estimated 11% of banked population in 2012 to about 18% in 2016 (RBM, 2017). Such low access and usage of mobile financial services may be a result of both supply and demand-side constraints. According to the World Bank (2014), the main reason behind poor access to financial services, besides not having enough resources, is lack of understanding and awareness of existing financial products. Financial education can therefore bridge the gap between product marketing and effective product use (Cohen et al., 2008). UNESCO (2015) recorded Malawi's national literacy rate at 65.8% compared to a global rate of 86.3%, with a bias towards males at 73.0% against 58.6% for women.

The main objective of the study therefore is to investigate the influence of financial literacy³ on use of mobile phone-based financial transactions in Malawi. Furthermore, the study investigates the relationship between socio-economic factors (sex, age, family income, type of employment and area of residency, among others) as well as use of mobile financial services. We hypothesise that financial literacy can stimulate demand for financial products and services, including mobile financial transactions. Financial knowledge raises awareness of existence of financial products offered through mobile services and increases one's confidence to transact, such that unless an individual is familiar with concepts such as savings, interest and insurance, they may not fully appreciate nor utilize the transaction platform available on their mobile phones. Financial transactions and planning are made easy once one knows financial concepts (Von Rooij, 2012). This paper raises an interesting question for Sub-Saharan Africa because existing literature on mobile banking in African economies is biased towards East and West African economies that have already made strides in mobile money technology. We analyze nationally representative data on financial literacy among the Malawi populace, a country in Southern Africa which appears to be lagging behind in financial inclusion⁴. No similar study has been published on Malawi before, and therefore the findings will be relevant for policy and strategic direction towards promotion of mobile financial services.

The rest of the paper is organized as follows: Section 2 presents background information on mobile financial services operations in Malawi; Section 3 reviews relevant literature; Section 4 looks at methodology and data; Section 5 contains results and discussions, and Section 6 concludes by offering study implications.

2. Mobile financial services operations in Malawi: A preview

Growth of mobile financial services use in Malawi

Malawi has experienced an increase in mobile phone ownership over the years, from as low as 1.8% of total population in 2004 to 42.5% in 2016 (Malawi Communication Regulatory Authority [MACRA], 2017). Such mobile phones may be used to access mobile financial services. Mobile money in Malawi was first introduced in 2012 and estimates show that only 8% of individuals in the country use mobile money services, 27% in urban and 5% in rural areas (MACRA, and National Statistical Office [NSO], 2014). Financial services that can be accessed include cash-in/cash-out, payment of bills, airtime purchase, insurance, salary payments and money transfers. Airtel and Telecom Networks Malawi (TNM) are the two licenced telecommunication network operators providing mobile money services in Malawi. International organizations such as FHI 360, World Bank and USAID are implementing projects aimed at expanding the subscription base for mobile money in the country. For instance, as part of Joint Emergency Food Aid Programme, Concern World Wide piloted cash transfers using mobile money in Mchinji District in 2015.

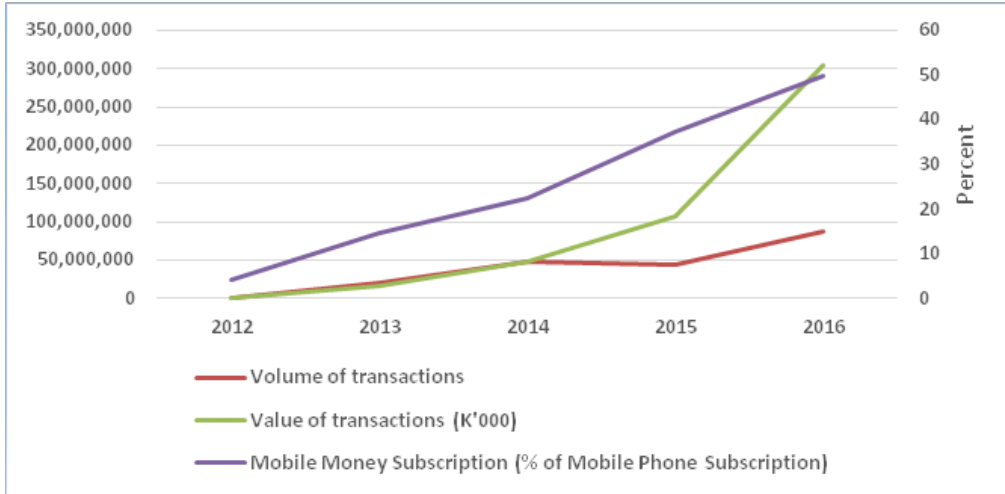
Since inception in 2012, non-bank mobile money subscription has registered an annual average growth rate of 125%, from slightly above 33,000 (4% of mobile phone subscription) to around 3.6 million subscribers (48% of mobile phone subscription) in 2016. Annual traffic of transactions has grown from about half a million to about 90 million between 2012 and 2016 (Figure 1). Usage of mobile money is largely limited to cash in/out transactions and purchasing of airtime. The under-utilization of the other services could be attributed to their complexity, among other reasons.

Meanwhile, only four out of the existing 10 banks in Malawi provided integrated mobile services. The subscription base for bank-led mobile banking grew from 11% of banked population in 2012 to 18% in 2016. Transaction values also increased while volume of transactions remained steady under 2 million (Figure 2).

Table 1 shows that buying of airtime and sharing using M2U are the most commonly used financial transactions among the studied sample. This is reported by 35% and 52% of the respondents, respectively, and is consistent with MACRA and NSO (2014) finding that the majority (65%) of Malawians use their mobile phones for buying airtime. Other transactions such as sending and receiving money and paying of bills are reported by less than 5% of the sample. This is lower than the proportion of 27%

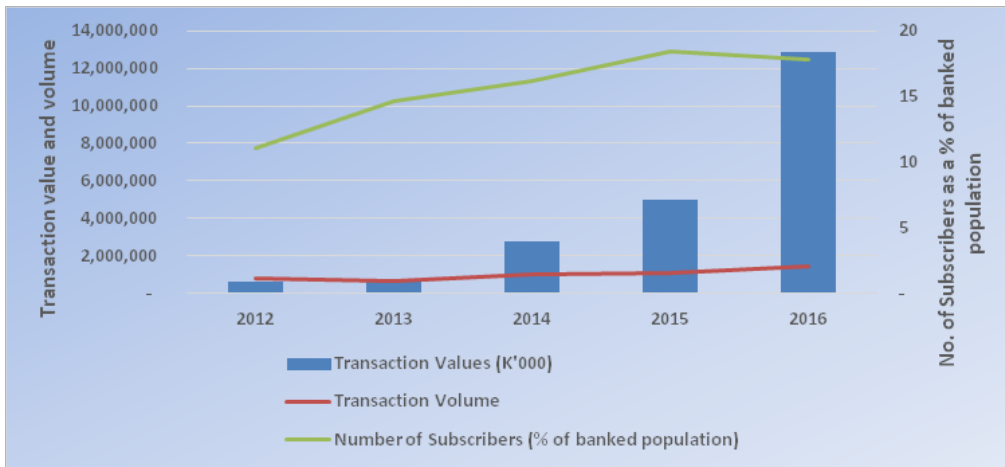
receiving payments reported in the MACRA and NSO (2014) Report. Internet and mobile phone services in Malawi gained platform in late 1990s.

Figure 1: Trends in non-bank mobile money



Source of data: Reserve Bank of Malawi and MACRA

Figure 2: Trends in bank integrated mobile services



Source of data: Reserve Bank of Malawi

Mobile phone penetration has grown from 1.8% of total population in 2004 to 42.5% in 2016. Over the same period, internet subscription has increased from almost non-existent to about 19% of the total population in 2016, as per indicators shared by MACRA through email. According to a survey conducted by MACRA (2014), access to mobile phones was skewed towards the urban population at 69%, compared to 29% of the rural counterparts. However, there were no significant disparities between

the male and female population. According to the survey, affordability was the major limiting factor to owning a mobile phone. In relation to financial literacy, individuals that engaged in mobile phone financial transactions had an average financial literacy level of 4, implying that they answered correctly 57% of financial concept questions, and suggesting that such transactions demand above-average financial literacy.

Table 1: Distribution of financial index by type of financial transactions

| Type of Financial Transaction | Proportion of respondents (%) | Financial literacy Index ⁵ (mean) |
|-------------------------------|-------------------------------|--|
| Receive money | 3.15 | 4.48 |
| Send money | 3.45 | 4.81 |
| Pay bills | 2.08 | 5.04 |
| Buy airtime | 35.38 | 4.05 |
| M2U (sending airtime) | 51.50 | 4.10 |
| Other | 0.61 | 4.26 |

Source: Authors' computation based on Reserve Bank of Malawi data.

The trend in non-bank mobile financial services indicates notable growth in subscription levels from as low as 4% to 48% of phone subscribers in a period of six years. However, the significant growth in subscription does not match utilization levels of services except for buying and sharing of airtime. A quick look at the sampled data shows that subscribers transacting in the under-utilized services had relatively higher scores of financial literacy than those transacting in the highly patronized services. This suggests that financial literacy plays an important role in the use of mobile financial services. Besides, Malawi needs financial consumers that can actively engage in innovative mobile financial services for them to be sustainable. However, such sufficient consumer demand is often missing in many contexts due to, among other factors, limited knowledge.

Policy and regulatory framework for mobile financial services in Malawi

Malawi has several financial services Acts and regulations including the umbrella Financial Services Act, the Agency Banking Regulations, the Financial Cooperatives Act, the Credit Reference Bureau Act, the Pension Fund Act and the Microfinance Act, among others. Since provision of electronic financial services cuts across financial and communication sectors, it requires a multi-sectoral regulation approach. This is crucial given literature alludes to policy and regulation as a significant constraint to adoption of mobile financial services (Dancombe and Boanteng, 2009). Until recently, the financial sector in Malawi operated without legislation to bind digital communication and financial transactions. This gap was addressed with the passing and enacting of the National Payments Systems Act (2016), and Financial Crimes

Act (2017). These legislations provide a regulatory framework for mobile financial services operations in Malawi. However, the sector still needs to address uncertainty of jurisdiction of authority over consumer protection. For instance, there are overlaps between Consumer Protection Act of 2003/Consumer Protection Council/Competition and Fair Trading Act of 1998/Competition and Fair Trading Commission; and the RBM over consumer protection and education responsibility under the different Acts. From the policy domain, the Malawi Financial Sector Development Strategy for 2015-2020 identified consumer protection and financial literacy as key areas for promoting financial inclusion. This was in response to the apparent high financial illiteracy levels. The Reserve Bank of Malawi, with support from the World Bank, is implementing a programme that aims at enhancing financial education among the populace, targeting existing users of financial services, the unbanked and students in education establishments. As others have argued, the functioning of modern society requires financial literacy, which affects financial behaviour (Lusardi et al., 2010; Agarwalla et al., 2015). Again, the potential to increase market share for all types of financial institutions and enhance their contribution to economic development hinges on recognizing and addressing the financial illiteracy problem (Shambare and Rugimbana, 2012).

3. Literature review

Theoretical literature

Financial capability is increasingly being recognized as key to stability and functioning of financial markets that are inclusive in nature (World Bank, 2014). Financial literacy is a component of financial capability defined as the combination of knowledge, understanding, skills, attitudes and especially behaviours that people need to make sound personal finance decisions suited to their social and financial circumstances (World Bank, 2014). Financial knowledge is considered as a form of investment in human capital (Agarwalla et al., 2015; Lusardi and Mitchell, 2013) required for planning and managing income between savings and consumption uses over one's lifetime as expressed in the life cycle hypothesis of maximizing consumer utility (Modiglian and Brumberg, 1954) or the permanent income hypothesis on ability to smoothen consumption over time (Friedman, 1957). In related consideration, Jappelli and Padula (2013) incorporates financial literacy into their model of intertemporal consumer's choice, where individuals aim at maximizing lifetime utility against intertemporal budget constraints. Their findings suggest that higher financial literacy levels are associated with higher savings, and therefore contribute to growth through investment channel.

Since this paper is interested in the use of mobile financial services as a distinct technology or innovation, we conceptually place the consumer decision making within the innovation and technology adoption framework. Rogers (1962: 17) defines the adoption process as 'the mental process some individual passes through from first hearing about an innovation to final adoption'. For purposes of empirical analysis, adoption is defined as the degree of use of a technology in the long-run equilibrium when the (individual) has full information about the technology and its potential (Feder et al., 1985). This definition of adoption refers to the degree of use of a technology as a quantitative measure of the extent of adoption. For technology such as mobile financial services, the extent of adoption at the individual level in a given period is necessarily dichotomous (use/no use). Feder et al. (1985) argues that a complete analytical framework for investigating adoption decision should include a model of individual consumer decision making about the extent and intensity of use of technology throughout the adoption process. Such consumer decisions are assumed to be derived from maximization of expected utility subject to a set of

constraints. Attempts to analyze adoption of technologies have among a variety of approaches tended to focus on relationship of key variables to adoption behaviour.

Another relevant theory is the Technology Acceptance Model that advances perceived usefulness and perceived ease of use as relevant factors in predicting users' acceptance of information technology such as mobile financial services (Davis, 1989; Talukder et al., 2014). In addition, the Theory of Reasoned Action is also widely used in analyzing technology adoption behaviour specifically focusing on the role of attitudes and norms (Ajzen and Fishbein, 1980; Talukder, et al., 2014). A person will perform a given behaviour if the perceived outcome is positive, and the opposite holds true. However, due to data limitations, we are not able to explore these dimensions of mobile financial services use. Suffice it to say that financial literacy plays a key role in people's formulation of financial perceptions regarding financial services (Lusardi, 2008).

Empirical literature

There is a rich body of literature on the relationship between financial literacy and demand for financial services. As argued by Clark et al., 2012; van Rooij et al., 2011; 2012; Sevim et al., 2012; Xu and Zia, 2012; Lusardi and Mitchell, 2006, financial knowledge affects a range of financial behaviours such as having a bank account, insurance take-up, business literacy, interest in financial education itself, retirement planning, borrowing behaviour and investment behaviour. In addition, sub-optimal financial outcomes are associated with low financial literacy in areas such as borrowing decision, stock market participation, indebtedness and responsible financial behaviour (Agarwalla et al., 2015). Similarly, Shibia and Kieyah (2016) show that financial literacy is a strong predictor of financial access in Kenya for both formal and informal services, but with a higher marginal effect for the formal sector. Cole et al. (2011) using field experiment in Indonesia and India finds that financial literacy stimulates demand for bank accounts while Alessie et al. (2007) conclude that less financially literate households are less likely to participate in formal financial systems and Agarwalla et al. (2015) explain that how individuals deal with money in their lives reflects their financial behaviour. While adoption could also be attributed to environmental factors such as government regulation on ICT and finance, including safeguards for consumer protection (Donovan, 2012) or perceived risks (Kabir, 2013), literature suggests that financial literacy increases awareness of financial choices and attitudes towards financial decision (Carpena et al., 2011) and thus potentially influences financial behaviour of adopting use of mobile financial services.

In addition, socio-economic factors have been found to influence use of mobile financial services elsewhere. In Bangladesh, the study by Duncombe and Boateng (2009) revealed that only 4% of mobile banking users were illiterate, compared to a national illiteracy level of 60% while Messy and Monticone (2012) found that access to formal services tends to be low among those whose main source of income was

farming and own business. Ivatury and Pickens (2006) documented that it is mostly low-income earners and not the poor who were making the most use of mobile banking in South Africa, and that users were mostly those with higher levels of education and technological sophistication. This calls for introduction of financial education in schools and vulnerable segments of the population to increase awareness, ability and confidence to use financial products. Technology attributes to do with ease of use, complexity, relative advantage, security assurance among others also tend to influence use of mobile financial services (Kabir, 2013; Kim and Kang, 2012; Talukder et al., 2014; Shi, 2011; Oliveira et al., 2016). Supply-side factors such as network connectivity, ICT, service provider infrastructure and regulatory framework are also important to improve digital financial services and their use. Buckley et al. (2015) revealed that most Malawi mobile users had low education and financial literacy levels, emphasizing the need for the regulator to have active powers to safeguard the end users. In addition, Reserve Bank of Malawi (2017) reported that biased agent distribution, at 21.4% in rural areas was one of the bottlenecks to adoption and usage of mobile money. However, due to data limitations, we are unable to account for the supply-side factors.

The studies reviewed infer that financial literacy raises awareness of existing financial products or services and positively influences access to financial services and financial behaviour. It may as well be that low financial literacy levels are associated with low adoption of mobile financial services. However, there is no evidence of causality from econometric analysis. This study will therefore seek to test the hypothesis that financial literacy does not influence use of mobile financial services.

4. Methodology and data

Methods of analysis

The study uses both descriptive statistical analysis and econometric evidence. A multivariate regression approach is used to analyse the influence of socio-economic attributes and financial literacy of individuals on use of mobile phone-based financial innovations. The dependent variable is a dummy variable equal to one if individual used mobile phone for any financial transactions, zero otherwise. We then control for various correlates including the key variable, financial literacy. Financial literacy is an index of responses to various fundamental financial concepts such as inflation, division, simple interest calculation, compound interest calculation, absolute/percent discount, risk and risk diversion. The index has a minimum value of zero (illiterate) if respondent got none of the questions correct, and a maximum value of seven (highly literate) when a respondent gives correct answers to all the seven questions. Thus, financial literacy takes only integer and non-negative values. The approach was to first include financial literacy index as a continuous variable and secondly considered dummy variables reflecting various levels of financial literacy.

We further investigate the relationships using an Instrumental Variable (IV) to account for possible endogeneity resulting from reverse causality in the estimation. We use highest education level of respondent as our instrumental variable. This is consistent with other studies on financial literacy such as van Rooij et al. (2012), which uses economics education as an instrument for advanced financial literacy, or Cole et al. (2012), which demonstrated the influence of education on financial behaviour and management. In the first stage, we regress financial literacy against a set of control variables including highest education level of respondent. The estimation is done using Poisson regression since our dependent variable is count data taking non-negative values (Wooldridge, 2010) between zero and seven. In the second stage, we investigate whether predicted financial literacy level influences use of mobile financial transactions. We are not able to correct for standard errors as is normally the case, but we demonstrate that the results are consistent, irrespective. We include a set of socio-economic factors (sex, age, family income, type of employment, and area of residency among others) as control variables. This relationship is estimated using Probit regression since our dependent variable is limited. The realized marginal effects indicate the effect of individual explanatory

variable on the probability of the dependent variable, i.e. conducting financial transactions on mobile phone.

Data and data sources

The study used cross-sectional data collected in 2013 by Reserve Bank of Malawi to understand financial knowledge, management and services among the Malawi population. The baseline survey that generated the data randomly drew a representative national sample of 4,999 households guided by the 2008 population census. Each district was stratified into enumeration areas that, on average, have 335 households. Using household list for each enumeration area, 20 households were randomly selected and in each an adult member was randomly selected and interviewed (Chirwa and Mvula, 2014). The households were further clustered into income groups by residential area, namely urban-city areas, urban-district town areas, peri-urban areas and rural areas representing differences in wealth and access to financial services in Malawi. The data for variables age and income were both winsorized at 1% level to remove outlier observations.

5. Results and discussions

Descriptive statistics

Characteristics of mobile financial transactions users

Table 2 provides characteristics of users of mobile financial transactions based on our sample. About 34% of the respondents use mobile financial transactions. The proportion of users increases with increasing financial literacy and the differences in each category of financial literacy score are statistically significant. Most respondents in formal employment (75%) and those residing in urban cities (64%) use mobile financial transactions, reflecting possible differential access to financial markets by employment sector and residential area. About 23% of individuals that do not own a bank account use mobile financial transactions, reflecting potential to include the unbanked through this service. About 61% of individuals that own a bank account use mobile financial services, possibly as either a complement or substitute to bank services. Further differentiation by income quantiles shows the proportion using mobile financial transaction increases from 15% to 64% as one moves from lowest to highest income quantile.

Table 2: Characteristics of mobile financial transaction users

| Category | Proportion of respondents using mobile financial transactions (%) |
|--------------------------------|---|
| | Yes |
| Financial Literacy Index Group | |
| 0 (illiterate) | 10.8 |
| 1-2 (low literacy) | 21.3 |
| 3-4 | 32.8 |
| 5-6 | 48.0 |
| 7 (highly literate) | 68.8 |
| Employed – formal sector | 75.6 |
| Employed – informal sector | 52.5 |
| Self-employed | 30.8 |

continued next page

Table 2 Continued

| Category | Proportion of respondents using mobile financial transactions (%) |
|-----------------------------|---|
| | Yes |
| Unemployed | 30.8 |
| Owns a bank account | 61.4 |
| Does not own a bank account | 23.9 |
| Urban-cities | 64.2 |
| Urban-district towns | 47.1 |
| Peri-urban | 48.0 |
| Rural | 27.9 |
| Income Quantile 1 | 15.1 |
| Income Quantile 2 | 24.4 |
| Income Quantile 3 | 37.5 |
| Income Quantile 4 | 63.5 |

Source: Authors' computation

Table 3 presents sample descriptive statistics for variables included in the regression models. Over half of respondents were female (61%) and close to 77% engage in self-employment activities. Roughly 5% of respondents are in either formal or informal employment. On average, respondents scored 3.5 on financial literacy, which represents low financial literacy as categorized by Agarwalla et al. (2015). Only 48% of respondents could answer 3-4 financial concept questions correctly or 50% of financial literacy questions. Respondents' monthly income is estimated at an average of MK18,861, with lowest average income of MK12,579 in rural areas and highest average income in urban cities at MK48,264. The differences in monthly income between urban and rural households are statistically significant. We also find that the level of income increases with increasing financial literacy levels and the differences in levels were statistically significant. Most respondents (96%) reported that their incomes varied by season. About 31% reported better financial position compared to the previous year upon assessing themselves.

Table 3: Descriptive statistics of model variables

| Variable | Mean | S. Dev | Min | Max |
|---|------|--------|-----|-----|
| Financial literacy index | 3.53 | 1.50 | 0 | 7 |
| Financial literacy index (instrumented) | 3.57 | 0.62 | 2.4 | 6 |
| Financial Literacy Index Group | | | | |
| 0 (illiterate) | 0.03 | 0.16 | 0 | 1 |
| 1-2 (low literacy) | 0.22 | 0.42 | 0 | 1 |
| 3-4 | 0.48 | 0.50 | 0 | 1 |
| 5-6 | 0.26 | 0.44 | 0 | 1 |

continued next page

Table 3 Continued

| Variable | Mean | S. Dev | Min | Max |
|--|-------|--------|------|-----|
| 7 (highly literate) | 0.01 | 0.10 | 0 | 1 |
| Use phone for various financial transactions | 0.34 | 0.47 | 0 | 1 |
| Use phone to save and receive money, and pay bills | 0.031 | 0.17 | 0 | 1 |
| Own/has use of phone (0/1)* | 0.54 | 0.50 | 0 | 1 |
| Age of respondent (years) | 37 | 21 | 21 | 63 |
| No education (0/1) | 0.19 | 0.40 | 0 | 1 |
| Primary (Std 1-5) education (0/1)* | 0.31 | 0.46 | 0 | 1 |
| Primary (std 6-8) education (0/1)* | 0.27 | 0.44 | 0 | 1 |
| Secondary (1-2) education (0/1) | 0.09 | 0.29 | 0 | 1 |
| Secondary (3-4_ education (0/1) | 0.10 | 0.30 | 0 | 1 |
| Tertiary education (0/1)* | 0.03 | 0.18 | 0 | 1 |
| Monthly income ('000) | 18.86 | 30.39 | 0.50 | 200 |
| Monthly income urban_cities ('000) | 48.26 | 51.67 | 0.50 | 200 |
| Monthly income urban_ district towns ('000) | 33.69 | 43.26 | 0.10 | 200 |
| Monthly income peri_urban ('000) | 39.53 | 46.11 | 0.50 | 200 |
| Monthly income rural ('000) | 12.56 | 18.52 | 0.5 | 200 |
| Better-off financially than a year ago (0/1)* | 0.31 | 0.46 | 0 | 1 |
| Seasonal income (0/1)* | 0.96 | 0.20 | 0 | 1 |
| Male respondent (0/1)* | 0.39 | 0.49 | 0 | 1 |
| Employed – formal sector (0/1)* | 0.05 | 0.21 | 0 | 1 |
| Employed – informal sector (0/1)* | 0.05 | 0.21 | 0 | 1 |
| Self-employed (0/1)* | 0.77 | 0.42 | 0 | 1 |
| Urban_cities (0/1)* | 0.13 | 0.34 | 0 | 1 |
| Urban_district towns (0/1)* | 0.03 | 0.16 | 0 | 1 |
| Peri_urban (0/1)* | 0.04 | 0.19 | 0 | 1 |
| Number of observations | 4999 | | | |

Note: * indicates dummy variable

Source: Computed by authors.

Econometric results

Factors influencing mobile phone financial services use

We report results of various regressions estimated in Table 4. We first checked pair-wise correlation among regressors and find none more than 0.8 rule of thumb suggested in Gujarati (2003). Model 1 and 2 presents Probit regression results where we are not considering problem of endogeneity for variable financial literacy. Overall, Wald test statistic shows that we reject the null hypothesis that all parameter estimates except the constant are zero at the 1% significance level.

Table 4: Factors influencing use of mobile financial services⁶ (marginal effects reported)

| Dependent Variable Independent Variables | Model 1 | | Model 2 | | Model 3 (IV) | | Model 4 | |
|---|---------|--------|---------|---------|--------------|--------|---------|--------|
| | dF/dx | Z | dF/dx | Z | dF/dx | Z | dF/dx | Z |
| Financial Literacy Index (FLI) | 0.017 | 2.66* | - | - | - | - | 1.593 | 13.79* |
| FLI Group (1-2) | - | - | 0.094 | 1.38 | - | - | - | - |
| FLI Group (3-4) | - | - | 0.114 | 1.75*** | - | - | - | - |
| FLI Group (5-6) | - | - | 0.144 | 2.1** | - | - | - | - |
| FLI Group (7) | - | - | 0.122 | 0.95 | - | - | - | - |
| Monthly income ('000) | 0.002 | - | - | - | - | - | - | - |
| Seasonal income (0/1)* | 5.09* | 0.002 | 515* | 0.003 | 3.84* | 0.001 | 2.09** | - |
| Better-off financially than a year ago (0/1)* | -0.012 | -0.22 | -0.011 | -0.2 | 0.011 | 0.08 | -0.02 | -0.30 |
| Age of respondent (years) | 0.065 | 3.31* | 0.066 | 3.35* | 0.182 | 3.53* | -0.01 | -0.57 |
| Age-squared of respondent (years) | -0.0002 | -2.83* | -0.0001 | -2.83* | 0.084 | 6.18* | -0.03 | -4.76* |
| Male respondent (0/1)* | 4.12* | - | - | - | -0.00 | -6.34* | 0.000 | - |
| Primary (Std 1-5) education (0/1)* | 0.116 | 5.93* | 0.118 | 6.01* | 0.321 | 6.34* | -0.02 | -0.70 |
| Primary (Std 6-8) education (0/1)* | 0.136 | 4.3* | 0.137 | 4.34* | 0.122 | 1.51 | - | - |
| Secondary (1-2) education (0/1) | 0.253 | 7.62* | 0.255 | 7.69* | 0.439 | 5.44* | - | - |
| Secondary (3-4_education (0/1) | 0.412 | 9.78* | 0.416 | 9.9* | 0.751 | 7.41* | - | - |
| Tertiary education (0/1)* | 0.469 | 10.62* | 0.476 | 10.89* | 0.99 | 9.65* | - | - |
| Employed – formal sector (0/1) | 0.520 | 6.11* | 0.525 | 6.23* | 1.01 | 6.69* | - | - |
| Employed – informal sector (0/1) | 0.148 | 2.27** | 0.1470 | 2.31** | 0.159 | 1.32 | 0.076 | 1.22 |
| | 0.134 | 2.56** | 0.1251 | 2.40** | 0.22 | 0.17 | 0.123 | 2.37** |

continued next page

Table 4 Continued

| Dependent Variable Independent Variables | Model 1 | | Model 2 | | Model 3 (IV) | | Model 4 | |
|---|---------|--------|---------|--------|--------------|---------|----------------|----------------|
| | dF/dx | Z | dF/dx | Z | dF/dx | Z | D=1 if use MFS | D=1 if use MFS |
| Self-employed (0/1) | 0.085 | 2.72* | 0.0840 | 2.67** | 0.085 | 1.09 | 0.052 | 1.63*** |
| Urban-city (0/1) | 0.163 | 5.01* | 0.1787 | 5.37* | 0.251 | 3.34* | 0.049 | 1.44 |
| Urban -district town (0/1) | 0.014 | 0.24 | 0.0314 | 0.55 | 0.240 | 1.78*** | -0.08 | -1.52 |
| Peri-urban (0/1) | 0.054 | 1.24 | 0.0682 | 1.50 | -0.12 | -1.00 | 0.111 | 2.48** |
| Number of Observations | | 4655 | | 4655 | | 4655 | | 4655 |
| F statistic | | - | | - | | - | | - |
| Prob >F | | - | | - | | - | | - |
| Wald Chi-Squared | | 588.67 | | 602.05 | | 672.35 | | 603.49 |
| Probability>Chi-squared | | 0.0000 | | 0.0000 | | 0.0000 | | 0.000 |
| Pseudo R-Squared | | 0.2118 | | 0.2115 | | - | | 0.2082 |

Note: For dummy variable dF/dx is for discrete change of dummy variable from 0 to 1. Superscripts *, **, *** represents statistically significant at 1%, 5% and 10% levels, respectively.

We find statistically significant positive influence of financial literacy on use of mobile phone financial transactions. An additional score on the financial literacy questions results in a 1.7% increase in probability that an individual will use their phone for financial transactions. This is true in Model 1 where financial literacy index is a continuous variable. Further analysis in Model 2 where the financial literacy index is categorized into various levels shows that probability of people using phones for financial transactions increases with increasing level of financial literacy. For instance, the probability that an individual will use their phone for financial transactions increases from 8.7% for low financial literacy index scores of 1-2 to 12% for highly financially literate respondent with a score of 7 relative to base category of financially illiterate individual. However, the influence of financial literacy level is only statistically significant for scores 3-4 and 5-6, representing probability increases of 11% and 14%, respectively. This finding emphasizes the role of financial literacy in enhancing use of mobile-based financial innovations.

Model 3 presents first-stage estimation of the IV model. Results shows that financial literacy as measured by the index is positively and statistically influenced by at least upper primary level education, income, age, being male, residing in a city and district town. Further, education positively influences use of mobile financial transactions. In all models, estimated marginal effect of education tends to increase with increasing education level. For instance, in Model 3, the effect ranges from as low as 0.439 (upper primary) to 1.01 (tertiary education) additional correct response on financial literacy concept questions reflecting the importance of education in ensuring financial literacy consistent with other studies (Adelman and Nagarajan, 2009; Worthington, 2004; Lusardi and Mitchell, 2008; Guiso and Jappelli, 2008). Second-stage results using instrumented independent financial literacy variable as one of regressors are presented in Model 4. The instrumented financial literacy scores range between 0.94 and 1.84 points with a mean score of 1.26. We find that an increase in financial literacy score significantly increases the probability of using mobile financial transactions by 1.59.

Inclusion of control variables allows accounting for differences among the respondents. Monthly income statistically increases probability of adoption in all models estimated, though marginal effect is small. The negligible influence may reflect inadequate underlying economic activities essential to motivate increased use of mobile financial transactions especially in environments where poverty levels remain high, estimated at 45% of the population (NSO, 2017) and incomes are seasonal (Chirwa et al., 2012). Despite the expectation that seasonality of income would call for various mechanisms to smooth household consumption, among them financial instruments (Diagne and Zeller, 2011), we find that seasonality of income does not significantly influence use of mobile financial services. The statistically significant positive effect of age (Models 1, 2) reflects that adoption of innovations increases with age as people become more knowledgeable. However, the significant negative influence of age squared confirms literature observation that as people get older, they are likely to fail to adapt to new innovations on the financial market due to natural

cognitive deterioration (Agarwalla et al., 2015). These results are reversed in Model 4, where, despite statistically significant more young people (40%) using mobile financial transactions relative to 32% of adults above 24 years, the probability of use tends to decline and pick up as they grow older, possibly reflecting the limited economic activities of the youths.

Gender of respondent also influences use of mobile phone financial transactions. We find male individuals are (Models 1, 2) more likely to use mobile phone for financial transactions relative to females. This resonates with literature that males are likely to engage more with financial services than their female counterparts (Mandell, 2008; Cole et al., 2011; Worthington, 2004; Chen and Volpe, 1998; Lusardi and Mitchell, 2006; 2008; Almenberg and Säve-Söderbergh, 2011; Monticone, 2010; Volpe et al., 1996; Danes and Hira, 1987). Goldsmith and Goldsmith (1997) attribute this tendency to a general lack of interest by women in topics related to personal finance, investment, technology and their low level of interaction with financial service providers. This variable is, however, not significant in Model 4. Individuals in self-employment and informal sector are 12.3% and 5.2%, respectively, more likely to use their mobile phone to access financial services compared to the unemployed. Thus, the unemployed are likely to have limited means and economic activities to use their mobile phone to access financial services. Residence in peri-urban areas increases the probability that an individual will use mobile phone for financial transactions by 4.9% (Model 4) relative to rural areas. Use and access to mobile phone for various purposes is more prevalent in urban than rural areas. This may well reflect the correlation between urbanization and availability and usage of financial services infrastructure in general, which is often better in urban than rural areas in developing countries (Cole et al., 2011), including Malawi.

6. Conclusions and policy implications

Malawi has experienced an increase in mobile phone use and access over the years, which presents an opportunity to expand financial services and promote financial inclusion. However, use of mobile phone for financial transactions remains low, with airtime purchase and sharing as the most commonly used transactions. This is happening amid continued financial education programmes to improve financial inclusion and capability among Malawians by the Reserve Bank of Malawi and other stakeholders. This paper set out to investigate whether financial literacy among the populace is constraining use of mobile-based financial services. The Reserve Bank collected nationally representative cross-sectional data from 4,999 randomly selected adults in 2013 on financial literacy and consumer protection that is analysed using statistical description and econometrics. On average, 48% of sampled individuals answered correctly 3-4 questions on financial literacy. The average financial literacy score was 3.53. About 34% use mobile financial transactions, most of whom are city dwellers, people in formal employment and in higher income quintiles.

Econometric results obtained show that financial literacy positively influences use of mobile financial transactions. More importantly, likelihood of use increased with increasing levels of financial literacy, demonstrating relevance of financial literacy in scaling up use of mobile phones for financial services. Consistently, the model with education variables also shows that, increasingly, people with higher education are more likely to conduct financial transactions through mobile phones. Being male increased the probability of using mobile financial transactions relative to females. We found that employment significantly affects use of mobile financial transactions; the magnitude of effect varies with higher probability of use among those employed in informal (12%) and self-employment (5%) relative to unemployed persons. Income is also another key factor, though magnitude of effect is negligible. Differences exist reflecting rural-urban divide, with peri-urban residence associated with higher probability of using mobile financial transaction.

The study results have important implications. Firstly, interventions must differentiate financial literacy education from adult segment of population by their characteristics and avoid a 'one size fits all' approach to financial education. Secondly, policy and strategies to promote mobile financial services should respond to constraints faced by rural residents to access mobile financial services. While rural population remains underserved relative to urban counterparts in Malawi, expanding

use of digital payment system in rural settings offers opportunities for increasing access to financial products and services. Thirdly, women should be encouraged to engage more with financial services. Therefore, gender-sensitive innovations capable of sustaining and developing a general positive interest in financial services among women are required. For instance, the proliferation of women village savings and loans associations presents a platform to integrate their activities with mobile financial services. Lastly, findings point to opportunities existing in informal sector to expand digital payments and yet many informal transactions have not embraced, to a large extent, use of mobile financial services. There is need to examine how to overcome informal setting barriers to use of mobile financial transactions to ensure effective intermediation between users, agents and service providers. Informal sector businesses, small and medium enterprises, and those engaged in petty trading, must begin to use mobile financial transactions.

Further research could expand current analysis to determine whether factors identified in single-country case can be generalized to other countries in SADC region. One can also investigate whether mobile financial transactions are a complement or substitute to existing bank services, which is important for integrated financial product innovation.

Notes

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2. Senior Economist at Reserve Bank of Malawi; tchauma@gmail.com
3. According to the OECD, financial literacy is defined as the combination of consumers'/ investors' understanding of financial products and concepts and their ability and confidence to appreciate financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being.
4. Finscope (2014) reports about 40% of adult Malawians had access to formal bank and non-bank services, which compares to 53% who had access to both formal and informal banking as reported by Chirwa and Mvula (2014). About 25% of adult Malawians participated in rotational savings and credit associations (ROSCAs) and village banks.
5. Financial literacy is an index of responses to various fundamental financial concepts such as inflation, division, simple interest calculation, compound interest calculation, absolute/percent discount, risk and risk diversion. The values range from zero to seven.
6. We also checked the influence of answering correctly financial literacy concepts on the probability of using mobile financial transactions. Results show positive and significant effect of correct answer on compound interest, insurance and division. While correct answers on inflation negatively influence use of mobile financial transactions. Concepts related to share diversification and discount rate are not statistically significant. Furthermore, persons that are responsible for household and personal expenses are less likely to use mobile financial transactions. Detailed results are presented in the appendix.

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Appendix

A. Summary of empirical literature

| Author | Research findings | Methodology used |
|------------------------|---|--|
| Agarwalla et al (2015) | Financial knowledge leads to responsible financial behaviour. However, negative relationship exists between financial attitude and financial behaviour | <ul style="list-style-type: none"> • Ordered logistic regression • Accounted for socio-demographic characteristics • Used Spearman's rank correlation coefficient to explore nature of relationship |
| Van Rooj et al (2012) | Positive link between financial literacy and wealth either directly or indirectly through likelihood of investing in stock market or retirement planning | <ul style="list-style-type: none"> • Employed survey data and used multivariate regression on several control variables including income • OLS regression on total net worth on financial literacy |
| Kabir (2013) | Adoption of mobile financial attributed to perceived factors – risk, trust, ease of use and relative advantages | <ul style="list-style-type: none"> • Multiple regression |
| Clark et al. (2012) | Many workers do not possess enough financial knowledge to confidently make optimal choices | <ul style="list-style-type: none"> • OLS regression |
| Sevim et al (2012) | Reports differences in borrowing behaviour of consumers with different levels of financial literacy | <ul style="list-style-type: none"> • Factor analysis approach |
| Carpena et al (2011) | Financial literacy increases awareness of financial choices and attitude towards financial decision | <ul style="list-style-type: none"> • Experimental study with randomised treatments |
| Talukder et al (2014) | Perceived usage, ease of use, perceived credibility, trust and intention had positive correlation with adoption of mobile banking in Australia while system quality had no impact on use of mobile phones | <ul style="list-style-type: none"> • Multiple regression analysis using Technology Acceptance Model. • Used survey data sampled from mobile phone users |

continued next page

A. Continued

| Author | Research findings | Methodology used |
|----------------------------|---|---|
| Kim (2012) | Perceived ease of use, security, risk and trust have direct effect on intention to use smartphone banking | <ul style="list-style-type: none"> • Adopted Technology Acceptance Model with an extension of trust, security risk and self efficacy • Employed Structural Equation modelling technique |
| Ivatury and Pickens (2006) | Most non-users of the mobile banking targeting low-income individuals in South Africa lacked knowledge of the service and perceived it to be expensive and meant for individuals in formal type of employment | <ul style="list-style-type: none"> • -Simple cross tabulations |
| Cole et al (2009, 2011) | Strong correlation between financial literacy and behaviour. Financial education programmes have modest effects, increasing demand for bank accounts only for those with limited education but financial subsidies had large effects. Financial literacy stimulates demand for bank accounts in India | <ul style="list-style-type: none"> • Linear probability model using household survey data for India and Indonesia |

B. Description and definition of variables

| Variable | Description |
|---|---|
| Financial literacy index | Ranges between 0 and 7. Reflects number of correct answers on financial concepts such as inflation, division, simple interest calculation, compound interest calculation, absolute/percent discount, risk, and risk diversion |
| Financial Literacy Index Group | Defined score groups 0 (illiterate) 1-2 (low literacy) 3-4 5-6 7 (highly literate) |
| Use phone for various financial transactions | D = 1 if used phone for financial transactions, zero otherwise |
| Age of respondent | Age of respondent in years |
| Education level of respondent No education | D=1 if respondent has not attended any education, zero otherwise |
| Primary (Std 1-5) education | D=1 if highest education level is primary (Std 1-5), zero otherwise |
| Primary (std 6-8) education | D=1 if highest education level is primary (Std 6-8), zero otherwise |
| Secondary (1-2) education | D=1 if highest education level is primary (Form 1-2), zero otherwise |
| Secondary (3-4) education | D=1 if highest education level is primary (Form 3-4), zero otherwise |
| Tertiary education | D=1 if highest education level is tertiary level, zero otherwise |
| Monthly income ('000) | Income in Malawi Kwacha |
| Better-off financially than a year ago | D=1 if one is better-off financially than a year ago, zero otherwise |
| Seasonal income | D=1 if one is individual income is seasonal, zero otherwise |
| Employed – formal sector | D=1 if one is employed in formal sector, zero otherwise |
| Employed – informal sector | D=1 if one is employed in informal sector, zero otherwise |
| Self-employed | D=1 if one is self-employed, zero otherwise |
| Urban_cities | D=1 if one resides in urban city, zero otherwise |
| Urban_district towns | D=1 if one resides in urban district towns, zero otherwise |
| Peri_urban | D=1 if one resides in peri urban, zero otherwise |

C. Influence of various financial literacy concepts on use of mobile financial transactions

| Variables | dF/dx | Z |
|---|--------|----------|
| Very confident in ability to manage finances ((0/1)* | 0.025 | 1.36 |
| Responsible for household and personal expenses ((0/1)* | -0.420 | -2.04** |
| Correct answer for division (0/1)* | 0.091 | 3.62* |
| Correct answer for inflation (0/1)* | -0.032 | -1.73*** |
| Correct answer for simple interest (0/1)* | 0.021 | 0.85 |
| Correct answer for compound interest (0/1)* | 0.048 | 2.61** |
| Correct answer for discount rate (0/1)* | -0.020 | -1.06 |
| Correct answer for insurance (0/1)* | 0.069 | 3.54* |
| Correct answer for share diversification (0/1)* | -0.011 | -0.6 |
| Primary (Std 1-5) education (0/1)* | 0.129 | 4.11* |
| Primary (Std 6-8) education (0/1)* | 0.234 | 7.07* |
| Secondary (1-2) education (0/1) | 0.383 | 8.89* |
| Secondary (3-4_ education (0/1) | 0.431 | 9.57* |
| Tertiary education (0/1)* | 0.497 | 5.67* |
| Monthly income ('000) | 0.002 | 5.06* |
| Seasonal income (0/1)* | -0.011 | -0.2 |
| Better-off financially than a year ago (0/1)* | 0.060 | 3.08* |
| Age of respondent (years) | 0.008 | 1.63*** |
| Age-squared of respondent (years) | -0.000 | -2.44** |
| Male respondent (0/1)* | 0.101 | 5.12* |
| Employed – formal sector (0/1) | 0.157 | 2.36** |
| Employed – informal sector (0/1) | 0.144 | 2.76** |
| Self-employed (0/1) | 0.088 | 2.81* |
| Urban-city (0/1) | 0.153 | 4.8* |
| Urban -district town (0/1) | 0.009 | 0.15 |
| Peri-urban (0/1) | 0.041 | 0.96 |
| Number of Observations | 4672 | |
| Wald Chi-Squared | 665.95 | |
| Probability >Chi-Squared | 0.000 | |
| Psuedo R-Squared | 0.2173 | |

Note: For dummy variable dF/dx is for discrete change of dummy variable from 0 to 1. Superscripts *, **, *** represents statistically significant at 1%, 5% and 10% levels, respectively.



Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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