Drivers of the Gender Gap in use of Digital Financial Services: Evidence from Uganda

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Abstract

This study uses a mixed methods approach to analyse the social and economic factors causing the gender gaps in the use of digital financial services (DFS) in Uganda, using the Uganda National Household Survey data of 2019/2020. Quantitatively, we applied the bivariate probit regression and the Fairlie technique to decompose the gender gap. Bivariate regression results showed that among other factors, males were more likely to use both bank accounts and mobile money services than females. A decomposition of the gender gap for each of the DFS using Fairlie decomposition technique indicated that social and economic factors explain 75% and 65% of the existing gender gap in the use of mobile money services and bank accounts in Uganda respectively. The largest contributor to the gender gap in the use of mobile money services was the ownership of a mobile phone (72.4%), followed by expenditure on information and communication technology (ICT) and education contributing 13.5% and 2.7% respectively. Similarly, the largest contributors to the gender gap in the use of bank accounts were education (18.0%), expenditure on ICT (15.3%), age (12.7%) and ownership of a mobile phone (11.5%). Our results from qualitative analysis put culture among the other key contributors to the gender gap. We therefore recommend that policy-makers in Uganda bridge the gender gap in employment and education between men and women, to achieve inclusivity in the use of DFS.

Key words: *Gender gap, Fairlie decomposition, Yun decomposition, Mobile Money, Bank accounts, Uganda.*

1. Background

The world has experienced a substantial increase in the access to and use of digital technologies over the last couple of years. However, significant challenges remain in ensuring inclusivity in transformation to a digital society (Mariscal et al., 2019). For example, marginalized groups, especially women, have largely been excluded from the transformation process (Liff et al., 2004; Antonio and Tuffley, 2014; FSDU, 2018; Sinha, 2018; Mariscal et al., 2019; Mugume and Bulime, 2022). These scholars and many others like Cheronoh (2019) have argued that the barriers to digital financial inclusion have been more pronounced for women. For example, in 2020, the World Bank (2020) estimated that women in low and middle-income countries, were 36% less likely than men to own mobile money accounts. The World Bank attributed the above findings to the digital financial products which are currently on the market seldom being designed or targeted explicitly towards women. Similarly, Coulibaly (2021) found that females in West Africa were less likely to adopt and use mobile money services or even own a bank account than males due to socio-economic factors such as education and income levels.

In Uganda, the National Financial Inclusion Strategy (NFIS) identifies several gaps in the current state of financial inclusion, including the high exclusion of women in the access and use of digital financial services (DFS). For example, women in Uganda are less likely to be active users of mobile money; (38% of men compared to 25% of women) have an account with a financial institution or join a formal insurance scheme (Coulibaly, 2021). Additionally, findings by Mugume and Bulime (2022) suggest that Ugandan women were 30% less likely to use digital financial transactions than the men. UBOS (2021) further revealed that only 44% of females used mobile money services in 2019/2020 relative to 60% of the males. The limited use of DFS by women deprives them of the potential to increase their income-generating capacity, manage risks, lower transaction costs of money transfers, access credit and promote a savings culture (Pierre et al., 2018; BOU, 2019; Agur et al., 2020; Myovella et al., 2020).

This study therefore sought to analyse the gender inequalities in access to and use of DFS (i.e., mobile money and bank accounts) in Uganda. Specifically, the study examined: (i) the socio-economic factors that explain the gender gap in the use of DFS; (ii) the interventions aimed at improving access and use of DFS by women; and (iii) the performance (successes and failures) of the interventions aimed at reducing the gender gap in accessing and using DFS.

Previous studies that focused on developing countries in general include Singh (2017), Antonio and Tuffley (2014) and Pawluczuk et al. (2021)). Particular to Uganda, studies such as that of Museba et al., (2021) concentrated on the impact of DFS on the economy. Mugume and Bulime (2022) examined digital technologies as pathways for COVID-19 recovery. To the best of our knowledge, none of these studies decomposed the gender gap. Therefore, using a nationally representative sample, the contribution of our study is two-fold. First, we decomposed the existing gender gap in the access to and use of DFS in Uganda and highlighted the contribution of each social-economic factor to the gap. Second, we applied a mixed methods approach (i.e., quantitative and qualitative technique) to provide a detailed understanding of the issues relating to the gender gap other than those highlighted by the results from the quantitative method.

The rest of the paper is organized as follows. Section 2 examines the existing literature and interventions made by stakeholders such as government and the private sector. Section 3 introduces the methodology used and the data source. Section 4 presents the discussion of results and the policy recommendations.

2. A brief literature review

The explanation of the determinants of gender gaps in financial inclusion can be described by two arguments: human rights and capabilities arguments (Benería et al., 2015). The human rights argument states that all individuals in society should benefit from the same rights, regardless of their sex. However, in many developing societies, women do not benefit from the same rights as men in the financial system. Differential treatment under law or customs may constrain women from entering contracts under their own name, including opening a bank account and ownership of land rights among others due to restrictive gender norms (Ogunleye, 2017; Naidoo and Hilton, 2006; Ndoya and Tsala, 2021). On the contrary, the capabilities argument assumes that the unequal allocation of resources is the cause of many other discriminations and inequalities in income and gender (Ndoya and Tsala, 2021).

Following the capabilities argument, literature from countries similar to Uganda such as that of Cheronoh (2019) classified the determinants of digital inclusivity among rural women in Kenya into socio-economic (education, employment status, membership in a saving group, among others), regulatory, institutional and policy factors (degree of regulation of financial institutions and the number of regulated financial institutions and their location). Similarly, Coulibaly (2021) found that male, older, more educated, richer and employed persons were more likely to adopt and use mobile money services in countries of the West African Economic and Monetary Union. Relatedly, Koloma (2021) found that financial inclusion of young people was hindered mainly by the high cost of the financial products on the market which limits their affordability. These findings point to the role played by resource ownership, especially income, in the use of DFS. Indeed, income differences between women and men in Uganda have been highlighted among the main factors that explain the divide in access and use of DFS. Some of these differences are a result of the pre-existing gender divide in access to education which culminates in gender differences in access to better-paying jobs.

In addition, Mugume and Bulime (2021) found that financial inclusion increased among middle-aged males since they have more SIM cards registered in their names in Uganda. This implies that chances of men in this age bracket owning a phone are higher relative to that of women. Worse still, even among the few women who own mobile phones, some of these are registered in their spouses' names who transact on their behalf. These findings were corroborated by (Tusubira and Mbabazi., 2021;

Cheronoh., 2019; Kahunde et al., 2022) who indicated that financial inclusion increased with ownership of a mobile phone and an identification document such as a national identity card or passport, education, age, membership in a social group and employment. Similarly, Murendo et al. (2018) also found that membership in a social group boosted the adoption and use of mobile financial services because of the increased awareness of such services through training.

Furthermore, results from a study by Aterido et al. (2013) indicated that the differences between men and women in access to and use of financial services can be explained by the fact that men are more likely than women to have access to education, formal employment and greater economic participation, which ultimately generates more income, and consequently reduces the number of barriers faced in the financial system. Demirgüç-Kunt et al. (2013) confirmed that manifestations of gender norms such as the level of violence against women and the incidence of early marriage of women contributed to explaining the variation in the use of financial services between men and women even after controlling for individual characteristics, for example; income, education, place of residence, age and socio-professional status. Indeed, Abdu et al. (2015), in applying the Probit regression and Fairlie's decomposition, confirmed that education is the key driver of the gender gap in financial inclusion.

Other empirical studies have emphasized the role of institutions and legal barriers in evincing the differences in access to and use of financial services between men and women. For example, institutions discriminate against women in access to land ownership (Balasubramanian et al., 2019). This difference in treatment reduces their involvement in entrepreneurial activities and contributes to keeping them away from the formal financial system. This finding is confirmed by Adegbite and Machethe (2020), who found that the causes of the financial inclusion gender gaps were sociocultural, institutional, legal and regulatory factors that affect the demand for and supply of formal financial services in Nigeria. Taking all the above literature into consideration, we proposed the following theory of change to close the existing gender gap in the use of DFS in Uganda.

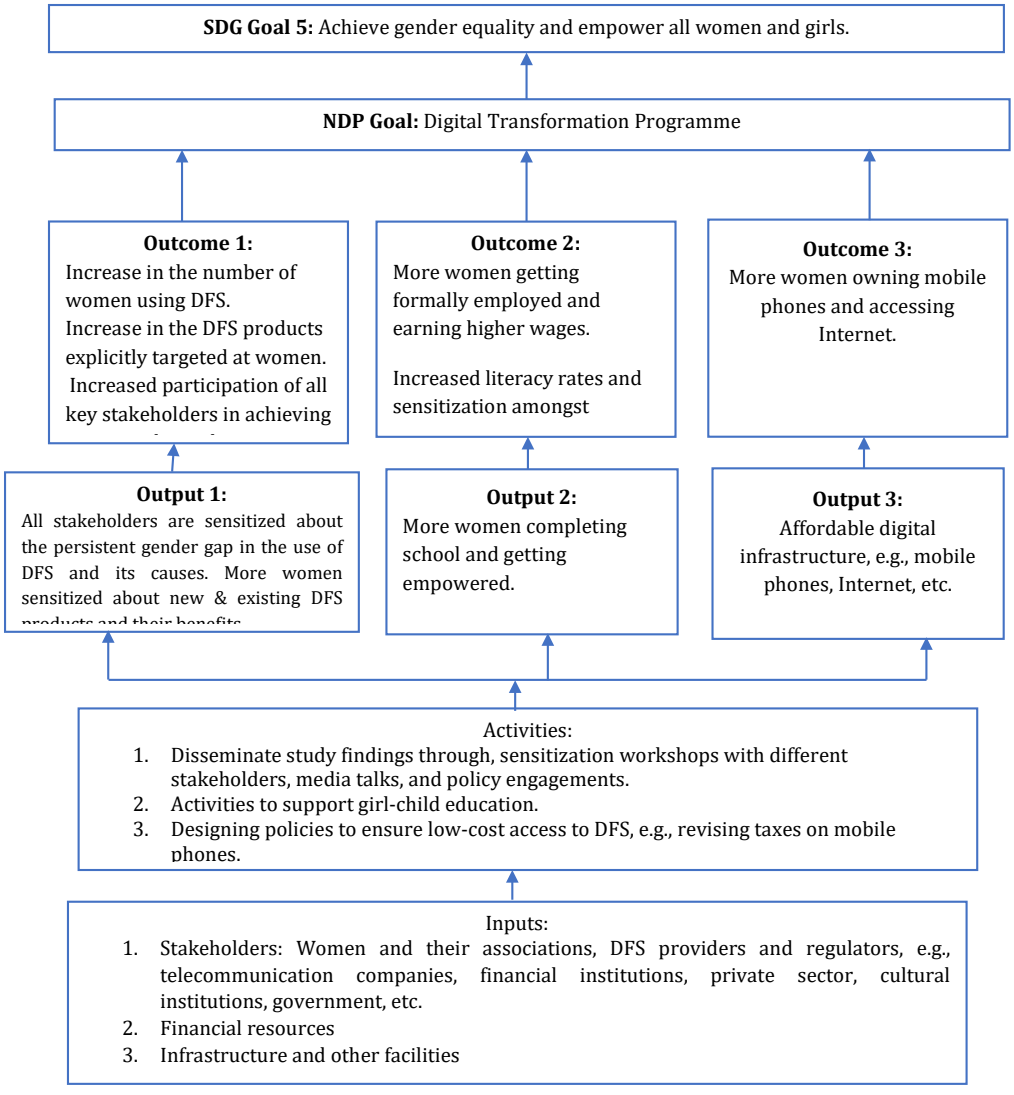
Theory of change to close the gender gap in access to and use of DFS in Uganda

The use of DFS has continuously replaced physical cash transfers across the different platforms. However, a significant part of the population, especially in developing countries, is unable to access and use some of these available services, for example mobile money and bank accounts. These include women, youth, people with disabilities and the elderly. Some of these vulnerable groups are involved heavily in informal sector activities that have little or no pay, for example, women doing unpaid care work (Baligar, 2018). Their status leaves them most susceptible to economic and financial crises, and exclusion (Macionis, 2010; Lindsey, 2011).

Closing the existing gaps is a process that requires stakeholders at all levels, proper targeting of interventions and creating an enabling environment not only for women but also for the poor, elderly, youth among others, to access and use digital financial services more ably. Figure 1 indicates the proposed pathways that key stakeholders in both government and the private sector can follow to bridge the gender gap in

the use of DFS. In doing so, we believe that Uganda will move faster towards the achievement of Sustainable Development Goal (SDG) 5 goal—Achieve gender equality and empower all women and girls.

Figure 1: Closing the gap between gender access to and use of digital financial services



Our study used the Fairlie decomposition technique to provide the contribution of each social and economic factor to the gender gap, to guide policy discourse and action on the most critical issues to focus on in order to close the gap.

3. Methodology

A two-step quantitative procedure was used to analyse the socio-economic factors contributing to the gender gap in the use of digital financial services (DFS) in Uganda. First, the study used the bivariate probit regression to establish the socio-economic factors affecting the likelihood of using DFS. Second, we used the Fairlie (2005) decomposition methodology to separate gender differences between observable characteristics and unobserved characteristics. These two steps are explained in the following paragraphs.

Socio-economic factors affecting the use of digital financial services.

To empirically estimate the socio-economic factors responsible for the gender differences in the use of DFS, the study considered the nature of the dependent variables. All the dependent variables (i.e., proxies for DFS) used in this study were dummies. The ordinary least squares estimation technique for a dummy dependent variable has short-comings (Maddala, 1983; Cameron and Trivedi, 1986; Cameron and Trivedi, 2005). The study leveraged the bivariate probit to estimate the probability that a given desired outcome was observed by using the maximum likelihood estimation (MLE) technique (Cameron and Trivedi, 2005) assuming strict exogeneity condition applies.

The probit assume there underlies unobserved variable y^*defined by:

$$y_i^* = \beta' x_i + u_i \tag{1}$$

Where $\boldsymbol{x}_i$ represents a vector of independent variables; $\boldsymbol{\beta}'$ is a vector of coefficients; and $\boldsymbol{u}_i$ is the error term.

The observed dummy variable y is defined by:

$$y = \begin{cases} 1 \; if \; y^* > 0 \\ 0 \; otherwise \end{cases} \tag{2}$$

$$Prob(y_i = 1|x_i) = Prob(u_i > -\beta' x_i) = 1 - \varphi(-\beta' x_i) \tag{3}$$

Where ϕ(.) is the standard normal cumulative distribution function. The probability that a given outcome is realized, is a function of several factors (Wooldridge, 2015). The empirically estimated form of Equation 3 is more specifically represented as:

$$\text{Prob(acces/use of DFS=1}|\text{S,X,C)=F(S,X,C)} \tag{4}$$

Where, **S** represents a vector of social factors; ***X*** is a vector of economic factors; and **C** is a vector of other control variables.

Contribution of social economic factors to the gender gap

Given a binary dependent variable, applying the standard Oaxaca (1973) and Blinder (1973) becomes somewhat problematic given it assumes that the dependent variable is continuous. To solve this problem, the study used the Fairlie decomposition technique (Fairlie 1999, 2003, 2005). The decomposition of the gender gap in the use of DFS in Uganda is expressed as a non-linear equation:

$$Y = F\left(X\hat{\beta}\right) \tag{5}$$

Following Fairlie (2005), $\bar{Y}$ does not necessarily equal $F\left(\bar{X}\hat{\beta}\right)$, for a non-linear equation such as the logistic or probit regression. To decompose the gender gap, Equation 5 can be written as:

$$\bar{Y}^M - \bar{Y}^W = \left[\sum_{i=0}^{N^M} \frac{F\left({X_i}^M \hat{\beta}^M\right)}{N^M} - \sum_{i=0}^{N^W} \frac{F\left({X_i}^W \hat{\beta}^M\right)}{N^W}\right] - \left[\sum_{i=0}^{N^W} \frac{F\left({X_i}^W \hat{\beta}^M\right)}{N^W} - \sum_{i=0}^{N^W} \frac{F\left({X_i}^W \hat{\beta}^W\right)}{N^W}\right] \tag{6}$$

Where, F is the cumulative distribution function that follows from the logistic distribution; $\bar{Y}^p$ is the average probability of using a digital financial service for gender group p; *M* represents males; and *W* represents females. The first part of Equation 6 is part of the gender gap due to group differences in the distribution of **X** and the second term is part of the gender gap resulting from unobserved endowments. N^p is the sample size for gender p.

Estimation of the total contribution basing on Equation 6 is the difference between the two sets of predicted probabilities (Fairlie and Robb, 2009). To get the contribution of each variable to the gender gap, a natural one-on-one matching of male and female observations is assumed, and N^M=N^W. The gender gap contribution of variable X_1 is expressed as:

$$\frac{1}{N^W}\sum_{i=1}^{N^W} F\left(\hat{\alpha}^* + {X_{1i}}^M {\hat{\beta}_1}^* + {X_{2i}}^M {\hat{\beta}_2}^*\right) - F\left(\hat{\alpha}^* + {X_{1i}}^W {\hat{\beta}_1}^* + {X_{2i}}^M {\hat{\beta}_2}^*\right) \tag{7}$$

Where $\hat{\beta}^*$ are coefficients from a logistic/probit regression based on the pooled sample.

The contribution of X_1 to the gap is thus equal to the change in the average predicted probability from replacing the male distribution with the female distribution of X_1, *ceteris paribus*.

Notably, the sample sizes for males and females are unlikely to be the same in most empirical estimations. The pooled sample coefficients are therefore used to calculate the predicted probabilities for each male and female observation in the sample (Fairlie and Robb, 2010). The main property of this technique is that the sum of the contributions of individual variables will be equal to the total contribution of all the variables evaluated in the sample (Ndoya and Tsala, 2021).

Data

The study used data from the Uganda National Household Survey (UNHS) of 2019/2020, collected by the Uganda Bureau of Statistics (UBOS). The UNHS collects households and individual level data to track and monitor various household aspects. It covers demographic and socio-economic characteristics on topical areas of education, health, labour force participation, food security, household expenditure and poverty, financial inclusion, ICT, household enterprises, etc. The survey collects information through in-person interviews using socio-economic, community, labour and market modules. The socio-economic module provides details of the different household and individual level characteristics that are important in explaining the objectives of this study. Table 1 presents the definition and nature of the selected study variables based on the literature.

Table 1: Description of variables

Variable	Description	Coding
Use of mobile money	Respondent has ever used mobile money service	1 = Yes, 0 = No
Use of a bank account	Respondent has ever used a commercial bank or an MDI account	1 = Yes, 0 = No
Age	Age of the respondent in complete years	Continuous
Expenditure on ICT	How much the respondent spent on ICT services during the past 30 days (reported in Uganda shillings)	Continuous
Household size	Number of individuals within the respondent's household	Discrete
Education level		
Primary	Respondent competed primary	1 = Yes, 0 = No
Secondary	Respondent completed secondary	1 = Yes, 0 = No
Post-secondary	Respondent competed post-secondary	1 = Yes, 0 = No
Region		
Central	Respondent resides in the Central region	1 = Yes, 0 = No
Eastern	Respondent resides in the Eastern region	1 = Yes, 0 = No
Northern	Respondent resides in the Northern region	1 = Yes, 0 = No
Western	Respondent resides in the Western region	1 = Yes, 0 = No

continued next page

Table 1 Continued

Variable	Description	Coding
Marital status		
Married monogamous	Respondent is married monogamous	1 = Yes, 0 = No
Married polygamous	Respondent is married polygamous	1 = Yes, 0 = No
Divorced/separated	Respondent is divorced or separated from their partner(s)	1 = Yes, 0 = No
Widow/widower	Respondent is a widow/widower	1 = Yes, 0 = No
Never married	Respondent has never been married	1 = Yes, 0 = No
Uses Internet	Respondent uses the Internet	1 = Yes, 0 = No
Ownership of a mobile phone	Respondent personally owns a mobile phone	1 = Yes, 0 = No
Income quintiles		
Quintile 1	Respondent belongs to the first income quintile	1 = Yes, 0 = No
Quintile 2	Respondent belongs to the Second income quintile	1 = Yes, 0 = No
Quintile 3	Respondent belongs to the third income quintile	1 = Yes, 0 = No
Quintile 4	Respondent belongs to the fourth income quintile	1 = Yes, 0 = No
Quintile 5	Respondent belongs to the fifth income quintile	1 = Yes, 0 = No

Source: UNHS 2019/20 questionnaire

4. Results and discussion

Overall, 77.7% and 8.3% of Ugandans use mobile money and have a bank account respectively (Table 2) . Gender disaggregation showed the existence of a gender gap in the use of both mobile money services and bank accounts between males and females. Whereas 81.7% and 11.7% of males used mobile money and bank accounts respectively, only 73.4% and 5.4% of females respectively used mobile money and bank accounts. Therefore, males dominated females in both mobile money services and bank account usage, and the gender gap was statistically significant (see Appendix Table A1). In education, females dominated the proportion of those who had at most primary-level education whereas the males dominated the proportion of those with secondary and post-secondary education (Table 2). This means that males on average had more years of schooling than their female counterparts, yet education is key in providing the technical knowledge of the different DFS available. More males (55.3% and 5.2%) owned phones and used the Internet than females (38.1% and 3.2%) respectively. The average monthly expenditure of males on ICT services was more than double that of females. The expenditure gap is explained by the differences in the average income between females and males, as males earn significantly more than females in Uganda. In summary, results in Table 2 show that there exist gender differences in social and economic factors.

Table 2: Descriptive statistics by gender

Variable	Overall			Male		Female	
	N	Mean	SD	Mean	SD	Mean	SD
Dependent variables							
Use of mobile money	18,274	0.777	0.416	0.817	0.387	0.734	0.442
Use of a bank account	34,199	0.083	0.276	0.117	0.322	0.054	0.225
Independent variables							
Age	34,309	35.000	17.000	35.000	17.000	35.000	17.000
Expenditure on ICT	68,520	3450	13200	4800	16700	2200	8600
Household size	68,155	6.029	2.702	6.057	2.697	6.003	2.706

continued next page

Table 2 Continued

Variable	Overall			Male		Female	
	N	Mean	SD	Mean	SD	Mean	SD
Education level							
Primary	23,803	0.646	0.478	0.605	0.489	0.684	0.465
Secondary	23,803	0.288	0.453	0.316	0.465	0.261	0.439
Post-secondary	23,803	0.066	0.248	0.078	0.269	0.054	0.227
Region							
Central	68,520	0.186	0.389	0.186	0.389	0.186	0.389
Eastern	68,520	0.349	0.477	0.350	0.477	0.348	0.476
Northern	68,520	0.235	0.424	0.231	0.422	0.238	0.426
Western	68,520	0.230	0.421	0.233	0.423	0.228	0.419
Marital status							
Married monogamous	44,052	0.362	0.481	0.380	0.485	0.347	0.476
Married polygamous	44,052	0.071	0.257	0.068	0.252	0.074	0.262
Divorced/separated	44,052	0.055	0.228	0.033	0.178	0.074	0.262
Widow/widower	44,052	0.051	0.220	0.011	0.107	0.086	0.280
Never married	44,052	0.461	0.498	0.508	0.500	0.419	0.493
Uses Internet	52,844	0.041	0.199	0.052	0.222	0.032	0.176
Ownership of a mobile phone	34,204	0.460	0.498	0.553	0.497	0.381	0.486
Wealth quintiles							
Quintile 1	68,155	0.226	0.418	0.233	0.423	0.220	0.414
Quintile 2	68,155	0.210	0.408	0.212	0.409	0.209	0.406
Quintile 3	68,155	0.201	0.401	0.198	0.399	0.203	0.403
Quintile 4	68,155	0.188	0.390	0.183	0.387	0.192	0.394
Quintile 5	68,155	0.175	0.380	0.174	0.379	0.176	0.381

Table 3 presents results from a bivariate probit regression showing the social and economic factors affecting the use of DFS in Uganda. The significance of the correlation coefficient between the use of mobile money and bank accounts represented by Fisher's rho showed that the bivariate probit provides better estimates than would be the case with ordinary probit regressions. The model overall p-values were less than 5%, thus the independent variables provide significant explanation of the dependent variable.

Females were less likely to use both mobile money services and bank accounts than their male counterparts. This difference was statistically significant at the 1% level. Besides gender, other variables also significantly affected the use of mobile money and bank accounts. Increasing expenditures on ICT services increased the likelihood of accessing and using both mobile money services and bank account, yet females spent less than double what males did on ICT services in a typical month (Table 2). Similarly, achieving a higher education status increased the likelihood of using mobile

money and bank account services. Individuals who had completed secondary and post-secondary were more likely to use both DFS than their counterparts who had at most acquired primary education. The regional distribution shows that the odds were against individuals in other regions using mobile money services compared to those in central region. This finding is attributed to the level of economic activity and development that takes place in the central region, where the capital city is located. Relatedly, in urban areas, it is easier to find a mobile money service point or mobile banking agents than in rural areas. This makes access to and use of such services more affordable for urban dwellers, unlike rural dwellers who are faced with long distances and transport costs. Furthermore, factors such as using the Internet, owning a mobile phone and belonging to a higher income quintile increase the likelihood of an individual using DFS. Our findings corroborate with those of Traoré, (2022), Ndoya and Tsala, (2021), and Fairlie and Robb, (2009).

Table 3: Bivariate probit regression showing socio-economic factors affecting the use of DFS.

Variables	Mobile money	Bank account
Age	0.01866***	0.06219***
	(0.005)	(0.006)
Age-squared	-0.00022***	-0.00048***
	(0.000)	(0.000)
Expenditure on ICT	0.00001***	0.00001***
	(0.000)	(0.000)
Female	-0.11799***	-0.25940***
	(0.029)	(0.034)
Household size	-0.00605	0.02066***
	(0.005)	(0.006)
Secondary	0.13535***	0.61522***
	(0.030)	(0.034)
Post-secondary	0.22108***	1.35524***
	(0.061)	(0.048)
Eastern	-0.22430***	-0.04288
	(0.039)	(0.039)
Northern	-0.46425***	0.01979
	(0.045)	(0.049)
Western	-0.42755***	-0.13302***
	(0.039)	(0.042)
Married polygamous	0.07475*	0.06075
	(0.043)	(0.049)
Divorced/separated	0.05825	-0.02597
	(0.051)	(0.055)

continued next page

Table 3 Continued

Variables	Mobile money	Bank account
Widow/widower	0.08312	0.05413
	(0.068)	(0.074)
Never married	-0.19263***	-0.17625***
	(0.044)	(0.055)
Use of Internet	0.27079***	0.58503***
	(0.064)	(0.049)
Own a mobile phone	1.33085***	0.43140***
	(0.038)	(0.079)
Quintile 2	0.16353***	0.07078
	(0.044)	(0.074)
Quintile 3	0.23934***	0.22994***
	(0.044)	(0.069)
Quintile 4	0.37894***	0.45937***
	(0.046)	(0.067)
Quintile 5	0.46819***	0.74809***
	(0.050)	(0.069)
Constant	0.52351***	0.01661***
	(0.063)	(0.003)
Fisher's rho	*0.18735****	
	(0.027)	
Observations	*15,066*	*15,066*
p-value	*0.000*	*0.000*
rho	*0.185*	*0.185*
Chi-square	*5166*	*5166*

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The odd ratios and marginal effects of using DFS based on logistic regression are presented in Table A2 and A3 respectively. Next, we decomposed the gender gap to show the contribution of each socio-economic factor to the total gap.

Factor contribution to the gender gap in the use of mobile money and bank account services

The Fairlie decomposition technique was applied on a pooled sample that had both males and females. Positive values suggest the gap is increasing whereas negative values indicate the gap is reducing (Ndoya and Tsala, 2021).

A decomposition of the gender gap in the use of mobile money services showed that males had a 0.836 probability of accessing mobile money services compared to 0.759 of females (Table 4). The social and economic factors included in the model

explain 74.98% of the gender gap while 25.02% remains unexplained. This means that equalizing the gender differences in social and economic factors would reduce the gender gap in the use of mobile money services by 74.98%.

In terms of each variable contribution to the widening of the gender gap, ownership of a mobile phone explained 72.35% of the gap, followed by expenditure on ICT and education contributing 13.5% and 2.65% respectively.

Similarly, decomposition of the gender gap in the use of bank accounts indicated that the likelihood of males using bank accounts was 0.145 compared to 0.0729 for females. About two-thirds (64.91%) of this gender gap was explained by social and economic factors included in the regression and 35.01% remained unexplained. Factors contributing to the widening of the gender gap in the use of bank accounts were mainly, education (18.04%), followed by expenditure on ICT (15.33%), age (12.65%) and ownership of a mobile phone (11.46%).

Table 4: Fairlie decomposition of gender gaps in the use of digital financial services

Variables	Mobile money	Bank account
Age	-0.00009	0.00912***
	(0.001)	(0.001)
	-0.12%	**12.65%**
Expenditure on ICT	0.01046***	0.01105***
	(0.001)	(0.001)
	13.50%	**15.33%**
Household size	0.00011	0.00007
	(0.000)	(0.000)
	0.14%	**0.10%**
Education	0.00205***	0.01301***
	(0.000)	(0.001)
	2.65%	**18.04%**
Region	-0.00482***	0.00004
	(0.001)	(0.000)
	-6.22%	**0.06%**
Marital status	-0.00223	0.00248**
	(0.001)	(0.001)
	-2.88%	**3.44%**
Internet use	0.00137***	0.00512***
	(0.000)	(0.000)
	1.77%	**7.10%**
Ownership of a mobile phone	0.05607***	0.00826***
	(0.001)	(0.001)
	72.35%	**11.46%**

continued next page

Table 4 Continued

Variables	Mobile money	Bank account
Income	-0.00481***	-0.00243***
	(0.001)	(0.000)
	-6.21%	**-3.37%**
Observations	15,066	22,654
Male	0.836	0.145
Female	0.759	0.0729
Gender gap	0.0775	0.0721
Explained gap	0.0581 (74.98%)	0.0468 (64.91%)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; variable contribution in bold

Overall, the gender gap in access to and use of DFS (i.e., mobile money and bank accounts) was positive, indicating that men's socio-economic status favoured them compared to females. The social and economic factors included in the model explained over 60% of this gender gap. This suggests that other than social and economic factors, other factors exist that are responsible for the gender gap. We carried out desk reviews and key informant interviews to unearth some of the other causes of the existing gender gap. Nevertheless, females had a lower likelihood than males in the usage of both mobile money services and bank account services in Uganda.

Robustness checks–Yun decomposition

To check the robustness of the results obtained based on the Fairlie decomposition, we performed an alternative decomposition method for a non-linear model such as the one obtained from a bivariate probit regression presented in Table 3. The Yun decomposition technique was chosen because it overcomes path dependence and identification problems (Yun, 2000; Yun, 2005). Table 5 shows results of the decomposition of the gender gaps based on the Yun decomposition technique. The differences in endowments account for 63.12% and 60.20% of the gender gap in the use of mobile money and bank accounts respectively. The unexplained 36.88% and 39.80% gender gap in the use of mobile money and bank accounts respectively, was due to other factors. The main drivers of the gender gap in the use of mobile money accounts were ownership of a mobile phone (57.38%), expenditure on ICT (13.00%) and education (3.80%). Similarly, the main drivers of the gender gap in the use of bank accounts were ownership of a mobile phone (29.26%), education (14.01%), age (11.37%) and expenditure on ICT services (9.15%).

Table 5: Yun decomposition of gender gaps in the use of digital financial services

Variables	Mobile money	Bank account
Age	-0.0038**	0.0082***
	(0.002)	(0.001)
	-3.21%	**11.37%**
Expenditure on ICT	0.0154***	0.0066***
	(0.005)	(0.002)
	13.00%	**9.15%**
Household size	0.0002	-0.0005***
	(0.000)	(0.000)
	0.17%	**-0.69%**
Education	**3.80%**	**14.01%**
Secondary education	0.0025***	0.0053***
	(0.001)	(0.000)
	2.11%	**7.35%**
Post-secondary	0.0020***	0.0048***
	(0.001)	(0.000)
	1.69%	**6.66%**
Region	**-2.79%**	**-0.56%**
Eastern	0.0005***	0.0001*
	(0.000)	(0.000)
	0.42%	**0.14%**
Northern	-0.0018***	-0.0002**
	(0.000)	(0.000)
	-1.52%	**-0.28%**
Western	-0.0020***	-0.0003***
	(0.000)	(0.000)
	-1.69%	**-0.42%**
Marital status	**-4.56%**	**-3.85%**
Married polygamous	0.0001**	0.00002
	(0.000)	(0.000)
	0.08%	**0.03%**
Divorced/separated	0.0021	0.0014
	(0.002)	(0.001)
	1.77%	**1.94%**
Widow/widower	0.0011	0.0008
	(0.003)	(0.002)
	0.93%	**1.11%**
Never married	-0.0087***	-0.0050***
	(0.001)	(0.001)
	-7.34%	**-6.93%**

continued next page

Table 4 Continued

Variables	Mobile money	Bank account
Use of Internet	0.0024**	0.0028***
	(0.001)	(0.000)
	2.03%	**3.88%**
Ownership of mobile phones	0.0680***	0.0211***
	(0.005)	(0.002)
	57.38%	**29.26%**
Income	**-2.5%**	**-2.23%**
Quintile 2	0.00004***	0.0000
	(0.000)	(0.000)
	0.03%	**0.03%**
Quintile 3	-0.0010***	-0.0005***
	(0.000)	(0.000)
	-0.84%	**-0.69%**
Quintile 4	-0.0012***	-0.0006***
	(0.000)	(0.000)
	-1.01%	**-0.83%**
Quintile 5	-0.0008***	-0.0006***
	(0.000)	(0.000)
	-0.68%	**-0.83%**
E	0.0748***(63.12%)	0.0434***(60.20%)
	(0.006)	(0.003)
C	0.0437***(36.88%)	0.0287***(39.80%)
	(0.013)	(0.004)
R	0.1185***	0.0721***
	(0.010)	(0.003)
Constant	0.0000	0.0000
	(0.000)	(0.000)
Observations	68,520	68,520

Note: Robust standard errors in parentheses; E refers to explained component; C refers to unexplained component; R is the difference between explained and unexplained part of the gap; *** p<0.01; ** p<0.05; * p<0.1; variable contribution in bold

Both the Fairlie decomposition and the Yun decomposition indicate that the social and economic factors accounted for more than 60% of the gender gap in the use of mobile money services and bank accounts in Uganda. A disaggregated level analysis showed differences in ranking and percentage contribution. For example, in the use of a bank account, ownership of a phone was the major contributor of the gender gap based on the Yun decomposition, whereas education level stood out as the major contributing factor when the Fairlie decomposition was used.

Discussion of the results

As highlighted in the regression results, several social and economic factors hindered women from using DFS at the same level as men. For example, the nature of work females and males are engaged in dictates their income levels. In Uganda, more females are engaged in unpaid care work whereas males are employed in money-generating jobs (Mwesigye, 2019). Specifically, a higher proportion of females (23.4%) than males (17.1%) are involved in unpaid care work (UBOS, 2021). Even in the context of gainful employment, females dominate the low-paying jobs. This makes basic DFS accessories such as mobile phones more expensive for them (UBOS, 2021); Gebre et al., 2019). The income differences were also highlighted by the differences in the average monthly expenditure on ICT. Factors like the affordability of a mobile phone are positively and highly correlated with an individuals' income level. For example, a smartphone is more expensive for women than it is for men (FSDU, 2021), given that the average monthly income of men (UGX 220,000, an equivalent of USD 55) is double that of women. As earlier highlighted, this could be attributed to the subsistence nature of jobs that most women engage in.

The gender gap in education contributed 14% to the gender differences in the use of bank accounts. In Uganda, the introduction of education programmes such as universal primary education (UPE) and universal secondary education (USE) have increased access to education across all genders. These have had a positive impact on overall enrolment and literacy levels. For example, literacy levels for those who are 10 years and above indicate that males and females are at 80.8% and 71.8% respectively in primary school, and 81.1% and 29.0% in secondary schools respectively. In addition, the net enrolment rate for females in primary and secondary school level is 81.1% and 29.0% respectively, and for the males is 78.9% and 25.5% respectively (UBOS, 2021). However, both UPE and USE focus more on the number of people enrolling in school, with little focus on the quality of their outcomes (Kasirye et al., 2023). This implies that higher enrolment levels do not necessarily imply higher literacy rates. In addition, gender-specific issues related to retaining both the boy child and the girl child in school have persisted. Especially for girl children, issues such as early child marriage and pregnancy are prevalent in some areas (Kahunde et al., 2022; Kahunde et al., 2023).

Our quantitative findings revealed that the social and economic factors included in the model explained only 60% of the gender gap. We conducted key informant interviews with relevant stakeholders to unearth other factors explaining the gender differences, and interventions by key stakeholders to close the gap. The qualitative findings are explained in the subsequent section.

Emerging issues from the key Informant Interviews and desk reviews

(i) Other factors affecting the gender gap

Employment differences in the types of jobs that men and women engage in: More men are in employment due to the inherent family set-up, that is, women are known for staying at home and doing household chores such as looking after children and

men are known for being providers. As such, men are more likely to have the money to save or to pay out for use of digital platforms such as mobile banking and mobile money. Additionally, few women have a chance to approach financial institutions such as banks given that most of them have no money to bank since only a few of them have a source of income that may necessitate owning a bank account. Durbin and Fleetwood (2010) indicated that gender inequality exists, and men are more likely to acquire employment than their female counterparts.

Religious beliefs: Religion also plays a very big role in determining women's access to DFS. For example, in Uganda businesses are mainly owned by Muslims, yet the religion is against borrowing that involves paying interest (Narayana and Shangishna, 2021). This may lead to exclusion from financial deepening and financial inclusion. In addition, for female Muslims, in most cases their husbands start up the businesses for them, reducing their ability to make such decisions such as borrowing to enhance their businesses.

Marital status: Even for the few women who have phones, most of them have lines which are not registered in their names. This makes some financial transactions such as mobile money difficult since much verification is needed during the transaction. And for married women, phones are mostly bought by their spouses, and most of the decisions regarding how and what to do with the phone remain in the hands of their spouses. The findings of our study are supported by those of a study done by Burrell (2010) that indicated that women were increasingly being excluded from phone operation as most of the sampled women in their study revealed that the mobile phones they used belonged to and were controlled by their spouses.

Culture: The cultural settings of some societies in Africa do not give women decision-making power. This is especially so in rural areas where a woman must first consult their husband before making some decisions, such as purchasing a mobile phone, engaging in gainful employment and opening a bank account. Married women in some households have little or no control over the family finances. This has led to fewer women using some of the existing digital platforms. It has further resulted in low yields even from policy interventions targeting women's financial inclusion. Anyangwe et al. (2022) indicated that some cultures positively affect financial inclusion while others have a negative impact.

ii) Interventions by stakeholders

Several interventions have been undertaken by stakeholders such as government, private sector, non-governmental organizations (NGOs), with the aim of increasing financial inclusion. These include:

a) Interventions by government

The passing of the Financial Inclusion Act Amendment Bill in 2016, which amended the 2004 Act, provided a legal basis for a host of new business models. Key among the changes in the new Act include: i) The introduction and authorization of agent banking: In 2016, the government launched the introduction of agent banking and put in place a legal basis for its regulation. This was an important step towards creating a more level playing field between banks and non-banks such as mobile network operators, who have for long been using agents to provide DFS. 2) Introduction of Islamic banking: The Act also redefined terms and made them broad enough to cover the range of Islamic banking products, though with limited prospects for its uptake since less than 10% of the population is Muslim. This, among other factors, was meant to increase the uptake of different financial products such as loans by Muslim clientele. Religion is one of the key factors deterring financial inclusion in Uganda as explained in a key informant interview with stakeholders in the banking sector:

The institution of the Deposit Protection Fund: The government, through the Central Bank, beefed up the Deposit Protection Fund and made it a requirement for all the concerned financial institutions to display all the information about it in all their branches and include it in all their print, radio and television advertisements. This has in turn reduced fears among the users of DFS regarding the loss of their banked money in case of events such as liquidation of a bank.

Other changes include offering powers to the Central Bank to establish additional credit reference bureaus and explicitly allowed the use of biometric identification for these purposes to reduce errors in identifying customers and stopping cases of fraud; bancassurance, etc. While the biggest impact on financial inclusion was expected to come from the introduction of agent banking, all the changes in the new Bill appear to be positive in terms of allowing new business models and greater choice and protection for customers .

b) Interventions by the private sector

The private sector, especially commercial banks and mobile telecommunication companies, have undertaken different initiatives to increase their female clientele. For example, literature indicates that the following interventions have been developed.

The launch of the mobile money application programme interface (API) as the first step to leverage its mobile money platform to grow its business and increase innovation in Uganda. The main objective of opening APIs was to make it easier for third-party developers to connect to a company's mobile money infrastructure, creating more innovative services and increasing usage and revenue . Such initiatives have increased the number of financial products on the market, which could easily be accessed by all users.

Linking mobile banking with village groups in Uganda: many service providers currently offer DFS, such as mobile money links, to group accounts and offer credit facilities to groups. However, this kind of digital solution has been criticized on the grounds that it can be too expensive or too complicated for people who transact locally through groups, in small values and very frequently.

Similarly, financial institutions such as banks (e.g., Post Bank Uganda (PBU)), through the pro-poor micro-savings programme of the World Saving Banks Institute (WSBI) sought to engage people already using saving and credit groups estimated to be a very large market that exists outside the reach of formal banking institutions. Indeed, through this scheme, the PBU group account offers cheap DFS such as free weekly deposits and withdrawals.

Other initiatives implemented by individual institutions to increase access to DFS are detailed in Box 1.

Box 1: Other initiatives

i) Women-customer value proposition: The she-for-her initiative by Stanbic Bank

Women customer value proposition, i.e., the she-for-her initiative.

Stanbic Bank introduced this women-focused product with the intention of attracting more women to open bank accounts and also to have more female clients borrowing from the bank. This initiative was launched in 2022 following the assessed impact of COVID-19 on female-owned businesses. Under this product, female clients have an opportunity to open bank accounts at no cost. The borrowing rates for women were lowered to 15.5% as opposed to the normal 19%.

Additionally, women have been educated on how to run their businesses using the Stanbic Incubator Lab at Kololo. They have also been connected to different opportunities, for example, in the oil and gas sector. The bank has an organized database for all its female clientele and the aim is to bring them all on board so that they can benefit from such initiatives. The bank has a whole department that strictly handles female clients and the products targeting them plus a team of salespersons who target women in different regions of the country.

(ii) Elevate-Women scheme—Ecobank Uganda

This is a scheme that is currently being undertaken to attract more female clientele. Under this scheme, borrowing has been made cheaper for women, i.e., 16% lending rate for a female client compared to 19% lending rate for a male client. This is also extended to male clients who mainly deal in women's products such as cosmetics and organizations where more than 50% of their employees are women.

The scheme also involves reducing account opening balances and monthly charges for the female clients.

(iii) The Supa-Woman Account—Centenary Bank

This is a product initiated by the bank to encourage more females to open bank accounts. Several advantages come with owning this account. For example, it makes it easy for the client to borrow a collateral-free loan, at a low interest rate (18% relative to the current 19–21% lending rate for the rest of the clients). Ever since the introduction of this account, the bank started opening about 200 accounts per week, 120 of which are owned by women, yet the number of accounts opened up by women were fewer than that of men before this intervention.

Source: Extracts from KIIs with various institutions

c) Interventions by Financial Sector Deepening Uganda

Not-for-profit organizations, mainly Financial Sector Deepening Uganda (FSDU), have played a big role in the extension of DFS in Uganda. Unlike interventions by other stakeholders, FSDU (in partnership with other organizations) seeks to promote a more inclusive financial sector with a focus on low-income individuals, particularly women and micro, small and medium enterprises (MSMEs) in a bid to realize the goals and objectives set out in the NFIS 2017–2022. FSDU has adopted the following measures in line with the objectives of the strategy: i) Under the objective of reducing exclusion and assessing barriers to financial services. Through partnership with other representatives, such as financial service providers (FSPs), development partners, donors and NGOs, FSDU has facilitated provision of financial services to excluded segments of the population. For example, FSDU in partnership with MTN supported the translation of the mobile money menu into seven languages to make it more accessible to people in peri-urban and rural areas. ii) Under the objective of credit infrastructure: FSDU leverages human-centred design and other best practices in product development to create pilot and test services that meet the needs of the excluded. One major example is the linkage to banking that has seen over 800 savings groups, mainly Village Savings and Loan Associations (VSLAs) comprising over 70% women, connect with financial institutions through mobile banking, offering safety and convenient access for their savings. iii) Under the Deepen and Broaden Saving, Investment and Insurance Usage Objective: FSDU has endeavoured to provide technical assistance and grant support to market actors such as NUMIDA which have leveraged technology such as a mobile phone to deliver suitable micro-insurance services in exchange for regular premium payment proportionate to the likelihood and cost of the risks involved. Furthermore, FSDU has, through its pillar on policy and regulation, supported a better business environment for women by initiating the movable collateral security bill that will see women, who do not ordinarily own property or land, use alternative assets such as bicycles or even sewing machines, as security for credit. Additionally, FSDU is working towards reducing the minimum (Know Your Customer) requirements to allow more women access to formal financial services and products.

Performance of the above interventions

Despite the implementation of the highlighted interventions by various organizations, it is worth noting that most of them (especially those by government) are not directly targeted at women. This further explains the existence of the gender gap despite their implementation. Some studies show that such gender-neutral approaches could have unintended negative consequences as they are likely to worsen the gender divide (Koning et al., 2021).

Even for the interventions explicitly targeting women such as those highlighted in Box 1, qualitative findings showed that most of them have had minimal success. This is partly because: 1) compared to men, women are more risk-averse when it comes

to borrowing. Additionally, they have low incomes, further reducing their ability to take up such schemes for fear of failing to pay back; 2) The scheme has not been advertised to the expected level, so most women have been left out due to lack of awareness; and 3) The lack of control of resources, for example, for a woman whose business was started up by her husband, the power to decide to borrow or open a business account is solely in the hands of the husband. This also explains why fewer women benefit from such schemes.

Challenges from the supply side are also an obstacle to the initiatives or the new products that service providers put on the market. For example, a cost–benefit analysis conducted by some of the DFS providers revealed that investing in a service that targets only a small proportion of their clientele was not profitable. As a result, products that target marginalized groups such as women have largely been excluded from their product lists.

5. Conclusions and policy implications

The study analysed the social and economic factors causing the gender divide in the use of digital financial services (i.e., mobile money and bank accounts) in Uganda using a mixed methods approach. Quantitatively, we used a two-step methodology to answer the first study objective. First, we used a bivariate probit regression to examine the existence of the gender gap and the other factors that affect the use of DFS. Results indicated that males were more likely to use both mobile money and bank accounts than females. Comparatively, the probability of a female using mobile money services and operating a bank account was 2.6% and 1.6% lower than for males, respectively, based on marginal effects. Second, we used the Fairlie decomposition technique to decompose the gender gap into observable characteristics and unobserved endowments. The socio-economic factors explained 74.98% and 64.92% of the gender gap in the use of mobile money and bank accounts respectively. Ownership of a mobile phone and expenditure on ICT and education were the major contributors to the gender gap in using mobile money services and bank accounts. Uniquely, for bank account use, age was the other major contributor to the gender gap.

To this end, policies designed to empower and equip women with employable skills to increase earnings would reduce gaps in incomes and improve productivity. There is a need to factor in the different interests and training needs of the females to guide the policy design and programme priorities. Current government programmes, such as the Youth Livelihood Programme and Emyooga , use a holistic approach to their target groups and are insensitive to gender, yet women are categorized among their priority target groups. A gender-sensitive approach would increase inclusion and participation.

Besides the socio-economic factors revealed by the quantitative analysis, the qualitative responses revealed that the socio-cultural differences significantly contribute to the gender divide in the use of DFS. Cultural beliefs in various societies have created a perception that certain roles, especially unpaid care work, are reserved for women, leaving them with little to no earnings at all. This has also left women with limited access to information about the existing financial products. As such, there is need for more sensitization and mindset change through providing financial support to the existing cultural institutions to facilitate their operations.

In conclusion, this study recommends that the existing public policies should be strengthened to reduce gender differences in the use of DFS in Uganda. Specifically, policies implemented by government should focus more on women to reduce the gender gaps in their education and employment opportunities. This will make it easier for women to afford mobile phones and spend money on ICT services. In addition, new products on the market should be specifically targeted to ensure more women use the digital technologies as opposed to increasing financial inclusion.

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Appendix A

Table A1: Differences in means by gender

	Males		Females		Difference
	Mean	SD	Mean	SD	
Mobile money	0.817	0.387	0.734	0.442	0.083***
Bank account	0.117	0.322	0.054	0.225	0.064***

Notes: *** p<0.01; ** p<0.05; * p<0.1

Table A2: Logistic regression odd ratios of socio-economic factors affecting the use of DFS

Variables	Mobile money	Bank account
Age	1.03115***	1.11272***
	(0.009)	(0.012)
Age-squared	0.99964***	0.99921***
	(0.000)	(0.000)
Expenditure on ICT	1.00001***	1.00001***
	(0.000)	(0.000)
Female	0.82087***	0.61081***
	(0.042)	(0.037)
Household size	0.98747	1.04256***
	(0.009)	(0.011)
Secondary	1.27714***	3.23188***
	(0.069)	(0.206)
Post-secondary	1.50534***	11.51915***
	(0.178)	(0.973)
Eastern	0.63824***	0.95656
	(0.047)	(0.068)
Northern	0.42033***	1.04940
	(0.034)	(0.092)
Western	0.44515***	0.78434***
	(0.033)	(0.060)

continued next page

Table A2 Continued

Variables	Mobile money	Bank account
Married polygamous	1.13350	1.10402
	(0.090)	(0.097)
Divorced/separated	1.13066	0.94832
	(0.102)	(0.096)
Widow/widower	1.14499	1.07824
	(0.139)	(0.145)
Never married	0.71039***	0.70601***
	(0.057)	(0.069)
Use of Internet	1.70867***	2.70824***
	(0.229)	(0.210)
Ownership of a mobile phone	8.73234***	4.20231***
	(0.549)	(0.462)
Quintile 2	1.31213***	1.19796
	(0.100)	(0.176)
Quintile 3	1.48628***	1.72669***
	(0.114)	(0.235)
Quintile 4	1.90107***	2.70682***
	(0.152)	(0.355)
Quintile 5	2.21957***	4.51130***
	(0.198)	(0.596)
Constant	0.37488***	0.00030***
	(0.079)	(0.000)
Observations	15,066	22,654
Probability > chi-square	0.000	0.000
Pseudo R-squared	0.203	0.373
Chi-square	3060	5774

Notes: Standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Table A3: Marginal effects from the logistic regression

Variables	Mobile money	Bank account
Age	0.003951***	0.003449***
	(0.001)	(0.000)
Age-squared	-0.000046***	-0.000025***
	(0.000)	(0.000)
Expenditure on ICT	0.000002***	0.000000***
	(0.000)	(0.000)
Female	-0.025537***	-0.016170***
	(0.007)	(0.002)

continued next page

Table A3 Continued

Variables	Mobile money	Bank account
Household size	-0.001624	0.001346***
	(0.001)	(0.000)
Secondary	0.030746***	0.049578***
	(0.007)	(0.004)
Post-secondary	0.046874***	0.224885***
	(0.012)	(0.016)
Eastern	-0.060974***	-0.001425
	(0.010)	(0.002)
Northern	-0.136203***	0.001578
	(0.015)	(0.003)
Western	-0.119693***	-0.007421***
	(0.012)	(0.002)
Married polygamous	0.015593	0.003318
	(0.009)	(0.003)
Divorced/separated	0.015270	-0.001679
	(0.011)	(0.003)
Widow/widower	0.016704	0.002512
	(0.014)	(0.005)
Never married	-0.048011***	-0.010189***
	(0.012)	(0.003)
Use of Internet	0.059639***	0.048830***
	(0.013)	(0.006)
Have a mobile phone	0.424927***	0.044347***
	(0.015)	(0.003)
Quintile 1	0.032881***	0.006147
	(0.009)	(0.005)
Quintile 2	0.047006***	0.020686***
	(0.008)	(0.006)
Quintile 3	0.073409***	0.043552***
	(0.008)	(0.007)
Quintile 4	0.091497***	0.076750***
	(0.009)	(0.010)
Observations	15,066	22,654
R square	0.203	0.373
Chi square	3060	5774

Notes: Standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

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