

Mobile Money and Financial Inclusion

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What are the effects on financial inclusion of increased mobile money transmission?

We will examine this question in the specific context of Kenya.

Based on joint work with Martina Metzger, BSEL and Maureen Were, Central Bank of Kenya

Financial Inclusion



- Narrowly, we define financial inclusion as an account in a formal commercial bank, savings bank or credit cooperative while a broader definition incorporates access and use of a variety of financial services; e.g. payments, savings, credit or insurance
 - This involves issues of:
 - Access
 - Usage
 - Quality and service delivery

Financial inclusion in SSA





Source: FinScope most recent consumer survey (2022) https://www.rbz.co.zw/documents/BLSS/2022/Zimbabwe_FinScope_Consumer_2022_Survey_Report.pdf

Economies with a third or less of adults unbanked



Economies with half or more of adults unbanked



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Mobile Money as a Solution



- Availability to consumers without restrictions geographically or by income.
- There are low costs of use and can be much cheaper without transaction or transport costs.
- Low infrastructure requirements
 - mobile network and electricity are needed
- Speed and Security also rank high as positive returns.
- Nearly 1 billion worldwide possess a mobile device but no bank account.



MAP 1.1.2

Mobile money accounts both grew and spread across Sub-Saharan Africa from 2014 to 2021

Adults with a mobile money account (%), 2014-21



Source: Global Findex Database 2021.

FIGURE 6.1 Mobile phone ownership among the unbanked varies across economies but tends to be high

Adults without an account (%), 2017





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Source: Demirgüc-Kunt et al. (2018)

Mobile money account (% age 15+) in SSA region



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Source: The Global Findex Database

Mobile money transactions



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Figure 2. Sub-Saharan Africa: Value of mobile money transactions

(Percent of GDP), 2021



Source: IMF Financial Access Survey

Simione & Muehlschlegel (2023): WP/23/238



Some Details About Kenya

Why Examine Kenya? (1)



Pioneer in financial inclusion

- Via Fintechs in form of mobile financial services
- M-Pesa (Safaricom and Vodafone): mobile phone-based payments system for Person2Person, p2b, B2B (since 2007)
- Regulatory framework:
 - Involved CBK and Communications Authority of Kenya
 - Regulatory approaches needed to be co-ordinated and consistent
- Key issues to be addressed by regulators:
 - Consumer-protection concerns: loss of money, data confidentiality
 - Financial-integrity concerns: fraud, money laundering
- Regulatory initiatives:
 - Trust Fund to be establised: to prevent mobile money accounts being used in the operation of the Safaricom; Trust fund held in a commercial bank: deposit insurance
 - Since 2011: CBK mandate to oversight non-bank based payments systems
 - in Kenyan banks and deposit-taking microfiSince 2012: deposit insurance for deposits nance institutions.

Why Kenya? (2)



- Meanwhile: "digital financial ecosystem" (CBK)
- Broadening and diversifying financial service providers:
 - M-Pesa (Safaricom) still dominating, but Airtel Money (Airtel), T-cash (Telecom Kenya)
 - Crowding-in of traditional banks: create own facilities and services or takeover
- Financial deepening: digital credit and savings platforms
- Increasing integration of payment and banking systems
- Outreach to non-financial sectors: utilities, agriculture, education
- Strong growth in financial inclusion
- **CBK:** learning-by-doing approach with regulatory sandbox





Financial Access Journey: 2006 - 2019

Access to formal financial services and products has expanded significantly among Kenyans...





Mobile money



is the story behind expanding financial inclusion...



Source: FinAccess 2019

More adults use a mix of formal and informal services and products to meet their growing and complex needs...



Source: FinAccess 2019

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Mobile banking usage dominates traditional banking...



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Source: FinAccess 2019

Despite rapid digitalization,



Cash still remains the most dominant mode of making payments...

Cash dominates all other transaction devices (%)



 Cash used widely for daily expenses, monthly bills payments, fee payments, remittances, and purchase of assets

Source: FinAccess 2019

Financial Illiteracy exists... 🦹



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Sources of financial advice (%)



respondents relying on their own knowledge was 39.6% compared to 34.7% who relied on family and friends for financial advice...huge opportunity for financial advisors!

And Consumer Protection Concerns Are Still Significant





Challenges experienced on financial services used (%)



Source: FinAccess 2019

Some conclusions from the descriptive empirics on Kenya



- Kenyan financial sector has made strong strides in formal financial services but cash is a still the dominant mode of payment for agriculture and business
- The financial diaries tell researchers that low-income Kenyan households intermediate 128% of their income through financial devices with a median of 14 different financial solutions used.
- Digital transformation via mobile banking and digital apps space raises cyber security, credit risk and consumer protection concerns.
- Majority of Kenyans feel that their financial status has worsened, implying reduced ability to use financial services and products to manage their daily needs, cope with shocks and achieve future goals.
- Promotion of financial literacy is important in addressing emerging consumer protection concerns.
- Fraud accounted for the highest incidences of loss of money on mobile money platforms, thus becoming a source of new emerging risks.



Data and the Empirical Strategy





- 2019 household survey data collected in 2018 by the Central Bank Kenya (CBK), the Kenya National Bureau of Statistics (KNBS), and Financial Sector Deepening (FSD) Kenya.
- Collected since 2006. Not a consistent set of households, the surveys measure and track developments in financial inclusion in Kenya.
 - 2006, 2009, 2013, 2016, and 2018. A new survey of Kenya is expected to be published in 2021 following policy implementations concerning the COVID-19 pandemic.
- 11,000 households in Kenya, of which 8,669 responded; a response rate of 89%.
 - The sampling methodology can be found in Njoroge et al. with greater detail (2019, p.2) however it is important to note that the survey data is weighted in sample.

Measuring Financial Inclusion



- We construct three measures of financial inclusion.
- 1. Formal sector financial inclusion. We use the survey question, C1, "*Do you currently use or used to use, in your own name, the following savings and loan products, transaction devices, insurance products, pension services, other bank services, etc.*?"
- 2. 2nd measure of formal financial inclusion using a variety of questions throughout the survey to record *use of different financial products and institutions in the last 90 days*.
- 3. Informal is the alternative of the constructed index for these two variables.
- 4. We also use of mobile banking and mobile money to allow for further investigation of the use of mobile payments and receipts.

Sample Questions in the HH Survey



Age of respondent	What is your age?	
Highest Level Education	What is the highest level that any member of the household has reached?	0 = none; 1= primary; 2= secondary; 3= post-secondary
Marital Status	What is your marital status?	O = unmarried; 1 = married; 2= widowed or divorced
Residence	Rural = 0; urban =1	
Sex of the respondent	Female = 0; male = 1	
Language	Official language = 1; Unofficial i.e., minority language = 0	3/4 of the sample use an official language
Main income source	"You have said that these are the ways you got money in the past 12 months. Which one of these brought you the most money?"	
Received payment	In the past 12 months, what was the MOST FREQUENT way that you received payments from (each alternative is a variable):	
	 Farming Employed Casual worker Self employed Government or NGO 	
	 Renting, land, house/rooms, equipment 	
	7. Earning money from investment, e.g. shares, stocks	
	 Pension Money/support from family/friands/spouso 	
	10 Other	

Data Variables in the Survey



Financial products
Savings at microfinance institution
Savings through mobile banking (e.g. Mshwari , KCB M-Pesa, M-Co-op cash, Eazzy Loan, Timiza, HF Whizz)
Savings through mobile money provider (e.g. M-PESA, Airtel Money, T-Cash, Tangaza, MobiKash, Equitel)
Savings at a Sacco / Savings and Credit Cooperative organisation
Registered on Mobile money (e.g. M-PESA, Airtel Money, T-Cash, Tangaza, MobiKash, Equitel), MobiKash, Equitel)
Registered on Mobile banking (e.g. Mshwari , KCB M-Pesa, M-Co-op cash, Eazzy Loan, Timiza, HF Whizz)
Personal loan/business loan from a bank
Loan from mobile banking (e.g. Mshwari , KCB M-Pesa, M-Co-op cash, Eazzy Loan, Timiza, HF Whizz)
Loan at a Sacco / Savings and Credit Cooperative organisation
Loan from a microfinance institution
Loan from a government institution for education, agriculture or a development loan (e.g. HELB, Ag Fin Corp, Youth or Women fund)
Digital loans that you get through the phone that you download through apps (e.g. Branch, Tala, Utunzi, KopaCredo, Haraka loans)
Loan / credits from buyer of your harvest / supplier of agricultural inputs
(e.g. coffee, tea, sugarcane, tobacco, vegetables)
Hire purchase (e.g. KuKopesha, Diamond Trust, Kenya Credit Traders (KCT), Synergy, One Africa Capital, Tuskys)
Loan to buy / build a house (mortgage), or to buy land from a bank / building society / Sacco
Loan given by government
Current account - with a cheque book/ Transactional account for day to day
Postbank account /Bank account for savings or investment (which pays interest) /Bank account for everyday without cheque book
Bank Overdraft
ATM/Debit Card /Credit card
Shares and/or stocks /T- Bills and Bonds, including M-Akiba
Mutual Funds/ Unit Trust
Car insurance /Home, building or contents insurance /Crop insurance /Livestock insurance
NHIF / Other medical/health insurance policy, NOT NHIF (e.g. M-Tiba, Afyatele, Linda Jamii, etc.)
Life insurance policy /Education policy /Other insurance (SPECIFY) /NSSF
Employment/ Occupation pension scheme, NOT NSSF /Mbao pension plan
Individual Pension Plan, NOT Mbao / Other Retirement/ pension plan (SPECIFY)

Empirical Strategy



The chosen model for the probability of financial inclusion is shown as:

$$\log(odds) = \logit(P) = \ln\left(\frac{P}{1-P}\right)$$

where
$$\frac{e^{a+bx}}{1+e^{a+bx}} = P$$
 and is the cumulative logistic distribution.

This can be linearized to think of a regression model in the following manner

logit
$$P = \beta 0 + \beta i X$$

where X is the vector of independent variables and P is the odds of financial inclusion.

Empirical Strategy (2)



Our model for formal financial inclusion (FI) is therefore linearized to be Formal FI $= \beta_0 + \beta_1 age + \beta_2 age^2 + \beta_3 education + +\beta_4 gender + \beta_5 marital status + \beta_6 income + \beta_7 language + \beta_8 distance + \varepsilon$

And to include mobile money and banking:

We further augment these two models with the additional measure for trust in information and/or the trust in the provider and create two additional models.



Some preliminary results

Variable	Model 1	Model 2	Model 3
Age	0.170***	0.197***	0.209***
	(0.009)	(0.044)	(0.045)
Age squared	-0.00***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)
Gender	0.023	0.846*	0.727*
	(0.066)	(0.345)	(0.347)
residence	-0.843***	-0.179	0.054
	(0.072)	(0.324)	(0.349)
Income source	-0.146***		
	(0.011)		
Distance walking	-0.367*		
	(0.167)		
education	0.673***	0.690***	0.670***
	(0.036)	(0.177)	(0.176)
Marital status		0.283	0.299
		(0.323)	(0.329)
Language		0.435	0.385
		(0.357)	(0.360)
Income		0.523^^^	0.482^^^
		(0.130)	(0.130)
Cost to woodb provider		0.664	
Cost to reach provider		-0.001	
.		(0.583)	0.445*
Distance to provider			-0.415*
			(0.196)
	4 5 40***	5 0 4 0 t t t	E 4 4 0 * * *
_cons	-1.542***	-5.642***	-5.148***
	(0.223)	(0.949)	(0.974)
Number of	8423	478	4//
observations			
Pseudo R2	0.1836	0.3108	0.3177



Some Preliminary Results:

Some sources of income are less likely to be included in the financial system; higher income leads to more financial inclusion as does higher education.

Likelihood ratio test statistics show that Model 2 and 3 are superior and therefore preferred to Model 1

All regression were performed in STATA 13 using logit functions.

Formal financial inclusion is the dependent variable in all models.

Significance reported: * p<0.05; ** p<0.01; *** p<0.001

Variable	Model 4	Model 5
age	0.207***	0.215***
	(0.042)	(0.043)
Age-squared	-0.002***	-0.002***
	(0.000)	(0.000)
Education	0.506**	0.486**
	(0.157)	(0.157)
Marital Status	0.400	0.420
	(0.293)	(0.297)
Residence	-0.147	0.038
	(0.302)	(0.323)
Gender	0.903**	0.824**
	(0.315)	(0.317)
	o (=o	0.400
Language	0.479	0.430
	(0.338)	(0.340)
	0.445***	0.440***
Income	0.445^^^	0.419^^^
	(0.113)	(0.113)
O = = 4.4 + = = 1 + = = = = 4	0.400	
Cost to reach nearest	-0.402	
Providor	(0.580)	
FIONICEI	(0.009)	
Distance to nearest		-0.326
provider		(0.186)
cons	-5.794***	-5.391***
	(0.891)	(0.914)
Number of observations	478	477
Pseudo R2	0.2959	0.3008



Mobile money financial inclusion

All regression performed in STATA using logit functions.

Mobile sector financial inclusion is the dependent variable in all models.

Significance reported: * p<0.05; ** p<0.01; *** p<0.001

Variable	Trust M1	TM 2	TM 3
age	0.212***	0.213***	0.167**
	(0.047)	(0.052)	(0.064)
age2	-0.002***	-0.002***	-0.002*
	(0.000)	(0.000)	(0.001)
highest_level_education	0.616***	0.710***	0.670*
	(0.180)	(0.213)	(0.274)
marital_status	0.336	-0.041	0.385
	(0.334)	(0.386)	(0.477)
residence	0.070	-0.311	-0.611
	(0.356)	(0.416)	(0.526)
gender	0 764*	0.620	1 098*
Service	(0.355)	(0.406)	(0.520)
	(,	(,	()
language	0.383	0.365	0.332
	(0.366)	(0.430)	(0.546)
income	0.504***	0.524***	0.504*
	(0.134)	(0.160)	(0.199)
distance_walking	-0.385	-0.377	-0.278
	(0.198)	(0.232)	(0.306)
formal_info provider	0.561		
	(0.605)		
Remittances		<mark>2.857*</mark>	
domestic_formal		<mark>(1.160)</mark>	
trust in provider			-1.182
			(1.085)
_cons	-5.345***	-7.633***	-2.669
	(1.006)	(1.754)	(1.869)
N	464	391	375
Pseudo R2	0.3228	0.3346	0.3029



Trust as an instrument of consumer protection is not significant but domestic remittances use formal institutions → likely to be driven by Mobile Money access.

Likelihood ratio test statistics show that Model 2 is superior and therefore preferred.

- All regression were performed in STATA 13 using logit functions.
- *Formal financial inclusion* is the dependent variable in all models.

Significance reported: * p<0.05; ** p<0.01; *** p<0.001

Variable	Trust M9	M10	M11	M12
age	0.229***	0.227***	0.233***	0.188***
	(0.043)	(0.045)	(0.048)	(0.051)
age2	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.001)
highest_level_ education	0.609***	0.585***	0.514**	0.352
	(0.166)	(0.176)	(0.180)	(0.190)
marital_status	0.545	0.592	0.490	0.773*
	(0.301)	(0.313)	(0.319)	(0.343)
residence	0.106	0.134	0.137	0.144
	(0.333)	(0.348)	(0.360)	(0.377)
gender	0.814*	0.881	0.884*	0.951*
	(0.327)	(0.343)	(0.351)	(0.374)
language	0.397	0.372	0.306	0.504
	(0.350)	(0.365)	(0.371)	(0.426)
income	0.392***	0.505	0.513***	0.512***
	(0.115)	(0.123)	(0.128)	(0.137)
distance_walking	-0.261	-0.249	-0.179	-0.203
	(0.188)	(0.193)	(0.199)	(0.222)
trust_MMprovider	1.669***	1.911	1.728***	1.699***
	(0.425)	(0.460)	(0.471)	(0.501)
formal_info		0.976	0.506	0.886
		(0.615)	(0.695)	(0.655)
mobile_remittance_			1.595***	
domestic			(0.422)	
access_mobile				2.955***
				(0.496)
cons	-6.254***	-6.772***	-7.122***	-8.507***
	(0.982)	(1.059)	(1.100)	(1.287)
N Pooudo P2	4//	404	404	404
Pseudo R2	0.3394	0.3082	0.4040	0.4033



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Trust in the mobile money provider is significant as is the access to a mobile device.

Trust in the mobile provider is significant and mobile remittances are significant indicators of financial inclusion.

The formal information providers are not significant (or not trusted).

Likelihood ratio test statistics show that Model 12 is superior and therefore preferred.

- All regression were performed in STATA 13 using logit functions.
- *Mobile Money financial inclusion* is the dependent variable in all models.

Significance reported: * p<0.05; ** p<0.01; *** p<0.001

Preliminary Conclusions



- Age, location, education, and language are all important for additional financial inclusion in the formal sector.
- Gender is more important for financial inclusion via mobile money consistent with the literature.
- Consumer protection is important for mobile money
 - Domestic remittances use the formal institutions and yet this is driven by mobile money
- Trust in the mobile money provider and access to a mobile device are significant for inclusion in mobile money.
- Formal information providers are not important determinants of participation (or not trusted).
- Kenya has reasonably high access and trust in mobile providers and this helps to provide a mechanism for financial inclusion.

Additional thoughts



- Methods of regulation might be important to increase financial inclusion in Kenya
 - What other ways do state institutions have to enforce mobile-money use?
 - What role could (regional) development banks play? -
- Check for better variables to capture consumer protection
- Financial system integrity and stability should also be measured somehow
- Extend this study to other countries perhaps those with less mobile coverage.
 - Peers would be other countries in EAC, but also Ghana

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