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Mobile Money and African Banking System

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ABSTRACT

With the development of financial technology, there has been a new payment method, that is, without a bank card, only a SIM card can be used through mobile phones for bank transfers and remittances, which is called mobile money. The rise and popularity of mobile money in various African countries is worthy of our attention because Africa is the region with the highest rate of mobile money usage. So, what kind of impact will the rise of mobile money have on the development of local mobile banks? We need to find out. Whether mobile money has become a competitor of mobile banks, we need to analyze through empirical analysis.

KEYWORDS

Mobile money; Mobile banking; Africa; Competition; Supportive

1. INTRODUCTION

1.1.The definition of mobile money

Mobile money is a mobile financial service system based on accounts held by a mobile operator and accessible from subscribers' mobile phones. The conversion between cash and electronic value happens at retail stores (or agents). All transactions are authorized and recorded in real-time using SMS. People's phone numbers are seen as their mobile money accounts, and people can transfer or deposit through coded secure SMS (Janine, John,2019).

Africa is the leading continent for mobile-money services. In 2020, mobile money accounts in Sub-Saharan Africa were 548 m, and the value of mobile money transactions in Sub-Saharan Africa is $490bn. The total transactions value of the 23.8bn carried out in 2019 exceeds $456bn, which is 3.5 times the value of transactions in South Asia, the second-highest ranked region in terms of mobile-money services (Statista. 2022).

In contrast to the prosperity of mobile money, the development of traditional finance in Africa is fragile. Less than 30 percent of the East and Southern African population has a formal bank account, ranging from 9 percent in Tanzania to 63 percent in South formal bank account, ranging from 9 percent in Tanzania to 63 percent in South Africa (FinMark Trust, 2008). Africa has leapfrogged over its inadequate infrastructure in traditional financial systems to mobile money. One reason is that mobile phones users are growing rapidly in Africa. The World Bank (2016a) stated that people in developing countries now value mobile phone use more than access to necessities, such as electricity or clean water. Another important reason is that Africa lacks infrastructure. Africa is lagging in infrastructure investment, especially transport and utilities; indeed, most mobile phone masts in Africa are powered by diesel generators because mains electricity is unreliable (Aker and Mbiti, 2010).

Table 1. The differences between mobile money and mobile banking

	Mobile money	Mobile banking
Operating institutions	MNOs	Banks
Account category	Virtual accounts associated with sim cards	Traditional banking accounts
Client category	Mobile phone clients	Banking clients
Applicable countries or regions	Areas with poor financial infrastructure and low coverage of banking services	Areas with better economic development and sufficient competition in the banking industry

1.2. Is mobile money a "competitor" or "supporter" to the bank

As described above, mobile money users can enjoy some financial services similar to those provided by banks without traditional banking accounts. According to interviews with a stratified sample of (62) Kenyans, Johnson and Krijtenburg (2015) get insight into the relationship between M-Pesa (Kenya's mobile money service) and formal finance. Because formal finance creates obligations based on 'borrowing and lending', interviewees are reluctant to move from M-Pesa into formal financial systems.

There is also concern that mobile money could change the traditional banking landscape in some markets, thereby putting commercial banks at a disadvantage. A particular problem arises if mobile money becomes a substitute for banks' demand deposits, which would limit their ability to lend and worsen their liquidity position.

However, there are views that mobile money may contribute to formal finance by increasing potential clients. Although most m-money systems allow users to store value in the account, subscribers do not deposit large amounts of value in their mobile money accounts. They only store the necessary value for transfers and cash conversions. One possible reason is that it does not pay interest (Mbiti and Weil, 2011). It implies that m-money merely provides partial financial services and cannot replace traditional finance.

2. LITERATURE REVIEW

As for the relationship between mobile money and banks in Africa, we propose two hypotheses. Hypothesis one is that mobile money is a strong competitor to the banks, while hypothesis two is that mobile money and banks are supportive of each other.

H1: we expect a negative relationship between bank performance and mobile money.

According to the hypothesis one: mobile money is a strong competitor to the banks. Because of the convenience and superiority of mobile money, only a SIM card is needed to open a mobile payment account. In addition, some mobile operators have added mobile payment functions, hence, more and more Africans choose to use mobile payment rather than formal finance. For example, there are 75% of adults in sub-Saharan Africa who do not have formal bank accounts (Sebastian, 2015), but millions of citizens in Africa choose to pay bills and consume in the markets by mobile phones now. In 2008, Kenya's GDP was estimated at US $30 Billion. M-PESA transactions in the month of July 2008 accounted for US$535 Million, or 2% of the year's GDP (JM Muisyo et al, 2014). As telecoms firms pursue more and more sources of banking revenues, banks can no longer ignore their success. Standard Bank, Africa's largest lender, for example, has launched a product called Unayo, which it hopes will compete with mobile money (Phiri & Rumney, 2021). So, we believe there is a very strong competition between mobile money and banks.

H2: mobile money is an addition bank activity therefore we expect a positive relationship between mobile money and bank performance.

On the other hand, we also hypothesize that mobile money and banks are supportive of each other. It has been reported that there is a positive relationship between mobile money adoption and financial inclusion (Bold et al, 2012; Jenkins, 2008, Porteous, 2006; Ehrbeck, 2012). According to Jenkins (2008:5) "It is mobile money's ability to facilitate financial inclusion that gives it its enormous potential for development impact…Financial sector inclusion is thus a critical prerequisite for effective market participation in its broadest sense – from being able to send a utility bill payment by mobile phone instead of losing half a day's work in line at the bank, to being able to integrate one's small business into the value chains of larger market players". Banks are realizing the potential to reach millions of potential customers, especially the rural population, which accounts for more than 60 per cent of Africa's total population, who do not have access to banking services, whereas mobile banking can make financial services available to the rural population (Ondiege, 2010). For instance, In October 2010, Safaricom signed a partnership agreement with Kenya's Barclays Bank, allowing Barclays account holders to deposit and withdraw money from their M-PESA accounts (Ondiege, 2010). In addition, the M-KESHO account recently launched by Equity Bank and Safaricom is a perfect demonstration of the convergence of mobile phones and banking. This convergence has the potential to bring more than 18 million Kenyans into formal banking services. There are no account opening fees, minimum balance or monthly fees for M-KESHO. the M-KESHO account earns interest and there is no limit on the account balance. Moreover, M-KESHO customers can open an account at an Equity Bank branch or at a subset of approximately 5,000 M-PESA agents, where Equity Bank will bank representatives among them and transact at any of the 17,000 M-PESA retail stores (Ondiege, 2010). That means people first use mobile money before getting classical banking account, because they are getting more wealthier, they would establish their own classical banking account which means banks obtain more customers. Thus, mobile money development prepares future banking claims and benefits to the banking performance. Therefore, mobile money diversifies bank activities thus it increases profit and reduces risks.

3. DATA AND METHODOLOGY

In our research, we use panel regression to investigate the relation between bank stability and mobile money use by estimating the following equation:

$$Z-SCORE_{i,t} = a_0 + a_1 MMU_{i,t} + a_2 TA_{i,t} + a_3 TAGR_{i,t} + a_4 ER_{i,t} + a_5 LR_{i,t} + a_6 DR_{i,t} + a_7 LLP_{i,t} + a_8 GDP_{i,t} + a_9 INF_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$RISK_{i,t} = a_0 + a_1 MMU_{i,t} + a_2 TA_{i,t} + a_3 TAGR_{i,t} + a_4 ER_{i,t} + a_5 LR_{i,t} + a_6 DR_{i,t} + a_7 LLP_{i,t} + a_8 GDP_{i,t} + a_9 INF_{i,t} + \varepsilon_{i,t} \quad (2)$$

In our further research, we would investigate the relation between bank performance and mobile money use by estimating the following equation:

$$ROE_{i,t} = a_0 + a_1 MMU_{i,t} + a_2 TA_{i,t} + a_3 TAGR_{i,t} + a_4 ER_{i,t} + a_5 LR_{i,t} + a_6 DR_{i,t} + a_7 LLP_{i,t} + a_8 GDP_{i,t} + a_9 INF_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$ROA_{i,t} = a_0 + a_1 MMU_{i,t} + a_2 TA_{i,t} + a_3 TAGR_{i,t} + a_4 ER_{i,t} + a_5 LR_{i,t} + a_6 DR_{i,t} + a_7 LLP_{i,t} + a_8 GDP_{i,t} + a_9 INF_{i,t} + \varepsilon_{i,t} \quad (4)$$

Table 3.1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
MMU	154	23.05062	24.1594	.6187012	72.93169
Z-score	154	70.93807	77.28344	3.400789	518.8572
SDROE	154	.0865619	.1242892	.0020278	.9048746
SDROA	154	.0053906	.0066069	.0002046	.0492836
ROE	154	.9710585	.2733365	.3811703	1.880894
ROA	154	.0255748	.0147521	-.0091803	.0736301
TA	154	22.29784	1.401786	19.67986	25.64179
TAGR	154	.0711741	.1434147	-.3165166	.5235576
ER	154	.1344321	.0396631	.0436988	.2319696
LR	154	.5437112	.1457923	.0429509	1.000339
DR	154	.7160819	.0772194	.4763953	.8531539
LLP	154	.0109861	.012734	-.00295	.0744501
GDP	154	.9058263	2.236071	-4.168388	6.123834
INF	154	7.996877	4.602462	-.9802895	17.45464

We estimate Equation. (1) (2) (3) and (4) to investigate the effect of mobile money on bank stability and bank performance. Specifically, we test the follow hypotheses:

H1: mobile money would have a negative influence on bank stability and bank performance

H2: mobile money would have a positive influence on bank stability and bank performance.

4. EMPIRICAL RESULTS

Table 4.1 shows the correlation matrix.

Table 4.1. Correlation Matrix

INF														1.0000
GDP													1.0000	-0.5140
LLP												1.0000	-0.1735	0.1928
DR											1.0000	-0.1856	0.3181	-0.3446
LR										1.0000	0.3689	-0.2323	0.0587	-0.4562
ER									1.0000	-0.2699	-0.2667	0.3375	0.1131	0.2249
TAGR								1.0000	0.0820	0.1011	0.0798	-0.1001	0.4394	-0.3059
TA							1.0000	-0.1364	-0.4723	0.0704	-0.0914	-0.1269	-0.3031	-0.1482
SDROA						1.0000	-0.2372	-0.0033	0.2234	-0.3650	-0.2237	0.0547	0.1675	0.2693
SDROE					1.0000	0.2097	-0.2076	0.1006	-0.2604	0.2397	0.1713	-0.0718	0.0991	-0.0926
ROA				1.0000	-0.0399	0.2521	-0.4216	0.3550	0.5499	-0.1276	-0.1258	0.1816	0.1377	0.2184
ROE			1.0000	0.0557	0.2325	0.0845	0.1753	0.0293	-0.4842	-0.0326	-0.0749	0.3349	-0.1627	0.1320
Z-score		1.0000	0.0424	-0.0557	-0.1733	-0.4384	0.2171	0.0401	-0.0986	0.2389	0.0678	-0.0205	-0.0602	-0.1558
MMU	1.0000	0.0438	-0.1162	0.3371	-0.1310	-0.0442	-0.3067	0.2081	0.3821	0.0568	0.1480	-0.0172	0.3148	-0.1274
	MMU	**Z-score**	**ROE**	**ROA**	**SDROE**	**SDROA**	**TA**	**TAGR**	**ER**	**LR**	**DR**	**LLP**	**GDP**	**INF**

Table 4.2 shows that mobile money has a negative influence bank stability, measured by Z-score, SDROE and SDROA.

We report the results of the estimation of Equation. (1) and (2). In bank stability, the estimation coefficient for mobile money use is negative and statistically significant with Z-score. This implies that the relationship between mobile money and bank is competitive, not collaborative.

Given this result, compared to SDROE and SDROA, Z-score is a more comprehensive measures of bank stability.

Table 4.2. Regression of the influence of mobile money use on bank stability.

	Fixed Effect	**Fixed Effect**	**Fixed Effect**
VARIABLES	Z-score	SDROE	SDROA
MMU	-5.559**	0.00324	8.84e-05
	(-2.58)	(1.25)	(0.55)
TA	76.78	-0.109	-0.00712
	(1.08)	(-1.27)	(-1.34)
TAGR	-1.787	0.0726	-0.00605
	(-0.03)	(1.00)	(-1.33)
ER	494.3	-0.389	-0.0160
	(0.85)	(-0.56)	(-0.37)
LR	24.57	-0.390***	-0.0216**
	(0.20)	(-2.66)	(-2.37)
DR	-292.7	-0.155	0.0101
	(-1.22)	(-0.54)	(0.57)
LLP	699.0	-3.559**	-0.213**
	(0.60)	(-2.54)	(-2.45)
GDP	5.426	-0.00426	0.000420
	(0.86)	(-0.56)	(0.89)
INF	-0.762	-0.000872	-0.000356
	(-0.15)	(-0.14)	(-0.92)
Constant	-1,430	2.888	0.175
	(-0.89)	(1.50)	(1.47)
Observations	154	154	154
R-squared	0.156	0.213	0.282
Number of bank	47	47	47

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.3 show shows that mobile money has a negative influence on bank performance, measured by ROE and ROA.

We report the results of the estimation of Equation. (3) and (4). Mobile money deteriorates the bank performance, implying that the mobile money is competitor of bank.

Table 4.3. Regression of the influence of mobile money use on bank performance.

	Fixed Effect	**Fixed Effect**
VARIABLES	ROA	ROE
MMU	-0.000654***	-0.00588**
	(-4.03)	(-2.53)
TA	-0.00193	-0.0295
	(-0.36)	(-0.39)
TAGR	0.00424	0.0253
	(0.93)	(0.39)
ER	0.194***	-4.422***
	(4.43)	(-7.08)
LR	-0.00267	0.123
	(-0.29)	(0.93)
DR	0.00121	-0.0835
	(0.07)	(-0.32)
LLP	-0.591***	6.003***
	(-6.74)	(4.79)
GDP	-0.000551	-5.48e-06
	(-1.16)	(-0.00)
INF	-4.22e-06	-0.00308
	(-0.01)	(-0.55)
Constant	0.0641	2.298
	(0.53)	(1.33)
Observations	154	154
R-squared	0.612	0.523
Number of bank	47	47

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

At present, we know that mobile money is a competitor to the bank. To further our study about mobile money, we are going to test the influence of mobile money regulation on bank stability and bank performance.

In this part, we introduce dummy variable. If one of these countries has mobile money regulation, its value is 1, otherwise is 0.

Table 4.4 shows the country that has regulation on mobile money and are also the subject of our study.

Table 4.4. countries having regulations on mobile money in our subject

Ghana	**Nigeria**
Kenya	Rwanda
Mauritius	Tanzania
Namibia	Uganda
Zimbabwe	

For our further research, we investigate the relation between mobile money regulation and bank stability or bank performance by estimating the following equation:

$$\text{RISK}_{i,t}/\text{PERFORMANCE}_{i,t} = a_0 + a_1\text{MMU}_{i,t} + +a_2\text{MMU}_{i,t} * \text{REG}_{i,t} + a_3\text{REG}_{i,t} + a_4\text{TA}_{i,t} + a_5\text{TAGR}_{i,t} + a_6\text{ER}_{i,t} + a_7\text{LR}_{i,t} + a_8\text{DR}_{i,t} + a_9\text{LLP}_{i,t} + a_{10}\text{GDP}_{i,t} + a_{11}\text{INF}_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where:

$\text{REG}_{i,t}$= Mobile Money Regulation

$\text{MMU}_{i,t} * \text{REG}_{i,t}$= moderator variable

Table 4.5 reports the result of Equation (5). For both bank risk and bank performance measures, the estimated coefficient for the moderator variable is negative and statistically significant in Z-score, ROE and ROA. This result indicates that the regulation on mobile money can increase the competitiveness of mobile money, making mobile money a strong competitor of traditional bank.

Table 4.5. Regression of mobile money regulation on bank risk and bank performance

	RE	**RE**	**RE**	**RE**	**RE**
VARIABLES	Z-score	SDROE	SDROA	ROE	ROA
MMU	4.993**	0.00304	0.000134	0.0197***	0.000950***
	(2.07)	(0.84)	(0.68)	(5.10)	(3.36)
MMU*REG	-5.186**	-0.00348	-0.000165	-0.0196***	-0.00101***
	(-2.06)	(-0.93)	(-0.81)	(-5.12)	(-3.57)
REG	20.43	-0.0371	-0.00176	0.108	0.00239
	(0.58)	(-0.65)	(-0.61)	(1.46)	(0.46)
TA	-1.492	-0.0435***	-0.00116	-0.0498**	-0.00445***
	(-0.16)	(-2.92)	(-1.55)	(-2.51)	(-3.23)
TAGR	41.74	0.0594	-0.00643*	0.0807	0.0123***
	(0.90)	(0.98)	(-1.79)	(1.46)	(2.97)
ER	183.0	-0.784*	0.0158	-4.467***	0.223***
	(0.65)	(-1.74)	(0.68)	(-8.81)	(6.04)
LR	105.2*	-0.0539	-0.0142***	0.0802	0.00278
	(1.69)	(-0.56)	(-2.78)	(0.76)	(0.36)
DR	56.58	0.0537	-0.00754	-0.200	0.00565
	(0.49)	(0.29)	(-0.78)	(-0.96)	(0.37)
LLP	-453.4	-1.525	-0.0855	6.429***	-0.458***
	(-0.65)	(-1.45)	(-1.51)	(5.85)	(-5.64)
GDP	-0.113	0.00137	0.00123***	0.00817	-0.000262
	(-0.03)	(0.23)	(3.62)	(1.36)	(-0.58)
INF	0.412	0.00152	0.000396*	0.0122***	0.000801**
	(0.16)	(0.37)	(1.86)	(2.63)	(2.38)
Constant	-62.31	1.184***	0.0421**	2.496***	0.0861**
	(-0.28)	(3.13)	(2.23)	(4.97)	(2.47)
Observations	154	154	154	154	154
R-squared					
Number of bank	47	47	47	47	47

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

According to our previous literature review, mobile money regulations are mainly focus on limitation of money amount, reserve rate and interest rate.

In here, we introduce dummy variable again. Among the country that has regulation on mobile money, if the regulation involves limitations of money amount, its value is 1, otherwise is 0. If the regulation involves reserve rate, its value is 1, otherwise is 0. If the regulation involves interest rate, its value is 1, otherwise is 0.

In this part, we are going to test the relation of detailed information about money regulation on bank stability and bank performance by the following equation:

$$\mathrm{RISK_{i,t}/PERFORMANCE_{i,t}} = a_0 + a_1\mathrm{MMU_{i,t}} + a_2\mathrm{MAL_{i,t}} + a_3\mathrm{TA_{i,t}} + a_4\mathrm{TAGR_{i,t}} + a_5\mathrm{ER_{i,t}} + a_6\mathrm{LR_{i,t}} + a_7\mathrm{DR_{i,t}} + a_8\mathrm{LLP_{i,t}} + a_9\mathrm{GDP_{i,t}} + a_{10}\mathrm{INF_{i,t}} + \varepsilon_{i,t} \quad (6)$$

$$\mathrm{RISK_{i,t}/PERFORMANCE_{i,t}} = a_0 + a_1\mathrm{MMU_{i,t}} + a_2\mathrm{RR_{i,t}} + a_3\mathrm{TA_{i,t}} + a_4\mathrm{TAGR_{i,t}} + a_5\mathrm{ER_{i,t}} + a_6\mathrm{LR_{i,t}} + a_7\mathrm{DR_{i,t}} + a_8\mathrm{LLP_{i,t}} + a_9\mathrm{GDP_{i,t}} + a_{10}\mathrm{INF_{i,t}} + \varepsilon_{i,t} \quad (7)$$

$$\mathrm{RISK_{i,t}/PERFORMANCE_{i,t}} = a_0 + a_1\mathrm{MMU_{i,t}} + a_2\mathrm{NIR_{i,t}} + a_3\mathrm{TA_{i,t}} + a_4\mathrm{TAGR_{i,t}} + a_5\mathrm{ER_{i,t}} + a_6\mathrm{LR_{i,t}} + a_7\mathrm{DR_{i,t}} + a_8\mathrm{LLP_{i,t}} + a_9\mathrm{GDP_{i,t}} + a_{10}\mathrm{INF_{i,t}} + \varepsilon_{i,t} \quad (8)$$

Table 4.6 reports the result of Equation (6). For bank stability, the estimated coefficient for money amount limit in mobile money regulation is negative but statistically non-significant. While, for bank performance, the estimated coefficient for money amount limit in mobile money regulation is negative and statistically significant. This result is consistent with our previous analysis that mobile money is in competition with banks.

Table 4.6. Regression of money amount limit in mobile money regulation on bank risk and bank performance

	RE	RE	RE	RE	RE
VARIABLES	Z-score	SDROE	SDROA	ROE	ROA
MMU	-0.104	-0.000935	-6.14e-05	-0.000172	-0.000127
	(-0.21)	(-1.15)	(-1.55)	(-0.14)	(-1.61)
MAL	-10.60	-0.0424	-0.00249	-0.0980*	-0.00957**
	(-0.48)	(-1.13)	(-1.38)	(-1.66)	(-2.51)
TA	11.03	-0.0334***	-0.000693	-0.0162	-0.00248**
	(1.55)	(-2.74)	(-1.19)	(-0.84)	(-1.98)
TAGR	51.09	0.0614	-0.00631*	0.0792	0.0120***
	(1.10)	(1.02)	(-1.78)	(1.33)	(2.83)
ER	168.9	-0.827*	0.0160	-4.357***	0.235***
	(0.60)	(-1.89)	(0.70)	(-8.19)	(6.40)
LR	90.83	-0.0590	-0.0149***	-0.00388	-0.00248
	(1.45)	(-0.63)	(-2.98)	(-0.03)	(-0.32)
DR	-10.50	-0.00138	-0.0101	-0.363	-0.00406
	(-0.09)	(-0.01)	(-1.08)	(-1.64)	(-0.27)
LLP	46.69	-1.207	-0.0721	7.143***	-0.421***
	(0.07)	(-1.20)	(-1.36)	(6.18)	(-5.22)
GDP	-1.009	-0.00128	0.00108***	0.00460	-0.000497
	(-0.24)	(-0.22)	(3.33)	(0.74)	(-1.14)
INF	-0.993	-0.00160	0.000227	0.00650	0.000421
	(-0.43)	(-0.44)	(1.22)	(1.45)	(1.37)
Constant	-248.0	1.040***	0.0360**	2.099***	0.0622*
	(-1.15)	(2.92)	(2.05)	(4.08)	(1.83)
Observations	154	154	154	154	154
R-squared					
Number of bank	47	47	47	47	47

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.7 and 4.8 reports the result of Equation (7) and (8), However, these results are statistically non-significant. Therefore, we need further information and evidence to research how mobile money regulation influences the relationship between mobile money and traditional bank.

Table 4.7. Regression of interest rate in mobile money regulation on bank risk and bank performance

	RE	RE	RE	RE	RE
VARIABLES	Z-score	SDROE	SDROA	ROE	ROA
MMU	0.106	-2.76e-06	4.16e-05	6.24e-06	0.00268**
	(0.21)	(-0.06)	(0.05)	(0.07)	(2.05)
RR	-7.120	-0.00268	-0.0463	-0.00391	-0.176**
	(-0.25)	(-1.14)	(-0.95)	(-0.79)	(-2.42)
TA	11.49	-0.000570	-0.0315**	-0.00218*	-0.0114
	(1.63)	(-0.97)	(-2.57)	(-1.74)	(-0.61)
TAGR	52.68	-0.00593*	0.0678	0.0131***	0.0986*
	(1.13)	(-1.67)	(1.12)	(3.01)	(1.65)
ER	131.7	0.0105	-0.910**	0.214***	-4.450***
	(0.49)	(0.48)	(-2.16)	(5.87)	(-8.66)
LR	102.0*	-0.0122**	-0.0186	0.00294	0.0698
	(1.70)	(-2.53)	(-0.20)	(0.38)	(0.64)
DR	-4.823	-0.00795	0.0333	-0.00128	-0.283
	(-0.04)	(-0.82)	(0.18)	(-0.08)	(-1.27)
LLP	102.0	-0.0651	-1.124	-0.397***	7.187***
	(0.16)	(-1.24)	(-1.13)	(-4.83)	(6.25)
GDP	-0.919	0.00108***	-0.00165	-0.000576	0.00262
	(-0.22)	(3.32)	(-0.29)	(-1.29)	(0.42)
INF	-0.910	0.000241	-0.00134	0.000461	0.00752*
	(-0.40)	(1.30)	(-0.37)	(1.47)	(1.69)
Constant	-271.1	0.0294	0.936***	0.0479	1.856***
	(-1.24)	(1.63)	(2.58)	(1.40)	(3.72)
Observations	154	154	154	154	154
R-squared					
Number of bank	47	47	47	47	47

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.8. Regression of interest rate in mobile money regulation on bank risk and bank performance

	RE	RE	RE	RE	RE
VARIABLES	Z-score	SDROE	SDROA	ROE	ROA
MMU	0.0194	-3.30e-05	-0.000488	-4.23e-05	0.000634
	(0.05)	(-0.97)	(-0.68)	(-0.58)	(0.58)
INR	-20.24	-0.00392	0.00141	-0.00139	0.0246
	(-0.40)	(-0.95)	(0.02)	(-0.16)	(0.19)
TA	11.07	-0.000678	-0.0326***	-0.00229*	-0.0139
	(1.56)	(-1.16)	(-2.66)	(-1.79)	(-0.71)
TAGR	51.08	-0.00624*	0.0656	0.0127***	0.0855
	(1.10)	(-1.75)	(1.08)	(2.93)	(1.43)
ER	111.2	0.00329	-1.000**	0.210***	-4.577***
	(0.43)	(0.16)	(-2.42)	(5.82)	(-8.80)
LR	99.92*	-0.0129***	-0.0304	0.00196	0.0367
	(1.67)	(-2.68)	(-0.33)	(0.26)	(0.33)
DR	-14.85	-0.0109	-0.00677	-0.00336	-0.354
	(-0.13)	(-1.16)	(-0.04)	(-0.22)	(-1.58)
LLP	153.8	-0.0499	-0.981	-0.399***	7.309***
	(0.24)	(-0.96)	(-0.99)	(-4.86)	(6.28)
GDP	-0.576	0.00116***	-0.00117	-0.000540	0.00393
	(-0.14)	(3.51)	(-0.20)	(-1.21)	(0.63)
INF	-0.926	0.000242	-0.00137	0.000441	0.00667
	(-0.40)	(1.30)	(-0.38)	(1.40)	(1.47)
Constant	-251.5	0.0349**	1.004***	0.0530	1.994***
	(-1.17)	(1.99)	(2.82)	(1.53)	(3.86)
Observations	154	154	154	154	154
R-squared					
Number of banks	47	47	47	47	47

5. CONCLUSION

Mobile money, with which people deposit, withdraw, transfer, pay or conduct other financial activities through SIM cards, are mobile payment systems provided by mobile network operators, while mobile banking offers mobile financial services through smart phones provided by banks. Consequently, we draw two hypotheses that mobile money is a strong competitor to the banks, while mobile money and banks are supportive of each other.

Through empirical analysis, we are able to figure out the relation between mobile money and bank risk/bank performance. According to the results, mobile money is a competitor to the traditional banks and the money amount limit in regulation would significantly damage bank performance. The results provide a new ideal about mobile money and financial inclusion. Based on the empirical analysis, mobile money can become a substitute for bank's demand deposits.

In a nutshell, to enhance the stability of mobile money, a real-name system and increased regulations for mobile network operators and mobile money will help.

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