

The Economics of M-PESA: An Update

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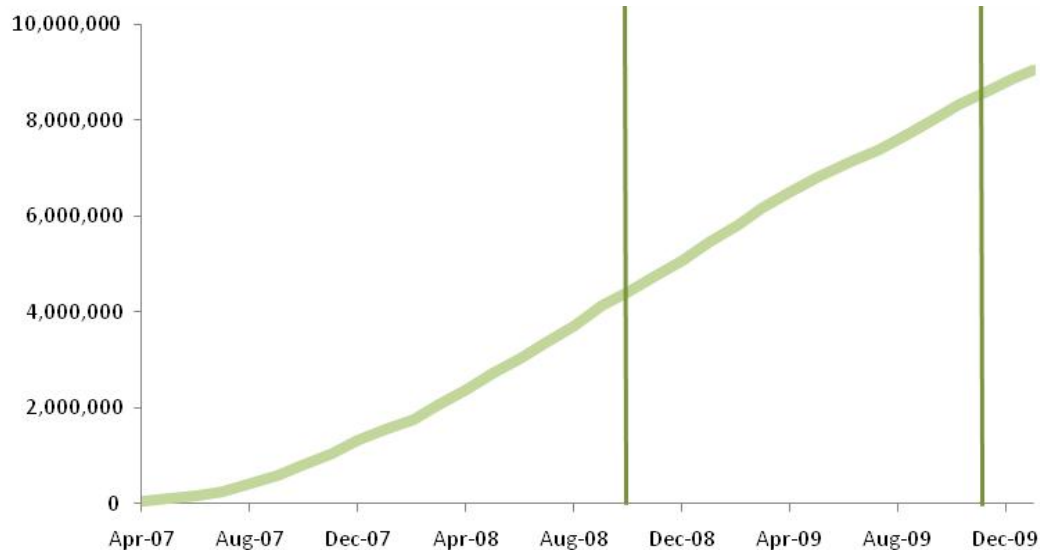
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I. Background

This short report is an update of the earlier descriptive paper “Mobile Money: The Economics of M-PESA”. This report updates all the data in that paper with the second round of data collected in late 2009. Figures 1 and 2 (directly from Safaricom) show the growth in users of M-PESA and in agents over the period covered by the data (the vertical lines in the Figures indicate the timing of the two rounds of the survey).

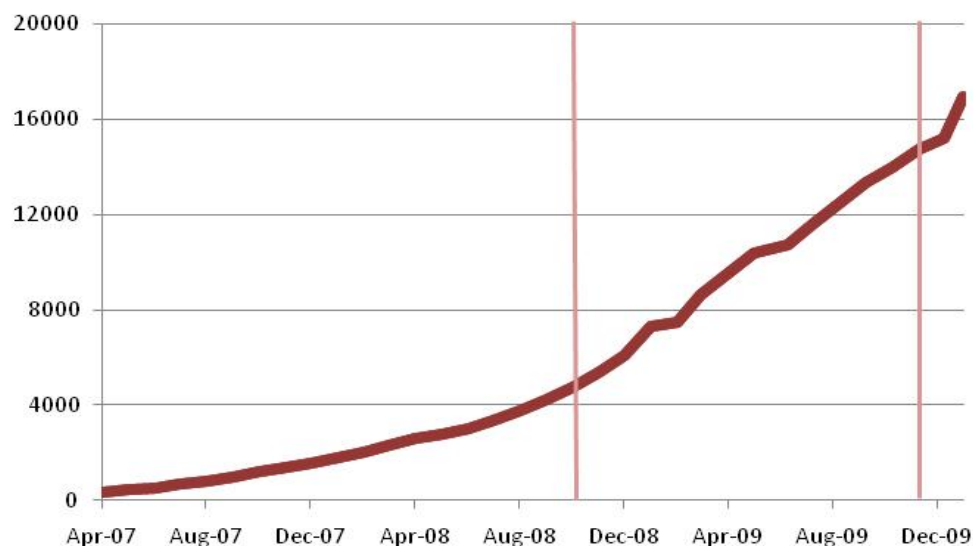
From Figure 1, it can be seen that there was a huge increase in the use of M-PESA over the period spanned by the two rounds of the survey. The number of users here is measured by the total number of SIM cards registered to M-PESA. Figure 2 shows a similar expansion in the number of M-PESA agents (where M-PESA users can deposit money into their accounts and withdraw money from their accounts). At the time of the first round of the survey, there were just over 4,000 agents across the country, which increased fourfold within a year to reach about 16,000.

Figure 1: Growth in M-PESA Users



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Figure 2: Growth in M-PESA Agents



II. Socioeconomic Characteristics

Table 1 reports summary statistics of households that were interviewed in both rounds of the survey. The upper panel reports the number of M-PESA users in each round: users are defined as those households with at least one member who has used M-PESA for any purpose. The number of M-PESA users increased dramatically between the two survey rounds: while in 2008 less than half the households surveyed were M-PESA users (43 percent), by 2009 nearly 70 percent of households were M-PESA users.

The second panel reports household-level income and wealth indicators. In both rounds of the survey, users generally report higher annual expenditures and asset holdings than non-users. However, the composition of each group has clearly changed over time, as the users in Round 2 have lower mean expenditures and assets than those in Round 1. This suggests that while M-PESA use was originally limited to the wealthiest groups, it is slowly being adopted by a broader share of the population. The non-users in Round 2 also appear less well off than those in Round 1, likely because it is the more affluent of them who became M-PESA users by the second round of the survey. However, there appears to have been a decline in expenditures across all households, so it is difficult to parse out the trend and compositional effects.

The numbers in the bottom panel of Table 1 provide further evidence that, by Round 2, a wider cross-section of people had begun to use M-PESA. As might be expected, the percentage of users in the banked population and the urban population increased substantially between Rounds 1 and 2. However, the percentage of users in the unbanked population also increased (from 25 percent in Round 1 to 50 percent in Round 2) as did the percentage of users in rural areas (from 29 percent to 41 percent). Thus, many of those who became users between Rounds 1 and 2 were those in rural areas and those without

Table 1: Household characteristics

	Round1			Round2		
	Non-users	Users	All	Non-users	Users	All
Number of households	1,143	873	2,016	629	1,387	2,016
Share of total	0.57	0.43	1.00	0.31	0.69	1.00
<u>Income and wealth</u>						
Annual Household Expenditure (KSh)	172,181 (221,960)	305,684 (434,581)	230,005 (337,712)	118,452 (100,437)	245,105 (240,852)	205,599 (215,626)
Assets (KSh)	77,706 (299,111)	209,769 (576,102)	134,910 (445,713)	55,652 (222,091)	166,478 (715,700)	132,187 (609,538)
Wealth index	-0.571 (1.529)	0.747 (1.826)	0.000 (1.788)	-0.929 (1.464)	0.416 (1.828)	0.000 (1.832)
<u>Other characteristics</u>						
Share of households with at least one cell phone	0.52	0.92	0.69	0.39	0.92	0.75
Share of households with at least one bank account	0.34	0.71	0.50	0.23	0.65	0.52
Share of the unbanked population in each category	0.75	0.25	1.00	0.50	0.50	1.00
Share of the banked population in each category	0.38	0.62	1.00	0.14	0.86	1.00
Share of rural population in each category	0.71	0.29	1.00	0.41	0.59	1.00
Share of urban population in each category	0.47	0.53	1.00	0.24	0.76	1.00
Notes: All figures reweighted accordingly. Standard deviations in ().						

bank accounts. In addition, the table shows that 52 percent of non-users owned a cell phone in Round 1, while only 39 percent of non-users owned a cell phone in Round2. This suggests that not owning a cell phone is a major constraint to adoption of M-PESA.

Table 2: M-PESA use across household expenditure quartiles

Quartile	Round 1			Round 2		
	Mean expenditure	Max expenditure	Fraction of users	Mean expenditure	Max expenditure	Fraction of users
1	68,871	98,720	0.19	67,579	97,816	0.40
2	122,818	151,144	0.37	122,829	151,492	0.64
3	191,319	245,076	0.53	187,196	235,144	0.79
4	537,384	8,326,328	0.65	445,313	6,365,544	0.93
Total	230,005	8,326,328	0.43	205,599	6,365,544	0.69

Table 2 shows the proportion of M-PESA user households by annual household expenditure quartiles. As expected, the percentage of households that are considered M-PESA users increases by expenditure quartile. Furthermore, between Round1 and Round2, the proportion of M-PESA users increases almost equally for every expenditure quartile suggesting that the new M-PESA user households in Round 2 are relatively evenly divided between the range of socio-economic backgrounds.

Table 3 compares socioeconomic variables for early adopters of MPESA, with those who started using it later and with non-users. Early adopters are defined as those who were MPESA users in Rounds 1 and 2 while late adopters are households that were non-users in Round 1 but became users by Round 2. In the 'never' category are non-users in Round 1 who remained as such in Round 2. A clear pattern emerges where the early adopters generally have higher consumption and their household heads have higher education levels than the late adopters, and the late adopters in turn have higher levels of consumption and their household heads higher education than those who never used MPESA.

The same pattern holds for possession of a bank account, and the reverse for using a mattress for saving. This is further evidence that the earliest MPESA users were the wealthiest and most educated, but that over time, it is being adopted by people of more varied socioeconomic levels. The non-users, however, remain the least well off and least educated group.

In addition, saving behavior on M-PESA was compared for the different categories of M-PESA users. In Round 1, about 79 percent of the early adopters saved on M-PESA, and this increased to 89 percent by Round 2. However, a large percentage (70 percent) of the late adopters also saved on M-PESA in Round 2. Thus, households that save on M-PESA by Round 2 are likely to include both early and late adopters.

Table 3: Early vs. Late Adopters

	Round 1			Round 2		
	Never	Late	Early	Never	Late	Early
Consumption (Ksh)	130,240	210,428	315,365	114,876	201,480	278,136
Bank Account (Anyone in HH)	0.19	0.47	0.72	0.19	0.54	0.73
Mattress (Anyone in HH)	0.82	0.76	0.71	0.89	0.83	0.73
Save on M-PESA (Anyone in HH)	0.00	0.00	0.79	0.00	0.70	0.89
HH Head Years of Education	4.9	7.9	10.2	6.0	8.8	10.5
Other Education (Vocational/Adult/Other)	0.05	0.11	0.17	0.05	0.11	0.18
HH Head Can Read?	0.70	0.88	0.96	0.72	0.93	0.98
HH Head Can Write?	0.66	0.88	0.96	0.72	0.92	0.98

Note: The sample in this table does not include 4% of households that stopped using M-PESA between Round 1 and Round 2

Table 4 reports demographic data on individuals who were members of the households surveyed, by the individual's M-PESA user status. Note that these statistics are for all the individuals in the sample, where M-PESA use is defined at the individual level (and not at the household level as it was for the earlier tables).

The average age of both users and non-users is about the same. Although a larger share of the users is male, by Round 2, M-PESA usage is more evenly divided between genders. Users are more likely to be literate than non-users and they are also, on average, more educated than non-users. Furthermore, the data indicates that while a slightly smaller percentage of users in Round 2 have completed secondary or university education than have users in Round 1, a higher percentage of users have completed primary education in Round 2 versus Round 1.

This, once again, points towards a change in the composition of users from Round 1 to Round 2. Note that the numbers in Table 3 are different from those in Table 2 as those in Table 2 are for the household (or household head where indicated), whereas those in Table 3 are over all the individuals in the sample.

Table 4: Individual Characteristics

	Round1			Round2		
	Non-users	Users	Total	Non-users	Users	Total
Count	3,907	958	4,865	2,772	2,327	5,099
Age (years)	36.0 (16.1)	36.3 (12.3)	36.0 (15.4)	36.0 (16.8)	36.7 (13.0)	36.3 (15.2)
Sex (share male)	0.46 (0.50)	0.62 (0.49)	0.49 (0.50)	0.44 (0.50)	0.56 (0.50)	0.50 (0.50)
Share who can read	0.87 (0.33)	0.97 (0.18)	0.89 (0.31)	0.84 (0.36)	0.98 (0.14)	0.91 (0.29)
Share who can write	0.86 (0.35)	0.96 (0.19)	0.88 (0.32)	0.84 (0.37)	0.98 (0.14)	0.90 (0.30)
Educational attainment (share)						
None	0.24 (0.43)	0.08 (0.26)	0.21 (0.41)	0.10 (0.30)	0.01 (0.11)	0.06 (0.24)
Primary	0.30 (0.46)	0.20 (0.40)	0.28 (0.45)	0.52 (0.50)	0.32 (0.47)	0.43 (0.49)
Secondary	0.36 (0.48)	0.46 (0.50)	0.38 (0.49)	0.31 (0.46)	0.45 (0.50)	0.37 (0.48)
University	0.03 (0.16)	0.10 (0.30)	0.04 (0.20)	0.01 (0.10)	0.08 (0.27)	0.04 (0.20)
Other	0.07 (0.26)	0.17 (0.37)	0.09 (0.29)	0.05 (0.22)	0.14 (0.35)	0.09 (0.29)

III. Remittances

Table 5 reports the shares of households in the sample who sent or received remittances in any form (goods, money, e-float, etc.), by rural/urban location and by M-PESA use.

On average households are more likely to send remittances than receive remittances although this difference is reduced in Round 2. In both Rounds 1 and 2, similar percentages of urban and rural households receive remittances, but a much larger percentage of urban households send remittances. In Round 1, M-PESA users are much more likely to send and receive remittances than non-users, and this difference is even more pronounced in Round 2.

Table 5: Who makes remittances- both money and goods

	Round1		Round2	
	Send	Receive	Send	Receive
Total	46%	38%	49%	45%
<u>By geographic location</u>				
Rural	34%	36%	36%	45%
Urban	55%	40%	58%	46%
<u>By M-PESA use</u>				
Non-user	32%	26%	17%	19%
User	65%	54%	63%	58%

Indicators of frequency and size of remittances sent and received are reported in Table 6. On average, households in Round 1 sent and received remittances every three to four months and households in Round 2 every two to three months.

M-PESA users generally sent and received remittances more frequently than non-users, however the total amount they sent and received is not very different from the average household. Users sent about half their remittances in Round 1 by M-PESA, this increased to about 75 percent of their remittances in Round 2. In both Rounds 1 and 2 they received about half their remittances by MPESA. The value of the remittance sent or received was generally lower for those transactions using M-PESA than for those using other methods.

Table 6: Remittances sent and received

	Round1					Round2				
	All	M-PESA Users		Non-Users	All	M-PESA Users		Non-Users		
	Total	Total	M-PESA	Other	Total	Total	M-PESA	Other	Total	
	Sending (N=1,026)					Sending(N=1,052)				
Number per month	0.31	0.34	0.17	0.17	0.25	0.41	0.43	0.32	0.11	0.28
Value per month (% consumption)	4.5%	4.9%	2.5%	2.3%	3.9%	6.7%	7.0%	4.8%	2.1%	4.6%
Value per transaction (KSh)	3,361	3,183	2,919	3,671	3,635	2,956	3,078	2,952	3,321	1,990
	Receiving (N=791)					Receiving(N=922)				
Number per month	0.23	0.23	0.14	0.08	0.24	0.33	0.34	0.17	0.17	0.26
Value per month (% consumption)	6.1%	7.1%	2.9%	4.1%	4.5%	6.4%	6.5%	2.9%	3.6%	5.9%
Value per transaction (KSh)	4,554	6,008	3,981	12999*	2,187	3,117	3,219	2,952	3,529	2,428
* Received has two large values of more 700,000 KSh (about USD1,000) for repayments of debts.										
* Note that M-PESA users send and receive remittances by M-PESA as well as in other ways.										

Table 7: Destination and origin of remittances

	Round1			Round2		
	Non-MPESA transactions	MPESA transactions	Total	Non-MPESA transactions	MPESA transactions	Total
<i>Destination of remittance</i>						
Spouse	9%	9%	9%	6%	8%	8%
Parent	46%	40%	44%	47%	29%	35%
Child	11%	10%	10%	16%	15%	16%
Other relative	14%	17%	15%	18%	24%	22%
Friend	6%	13%	8%	10%	18%	15%
Other	14%	12%	13%	4%	5%	5%
<i>Origin of remittance</i>						
Spouse	9%	18%	12%	6%	13%	9%
Parent	16%	4%	12%	9%	5%	7%
Child	27%	20%	25%	26%	21%	23%
Other relative	30%	37%	33%	25%	23%	24%
Friend	17%	20%	18%	28%	25%	27%
Other	1%	0%	1%	7%	13%	9%

Table 7 reports the destination and origin of household remittances. About half of remittances seem to go from children to their parents: recipients are most likely to be parents and senders are most likely to be children or other relatives. Remittances sent by MPESA are less likely to go to parents, but more likely to go to other relatives or friends. This holds true for remittances received by M-PESA as well – they are much more likely to be received from friends and other family members than remittances received through other methods. This suggests that M-PESA is used more frequently by younger people and people outside the direct parent-child relationship. This may also signal that M-PESA users have and/or take advantage of much broader networks than non-users (something we will study more closely in future research).

Table 8 compares the remittance behavior of early versus late adopters of MPESA as well as non-users of MPESA. The results are very similar to our earlier comparisons of early versus late users, and comparisons of these two groups with non-users. A higher percentage of the early adopters sent and received remittances than either the late adopters or the non-users. In Round 1, the late adopters were more likely to send remittances than the non-users but about equally likely to receive remittances. By Round 2, the late adopters were much more likely to both send and receive remittances than the non-users, suggesting that there is a relationship between the adoption of MPESA and remittance behavior. The size of the remittances follow the general pattern with the early adopters sending and receiving the highest amounts, and the non-users sending and receiving the lowest amounts.

Table 8: Early vs. Late Adopters II

	Round 1			Round 2		
	Never	Late	Early	Never	Late	Early
Send Money?	0.26	0.37	0.66	0.18	0.55	0.69
Receive Money?	0.24	0.26	0.55	0.19	0.55	0.59
Amount Sent	3,269	5,814	10,294	1,646	4,438	7,599
Amount Received	2,415	3,357	12,285*	2,428	4,508	5,458
Net Receiver?	0.22	0.22	0.37	0.17	0.35	0.31
Net Receipts	-855	-2,556	2,092	752	82	-2,128

* Received has two large values of more 700,000 KSh (about USD1,000) for repayments of debts.

Note the numbers in this table do not include the 4% of households that dropped M-PESA between Round 1 and Round 2

IV. Savings

Looking at savings², Table 9 reports on the different types of savings instruments used by households by their M-PESA user status. In Round 1 about 75 percent of users used MPESA for saving and by Round 2 this had increased to 81 percent. Users are much more likely to use a bank account to save than are non-users. A large percentage of households save money at home “under the mattress” (about 80 percent) although a slightly smaller percentage of users do than non-users. The users in Round 2 are less likely to save in a bank account and more likely to use a mattress for saving than are the users in Round 1- again, this is likely because users in Round 2 encompass a larger share of the population.

Table 9: Savings instruments used by households

	Round1			Round2		
	Non-users	Users	All	Non-users	Users	All
M-PESA	0.00	0.76	0.33	0.00	0.81	0.56
Bank account	0.34	0.71	0.50	0.23	0.65	0.52
Mattress	0.79	0.71	0.76	0.89	0.77	0.81
SACCO	0.15	0.24	0.19	0.10	0.21	0.18
Merry-go-round	0.39	0.42	0.40	0.38	0.52	0.47
HH member	0.13	0.15	0.14	0.13	0.13	0.13
Family member	0.04	0.04	0.04	0.03	0.03	0.03
Friend	0.03	0.05	0.04	0.02	0.02	0.02
Advance purchase	0.03	0.04	0.04	0.05	0.06	0.06
Stocks	0.05	0.18	0.11	0.01	0.11	0.08

In Table 10 we compare the proportion of M-PESA users that save on M-PESA depending on whether the household owns a bank account or not. M-PESA users who own a bank account are much more likely to save on M-PESA than those who do not, and this is true in both Round 1 and Round 2. The proportion of M-PESA users who save on M-PESA increases between Round 1 and Round 2 among both the banked and unbanked population, however the increase is larger for the banked population.

² Here modes of savings are defined to the respondent as any instrument where they have held cash for more than twenty four hours.

Table 10: Probability of saving on M-PESA across households with and without a bank account

Probability Save on M-PESA		
	Round 1	Round 2
No Bank account	0.65	0.68
Bank account	0.80	0.88
Total	0.76	0.81

Table 11 reports on the reasons why households choose or do not choose to use M-PESA for saving. The major reasons people cite for using M-PESA for saving is ease of use (about 40 percent) and safety (26 percent). The percentage of households saving on MPESA for emergencies increased dramatically from 12 percent in Round 1 to 22 percent in Round2. Of the reasons households mentioned for not using M-PESA for saving (no reason was the primary response), the largest percentage cited the absence of need for it and the lack of access.

Table 11: Reasons for household use and non-use of MPESA for saving

Reason	Round 1		Round2	
	Non-users	Users	Non-users	Users
Safety	0.03	0.26	0.01	0.26
Ease	0.01	0.43	0.01	0.41
Cost	0.09	0.07	0.09	0.07
No access	0.20	0.00	0.21	0.01
Confidentiality	0.02	0.02	0.01	0.02
Emergency	0.00	0.12	0.00	0.22
No Reason	0.28	0.07	0.41	0.01
No need	0.17	0.00	0.25	0.00
Other	0.19	0.01	0.01	0.00

V. Customer experience with M-PESA

We can also look at some factors that relate to customers' experience with M-PESA. Tables 12a and 12b highlight some of the problems experienced by M-PESA users, particularly the delays to withdrawing money from customers' M-PESA accounts. In Round 1, about 20 percent of users experienced some kind of delay, by Round 2 this had decreased to 16 percent. This is rather striking as we know (from Figure 1) that use climbed a lot between the two rounds. However, the number of agents also grew tremendously over this period (Figure 2), which may explain this improvement in delays.

In Round 1 the majority of delays (about 70 percent) were caused by the agent not having money. This was less of an issue for users in Round 2 although it was still the cause of 30 percent of the delays. In Round 2 the major problem seems to have been the Safaricom network being down, contributing to about half the delays.

However, it is important to note that most of these delays were resolved fairly quickly. About 79 percent of delays were resolved within a day for users in Round 1 and 81 percent were resolved within a day for users in Round 2.

Table 12a: Delays to withdrawing money from M-PESA

	Round1	Round2
Share experiencing delays to withdrawal of money	0.20	0.16
<u>Reason</u>	Share of delays	
Deleted sms	0.01	0.00
Agent had no money	0.70	0.30
Public holiday	0.01	0.02
Agent not available	0.01	0.02
Agent system down	0.05	0.11
Safaricom network down	0.11	0.51
No ID	0.07	0.07
Other	0.04	0.05

Table 12b: Delay until withdrawal possible

Delay until withdrawal possible	Round1	Round2
Hour or less	0.18	0.34
Half a day	0.28	0.15
A day	0.33	0.32
A few days	0.17	0.03
A week	0.02	0.00
Several weeks	N/A	0.00
Several months	0.02	0.01
Never	0.00	0.00
Went to another agent	N/A	0.14

Users were also asked about their experiences with the agent closest to them (Round 1) or the agent with whom they conducted their last two transactions (Round 2) and these data are reported in Table 13. Note that this question was changed across rounds. The reason was that the growth in use and in the number of agents meant that asking about the closest agent was not very useful (since a lot of respondents had more than one closest agent) and asking about the most used agent as we did in Round 1 did not make sense for Round 2. Therefore, in Round 2, we asked detailed questions about the last two M-PESA transactions that customers did with agents.

In general, users in Round 2 had a better experience with their agents, as a smaller percentage of them experienced problems with withdrawing or depositing money. Furthermore, 95 percent of users in Round 2 were asked by the agent to show ID (as required for security reasons), while only 77 percent were asked in Round 1. In addition, a much larger percentage of users in Round 2 trust their agent (95 percent) than did users in Round 1 (65 percent).

These numbers suggest that the quality of MPESA services have improved dramatically over time, as has the general level of trust that users have in the system. The difference in these numbers over time is all the more striking given that there are a lot more users in Round 2 and that these newer users tend to be poorer households and have less educated heads.

Table 13: Reported experiences with agents

	Round1 (closest agent)	Round2 (last 2 transactions)
Fraction unable to withdraw from agent	0.16	0.05
Fraction unable to deposit money with agent	0.07	0.04
Fraction asked by agent to show ID	0.77	0.95
Fraction who trust agent	0.65	0.95

Overall, users seem to be quite satisfied with their M-PESA services. When asked to rank on a scale of 1 to 10 how happy they were with M-PESA, in Round 1 over half reported a rank of 10 and over 90 percent reported values of 8 or above (Table 14a). The happiness ranks were lower for users in Round2, with about 35 percent reporting a rank of 10 and 88 percent reporting a value of 8 or above.

However, when asked about the impact of MPESA closing down (Table 14b), a higher percentage of users in Round 2 (92 percent) said that it would be large and negative than did users in Round 1 (85 percent). Thus, it is not clear whether users in Round 2 are less satisfied with the quality of the services provided or whether they simply have higher expectations.

Table 14a: Measures of satisfaction with M-PESA: Happiness with M-PESA

	Round1	Round2
Extremely unhappy 1	0.008	0.002
2	0.003	0.002
3	0.001	0.006
4	0.001	0.002
5	0.005	0.022
6	0.024	0.022
7	0.055	0.065
8	0.129	0.199
9	0.221	0.332
Extremely happy 10	0.554	0.347

Table 14b: Measures of satisfaction with M-PESA: Impact of closing down of M-PESA

	Large Negative	Small Negative	None	Small Positive
Round 1	0.85	0.10	0.03	0.02
Round 2	0.91	0.08	0.01	0.01

Individual non-users of M-PESA were also asked their reasons for not using M-PESA, as reported in Table 15.

Table 15: Individuals' reasons for non-use of M-PESA

Reason	Round1	Round2
Don't know about it	0.18	0.03
Don't need it	0.14	0.21
No network available	0.00	0.00
Celtel (or Zain) customer	0.04	N/A
Don't own a mobile phone	0.28	0.60
Don't understand it	0.05	0.05
Too complicated	0.01	0.02
Too costly	0.01	0.07
Not safe/Don't trust it	0.00	0.03
No agents where I live	0.01	0.01
No agents where my recipient lives	0.01	0.00
Happy with existing money transfer service	0.02	N/A
Other	0.17	0.16
No response	0.08	N/A

In Round 1, about 18 percent of non-users said that they didn't know about M-PESA, while in Round 2 only 3 percent did, indicating that awareness of M-PESA grew dramatically over the year and is now, therefore, a negligible constraint to adoption of M-PESA. About 14 percent of non-users said that they didn't need M-PESA in Round 1, while 21 percent cited this reason in Round 2. The major constraint to adoption of M-PESA, however, appears to be access to a cell phone. In both Rounds 1 and 2, not owning a cell-phone was the primary reason cited although a much larger percentage mentioned it in Round 2 (60 percent) than in Round 1 (28 percent). This suggests that many of those individuals who adopted M-PESA between Round 1 and Round 2 were those who already owned cell phones.

VI. Conclusions

This report is an update to earlier work describing the use of M-PESA in Kenya. The descriptive statistics across rounds suggest that the product has been adopted by an ever-broadening cross-section of the population. While it has always been used by a non-negligible share of those with lower economic means, it has quickly expanded its reach into these groups, and is now used by households with a wide range of economic, demographic, and educational characteristics.