



FINANCIAL SERVICES ASSESSMENT

Cash In, Cash Out Kenya:

The Role of M-PESA in the Lives of Low-Income People

GUY STUART, Ph.D.
Independent Consultant

MONIQUE COHEN, Ph.D.
Microfinance Opportunities



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ABSTRACT

Using a Financial Diaries methodology, Microfinance Opportunities undertook a study to examine how low-income Kenyans use M-PESA, that country's pioneering e-money service. The study focused on (1) the value of M-PESA to low-income individuals; (2) the most likely areas for M-PESA's future growth; and (3) whether M-PESA can serve as a platform for financial services beyond remittances. The study sample consisted of 92 low-income respondents (median of average per capita income ~\$2 per day) from three research sites. Researchers recorded all weekly financial transactions for these respondents between November 2009 and June 2010 for a total database of more than 18,000 records. The study found that "cash is king." E-money's share of transactions was less than 6 percent, compared to more than 94 percent for cash. M-PESA is still primarily used to send money home, usually from urban to rural, and cash out almost always happens quickly, often the same day the remittance is received. Respondents did not appear to use M-PESA as de facto savings accounts, but the service was an important part of their coping strategies for unusual large expenses, particularly hospital bills. The study provides a Distance/Purpose Framework that segments the e-money market by the intended use (business or household) and the distance (local or long-distance) it travels. Within that framework, the study draws on concepts from economic sociology to show that Kenyans' use of M-PESA is "embedded" in preexisting social and spatial relations and that M-PESA usage patterns mimic to some degree those of cash. It also examines the length of the "e-money loop" (the number of times an e-money unit is transferred before it is cashed out) and the transaction fees M-PESA users pay in order to identify the cost and price implications of current and potential uses. The Distance/Purpose Framework suggests that e-money providers have a virtually untapped potential "sweet spot," in terms of cost and price, serving the business market segments provided that issues of trust can be overcome.



ABOUT THE PROJECT

The Financial Services Assessment project is designed to examine the impact of financial services on the lives of poor people across the developing world. This project is funded by the Bill & Melinda Gates Foundation, which is committed to building a deep base of knowledge in the microfinance field. The IRIS Center at the University of Maryland, College Park, together with its partner Microfinance Opportunities, will assess a diverse range of innovations in financial services. The results of this project will shed light on the design and delivery of appropriate financial products and services for the poor, and on the potential to scale up successful innovations to reach larger numbers of low-income households.

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REPORT SERIES

This report is part of a series that will be generated by the Financial Services Assessment project. The reports are disseminated to a broad audience including microfinance institutions and practitioners, donors, commercial and private sector. Additional copies can be downloaded at www.fsassessment.umd.edu.

ABOUT THE AUTHORS

Guy Stuart is an independent consultant and senior advisor to Microfinance Opportunities and a fellow at the Ash Center, Harvard University. He uses “bottom up” methods, such as Financial Diaries and Participatory Research, to help microfinance organizations find the best way to serve their clients. He holds a Ph.D. in political science from the University of Chicago.

Monique Cohen, Founder and President of Microfinance Opportunities, is a leading international authority on the use of financial services by the poor. She currently supervises a team which employs the innovative Financial Diaries methodology to assess financial behaviors and preferences in Kenya and Malawi. Dr. Cohen spearheaded the groundbreaking “Global Financial Education Program” which builds the financial capabilities of the poor using a range of media tools and workshops. Together with MicroSave she developed “Listening to Clients,” a visual and interactive market research microfinance training toolkit. Dr. Cohen is on multiple advisory

committees, speaks regularly at microfinance conferences around the world, and is widely published. Prior to founding Microfinance Opportunities, she led the “Assessing the Impact of Microenterprise Services” (AIMS) project at USAID.

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CONTACT MICROFINANCE OPPORTUNITIES

1701 K Street, NW
Suite 650
Washington, DC 20006 (USA)
E-mail: info@mfopps.org
Phone: +1.202.721.0050
Fax: +1.202.721.0010
Web: www.microfinanceopportunities.org

CONTACT IRIS

University of Maryland Department of Economics
3106 Morrill Hall
College Park, MD 20742 (USA)
E-mail: info@iris.umd.edu
Phone: +1.301.405.3110
Fax: +1.301.405.3020
Web: www.iris.umd.edu

*All photos taken by Guy Stuart (2009) and Eva Fowler (2011).
Original graphic illustration by Dawn Shepherd.*

In instances when the report refers to individuals, names and identifying information have been altered.





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Executive Summary

M-PESA, Kenya's breakthrough mobile phone-enabled e-money innovation, has reached massive scale since its 2007 launch. To state the facts in brief: as of this writing, over 13.5 million Kenyans, or about 70% of the adult population, have an M-PESA account. M-PESA customers are served by a nationwide network of more than 28,000 agents, who process the deposit and withdrawal of cash back and forth into "e-money." Given its stunning growth, much has already been written about M-PESA. This report's contribution to the growing and important literature is twofold. First is an analysis that draws on a unique, large set of transactional data, gathered using the Financial Diaries methodology from almost 100 respondents over eight months. The data-gathering yielded over 18,000 transactional records.

Microfinance Opportunities (MFO) analyzed this data to examine how low-income Kenyans use M-PESA and what difference it makes to their lives. The median income of the respondents in our sample was \$29 per week.¹

The report's second contribution is MFO's analytical framework for how to think about the ways M-PESA is currently working and how the service might evolve in the future. The Distance/Purpose Framework, as MFO calls it, segments the e-money market by the intended use (household or business) of an e-money transfer and the distance (local or long distance) the e-money had to travel between sender and recipient. Within that framework, we draw on concepts from economic sociology to show that low-income Kenyans' use of M-PESA (1) is "embedded" in preexisting social and spatial relations, and (2) mimics, somewhat, the ways they use cash.

We also focus on the "transactional pathways" e-money travels, the path an e-money transaction follows from the time it is cashed in to the time it is cashed out, using the concept of the *e-money loop* (Mbiti & Weil, 2011) to explain the cost implications of the different pathways. Finally, we show how embeddedness and transactional pathways vary across market segments. This framework, we believe, offers powerful insights that financial service providers, including e-money providers, can draw upon to expand and improve their services to low-income individuals and communities both in Kenya and other developing countries.

When we examine the role of M-PESA in the lives of low-income Kenyans, there is no doubt that M-PESA is of value to them, especially as a way for geographically scattered family members to send money to each other. In

addition, our data suggest that M-PESA helps people manage cash flow and risk. They can access, receive and cash out remittances in order to help pay for big-ticket items and for emergency expenses. The latter finding holds potential significance for rural health-care delivery since M-PESA transfers were the most frequent means by which people acquired sufficient money to pay for emergency hospital visits their own resources could not fully cover. (It should nevertheless be noted in this regard that existing cash flow and cash savings accumulated at home remain the most important ways that people meet both emergency expenses and unusually large non-emergency ones.)

Our data do not support the idea that people use M-PESA for savings. The average daily balance of our median respondent was about \$3.70. Our data show that almost 70% of money going into an M-PESA account leaves that account before any new money is put in, and that in 88% of those cases, the e-money is cleared out of the account on the same day it is received. Furthermore, we looked for instances where M-PESA users deposited cash onto their account and then withdrew it as cash at a later date, on the assumption that such behavior mimics how a person might use a bank account. Our data suggest that this sequence of transactions occurred, but was uncommon: 12 percent of the cash deposits that we were able to track were cashed out at a later date, rather than remitted to someone or used to buy airtime. In other words, there was some use of M-PESA as a checking (current) account or short-term savings account.

More generally, the data suggest that despite the value that M-PESA can create for its users, cash is still king. Only 5.6% of the total value of all reported transactions involved e-money transfers or expenditures; the remaining 94.4% were cash transactions. Furthermore, as noted

¹ Throughout this report, dollar figures shown are purchasing power parity (PPP) dollars calculated at a rate of 47 Kenyan shillings to 1 PPP dollar. This conversion factor was derived from the United Nations Millennium Development Goals statistics. We have only quoted amounts in the original Kenyan shilling denominations if converting them would have resulted in stylistic awkwardness (e.g., when discussing remittance amounts that rise according to multiples of 100 shillings or other even numbers).

above, when our respondents received M-PESA transactions they were likely to transform the e-money they received into cash, often on the same day. In cases where we could clearly trace the inflow of a given remittance on through to some sort of outflow, whether it was cashing out the e-money, sending it on to someone else, or paying for something with it, we found that 75 percent of the time, our respondents cashed out, almost invariably the whole amount.

This suggests that the length of the *e-money loop*, the number of times that a unit of e-money travels from one person to another before it is cashed out, is short. The length of the e-money loop has important operational implications because the physical infrastructure needed to cash out e-money is expensive. The more the e-money loop can be lengthened, the more that costs can be reduced for both the service provider (in the form of reduced infrastructure requirements) and for consumers (fewer cash-conversion transactions means fewer transaction fees).

We did find that remittances received for business purposes were slightly more likely to be on-sent, suggesting that the e-money loop might be longer when people use e-money in business contexts. But again, the point is that in the overwhelming majority of cases, e-money transfers are quickly converted to cash and returned back into the cash economy. The example of airtime purchases provides a remarkable and ironic case in point. Of the 1,386 airtime purchases reported to us by the Diaries respondents, 1,377 were in cash, *even though purchases of airtime with e-money do not incur any transaction fees*. Partly this has to do with convenience. Like people everywhere, low-income Kenyans find it efficient to combine errands, so they tend to buy airtime on scratch cards they can purchase at shops that sell groceries and other necessities for which they are bringing cash anyway. But this example

points to deeply ingrained financial habits: even for the purchase of an item that is itself virtual, people prefer to pay with cash.

Like the dominant cash economy it mimics, the e-money flows among low-income Kenyans are embedded in preexisting social and spatial relations. Eighty percent of the remittances our respondents reported took place within (extended) families or between friends. A majority of the remittances intended for household use were long-distance remittances that traveled over 20km, and a majority of them were sent from urban areas to rural areas. In other words, the data are consistent with the “send money home” marketing of M-PESA and with what others have found about M-PESA through surveys and ethnographic studies.

The flow of e-money mimics the flow of cash in other important ways. For example, e-money does not alter existing gender relations where wives depend on husbands for transfers. Just as cash does, e-money flows from husbands to wives, and hardly ever in the opposite direction. Outside of married couples, the flow of cash gifts between friends and among family members is less uni-directional (although the flow from women to men is the least likely to occur), and this is also true for e-money. Looking beyond gender relations, long-distance e-money transfers tend to have the same distribution as (very local) cash gifts, but local e-money transfers are, surprisingly, smaller than cash gifts. In the Diaries’ transactional database there is a large number of local remittances (traveling less than 20 km) for about \$10.

In short, so far from being a “disruptive” technology, M-PESA remains for now one that reinforces established practices by making them easier and cheaper to perform through existing social networks. This is not to suggest that such a state of affairs is predestined or that e-money could not well evolve in new directions.

To the contrary, MFO's Distance/Purpose Framework (described above) contains some clues about areas for potential growth.

Currently, most of the "heat" in the e-money market is in the long-distance/household market segment, the "send money home" segment. Meanwhile most of the heat in the cash economy is in the local segment, for both the business or household sub-segments. Each segment has different characteristics in terms of embeddedness and transactional pathways—differences that have important implications for the future growth of M-PESA and of e-money generally.

The dominant "send money home" e-money segment, for example, is characterized by long-distance household remittances embedded in existing networks of relations within families and between friends. There, the "e-money loop" is most likely to have a length of just one, and growth in this market segment may be inherently limited both by the size of the networks in which it is embedded (each person has a limited number of friends and family) and by dollar amount (each person also has a finite amount of spare cash he can send home).

Thus, it seems reasonable to surmise that this segment of the e-money market will continue to grow only while the customer base of the e-money market as a whole grows, but will level off once that customer base stops growing. (The literature shows that frequently the level of money sent home declines with length of time the sender is away from their home base.) Furthermore, without growth in the other segments, the short e-money loop that characterizes the dominant "send money home" segment will also remain the correspondingly dominant loop, with all the costs that implies both for the customer and for the e-money provider.

The other market segments are in their infancy. But do they have potential? In the business segments (both local and long-distance), the networks are less constrained by existing social relations because our data suggest that business transactions are more likely to take place between people who are not friends or family. In addition, business transactions may naturally lend themselves to longer e-money loops. The longer the supply chain of a given business, the longer the potential e-money loop. Finally, given the larger sums involved in long-distance business transactions, the transactions costs for cashing in, sending, and cashing out e-money by the customer are relatively low.

There is also potential for growth in the "local/household" market. This segment is the flip-side of a considerable part of the local/business segment, with the two often representing two sides of the same coin. For a vendor of household goods, for example, the sale of a broom is a business transaction. For his customer, the purchase of that same broom is a household transaction. In such a scenario, the "local/household" use of e-money is no longer defined by the limits of the individual's social network. In a real-life scenario that is becoming increasingly prevalent, Kenyan taxi drivers, who appreciate receiving fares via M-PESA rather than cash for reasons of personal security, already operate at this nexus where business, household, and e-money provider interests all converge.

All predictions and prescriptions come with caveats. In the case of the potential for growth in the long-distance/business segment, it is important to note that trust in the e-money system remains a significant issue. Viewed in light of the importance of trust, it makes sense that the "send money home" scenario was the first e-money application to take off. A son working in the capital city who sends his mother

\$100 can call her to make sure she received it (and can take her word for it if she says she did not or that she only got \$50). This ability to verify that the transactions worked enabled users to get comfortable over time with the e-money concept. The question now is whether sufficient trust has built up in the system for people to be willing to send money to someone with whom they may have weaker ties, trusting the confirmation messages the e-money system generates as sufficient verification that the intended recipient did in fact receive the funds in full.

The question of verification is not an issue in local business transactions, where people use M-PESA as a cash substitute while standing face-to-face, as in the taxi-fare example. Such a transaction mirrors what e-money users are already accustomed to; it is the same type of transaction they experience every time they cash into or out of their M-PESA account at a local agent. The only difference is that in local business dealings such as with the broom vendor or the taxi driver, they will be exchanging their e-money for a good or service rather than for cash.

Despite the familiarity of the face-to-face business transaction, our data suggest that there may be other challenges in expanding this market. The force of habit and the importance of convenience are both powerful, as illustrated by the earlier example in which almost invariably, individuals in the sample used cash to buy airtime even though they could have bought it through M-PESA at no charge. Another challenge involves the small dollar amounts typical of everyday household transactions.

Diaries respondents reported all their weekly transactions, and often aggregated small ones into groups (e.g. they reported they had purchased “groceries” without indicating whether this was one bigger purchase or

multiple smaller purchases over the course of the week). Nevertheless, half the transactions reported were less than \$4.25, meaning that, given the current fee structure of M-PESA, people or merchants would have to be willing to pay a fairly large transaction fee if they were to use M-PESA for regular household transactions.

The Distance/Purpose Framework and our focus on embeddedness and transactional pathways within that framework, highlight both important opportunities and constraints on growth. If e-money is to grow beyond the “send money home” market segment, e-money providers will have to address issues of fee structures (in the case of local, small transactions) and trust (in the case of long-distance business transactions). Financial service providers who want to use e-money services to extend their reach to low-income individuals and communities, should be aware of these challenges’ implications for their own activities. Can they become an e-money conduit through inter-account transfers? Which market segments are the most appropriate for them to tap if they do?

More significantly, what are the relationship-management implications of handling savings, loans, and other services via “high tech, low touch” e-money transactions? E-money is a powerful tool to lower the costs of handling cash and to enable long-distance remote transactions. But the latter advantage may turn to a disadvantage if face-to-face meetings with customers turn out to be an essential component of assessing creditworthiness, building customer loyalty, and cross-selling. For all of e-money’s significant operational advantages, its optimal role within a financial service provider’s business model is fundamentally a strategic, not just an operational, consideration.



Introduction

In the field of financial services for low-income individuals, few innovations have generated as much hope and excitement as M-PESA, a partnership between two telecommunications companies, Vodafone and Safaricom. Launched in 2007, M-PESA (“pesa” is Swahili for “money”) has quickly reached massive scale. The outreach statistics alone tell a remarkable story.

At the mid-2011 time of writing, over 13.5 million Kenyans, or about 70 percent of the adult population, had an M-PESA account, served by a nationwide network of more than 28,000 agents who process the deposit and withdrawal of cash back and forth into “e-money.”

The growth and scale of M-PESA have attracted considerable attention from stakeholders—including policymakers, researchers, donors, investors, financial service providers, and telecommunications companies—who are all interested in leveraging mobile phone technology to expand financial services among low-income communities, especially rural ones.

This report seeks to provide an understanding of how low-income Kenyans use M-PESA. It goes to the heart of the question of how people transact money and how this knowledge can inform market expansion and product development. It provides data on the timing of the inflows and outflows of both cash and e-money into and out of low-income individuals’ M-PESA accounts. We analyze

these flows in the context of M-PESA users’ other economic transactions, including their business income and expenditures, their wage earnings, their household expenditures, and all the financial transactions they engage in with family, friends, associates, and financial institutions, both formal and informal.

This understanding of how low-income Kenyans use M-PESA can help answer many of the important policy and practical questions with which so many stakeholders are concerned. We focus on three of these questions in depth:

- What is the value of M-PESA to low-income individuals?
- Where is the future growth of M-PESA likely to occur?
- Can M-PESA serve as a platform through which other financial services, beyond remittances, can be supplied? Is it already being used, ad hoc, as a savings account?

This report lays out a framework we believe can help stakeholders in the e-money and financial services fields understand how low-income Kenyans are using M-PESA. It is only by understanding current use that we can discern the value that M-PESA provides to its customers, and thus have a meaningful basis from which to speculate how M-PESA might evolve in the future in ways that add value.

WHY M-PESA? WHY KENYA?

- The most necessary precondition, mobile phone penetration, has been dramatic in Kenya. Only 1 percent of Kenyans have a landline, but 70 percent have a cell phone.
- The high percentage of geographically scattered families facilitated demand for an affordable means to move money.
- One dominant mobile operator (Safaricom) with fully 80 percent market share.
- Reasonably extensive bank branch infrastructure (relative to other developing countries) to support agent liquidity management.
- Central bank regulators who took the objective of financial inclusion to heart.

Source: Expanding Customers’ Financial Options through Mobile Payment Systems: The Case of Kenya (Conference paper from Global Savings Forum 2010, Bill & Melinda Gates Foundation).

At the heart of the framework is the evidence that M-PESA operates within a structured set of social relations. It is within these structures that people make choices about how they use their M-PESA accounts, including how they handle M-PESA remittances.² Our data suggest the following conclusions:

Cash is still king. Though M-PESA's scale is impressive, it has a long way to go before it challenges the role of cash in the economic lives of low-income Kenyans.

One form of M-PESA use still dominates. M-PESA is still primarily used to "send money home." People are most likely to send and receive remittances to and from family and friends across long distances, with the flow most likely to be from urban to towns and from town to countryside.

Cash in, cash out happens quickly. People tend not to leave much balance in their M-PESA accounts or to leave it there for long. So although M-PESA is an effective tool for moving money from point A to point B while minimizing risk of theft, its uptake as a de facto savings tool has to date been limited.

M-PESA is expanding beyond the "send money home" market. This evolution, albeit in the embryonic stages, has the potential to grow the overall use of e-money in the economy and to lower the costs of managing the system as a whole, thereby, in a virtuous cycle, expanding usage even more.

In particular, we see the increasing use of M-PESA for business purposes both locally and across long distances as a way for microentrepreneurs to significantly improve the efficiency of their operations. But such adaptations are likely to confront challenges, primarily around issues of trust (and lack

²This framework is informed by theories in economic sociology regarding the role of interpersonal networks, institutionalized practices, and spatial relations in structuring market activities (see Stuart 2003, pp. 13 – 18). But it also reflects what our Kenyan respondents told us in weekly, Financial Diaries surveys.

thereof) as well as the powerful force of habit, which we elaborate in a later section of this report.

The report draws on data from a Financial Diaries study conducted from November 2009 to July 2010 at three research sites:

- Kibera, the large informal settlement on the southwest side of Nairobi.
- Kitui, a provincial town, and its surrounding villages in a dry area of the Eastern Province about 130 km east of Nairobi.
- Murang'a, another provincial town, and its surrounding villages in a more lush part of the Central Province nearer Mount Kenya and 75 km northeast of Nairobi.

The final Diaries database included 92 respondents. Their records yielded a database containing over 18,000 transactions, of which about 1,200 are related to remittance activity, most involving M-PESA in some way (a cash deposit or withdrawal, a remittance, a purchase of airtime).

M-PESA use as a savings tool has to date been limited. People tend not to leave much balance in their M-PESA accounts or to leave it there for long.

The Diaries' transactional data provide powerful insights into the economic lives of our respondents. The data are organized sequentially, allowing us to analyze how one type of transaction follows another. For example, we can look at whether an e-money remittance received by a respondent is followed by a cash withdrawal (the answer is usually that it is) and then what the respondent did with that cash.

LONG-DISTANCE HOUSEHOLD RECEIVER

Lucy, who lives in a small village seven kilometers from Murang'a, raises dairy cattle and cash crops (e.g., maize, beans, and bananas). She is active in a merry-go-round fund to which she contributes about \$6.30 every week. Lucy also joined a SACCO (Savings and Credit Cooperative) because the broker to whom she sells her cows' milk pays her by direct deposit into her SACCO account.

She bought her first phone in 2007 and used it to communicate with her husband, who works in Nairobi, and her two sons, who live in Murang'a and Naharuru, respectively. She signed up for M-PESA in 2009, just before the start of the Financial Diaries project, and during the course of the study, she received a remittance about once a week (median amount roughly \$30) almost always from her husband.

In almost every case, Lucy cashed out her M-PESA remittances on the same day she received them. One notable exception involved an unusually large sum (\$245) she received from a friend in Murang'a. She withdrew a portion of this sum in cash but also sent some on to her father in Nairobi and left the balance on her M-PESA account.

Lucy primarily uses her M-PESA remittances for regular household expenses, but occasionally they are applied towards business investments as well. For example, she uses some of the money her husband sends to buy building materials for a business they plan to launch at the local market where they own a plot of land. She also uses the less frequent remittances she receives from her son to help fund larger expenses such as the purchase of a cow for her dairy operation.

The data also contain information on the other party to the e-money or cash transaction, and information on the location where cash transactions took place (or in the case of an e-money transfer, the locations since in those instances the two parties were not likely to be in the same place).

In what follows, we start with a more detailed description of the research sites, sampling procedure, and methodology. We then present evidence from the Diaries in three sections that also build the framework discussed above for understanding how M-PESA is used. The first of these sections will describe the Distance/Purpose Framework, a simple matrix that is the foundation for the discussion. The data in this section will show the distribution of cash and e-money transactions by their intended purpose (household or business), and by the distances

involved (either the distance the people carrying cash traveled in order to complete those transactions or the distances the e-money traveled digitally).

The next section discusses how the use of e-money is “embedded” within preexisting social networks and how it mimics the ways our sample of respondents use cash. We go on to explain the ways this embeddedness varies from one quadrant to another within the Distance/Purpose Framework.

In the final framework-building section, we analyze the “transactional pathways” that M-PESA users follow. We pay particular attention to how those transactions affect the length of the “e-money loop” (that is, the number of times an e-money unit is used before it is cashed out [Mbiti & Weil, 2011]), and the transaction costs M-PESA users incur.

In essence, as we will see, understanding the transactional pathways that users follow can help us understand the supply-side costs of serving those users and the demand-side willingness to pay transaction fees at each juncture in the pathway. We will also examine how these transactional pathways vary from quadrant to quadrant within the Distance/Purpose Framework, as we did with embeddedness.

In the penultimate section, we look at the value customers derive from M-PESA by looking at how people manage cash flow and risk, and how they accumulate liquid assets. We end with a section on the implications of our findings for the industry. It includes suggestions for how both financial service providers and telcos can analyze their own data to test our conclusions and use them to improve customer service.



Methodology, Research Sites and Sample

Financial Diaries is a data-gathering methodology. There are two key dimensions to the Diaries methodology:

- *It gathers data on economic transactions performed by individuals; and*
- *It gathers these data on more than one occasion in high-frequency sequences of surveys—in our case every week over a series of many months.*

METHODOLOGY

The Diaries survey asks questions that are intuitive and simple. The survey captures all transactions where cash flowed out of the hands of the respondent and all transactions where cash flowed into the hands of the respondent (see text box). It also captures transactions not involving cash, including the barter exchange of goods and services and the giving and receiving of non-cash gifts. The need to capture information on e-money transactions complicated our data-gathering a little. We adapted our survey instrument because e-money flows do not cause cash to flow into or out of the hands of an individual, but rather cause e-money to flow into or out of their e-money account. So we asked about these flows separately, and also about transactions that converted e-money into cash, or cash into e-money.

The survey asks about more than just the nature of the transaction and the amount

involved. We ask for a description of the other person involved in the exchange, their gender, their relationship if any to the respondent, and where the transaction took place. We also ask the respondents to identify the purpose of the transaction, limiting their choices to the purpose being: for business; for household (which includes for personal purposes); or for mixed business and household. In essence, we try to capture the “Who? What? Why? Where? When?” on both sides of the transaction, with the exception of the “Why?” (purpose) for the other party to the exchange. Note that in the case of cash transactions, the two parties to the exchange are in the same place, but in the case of e-money flows, they can be far apart. As a result, when asking about e-money transactions, we ask the location of the other party to the exchange.

Transactions Covered by Survey Instrument

- Purchases of goods and services.
- Sales of goods and services.
- Income from employment.
- Cash gifts given and received.
- E-money remittances sent or received.
- Money deposited into any sort of account including informal accounts such as deposit collectors or rotating savings and credit associations.
- Money withdrawn from any sort of account.
- Money borrowed.
- Money lent.
- Loan repayments made or received.
- Insurance premium payments.
- Insurance pay-outs.
- Winnings from gambling/lottery.
- Barter exchanges, including the exchange of labor for goods/services.
- Non-cash gifts given and received.
- Intra-household cash transfers.

FIGURE A
MAP OF KENYA, SHOWING RESEARCH SITES



FIGURE B
MAP OF KIBERA NEIGHBORHOODS

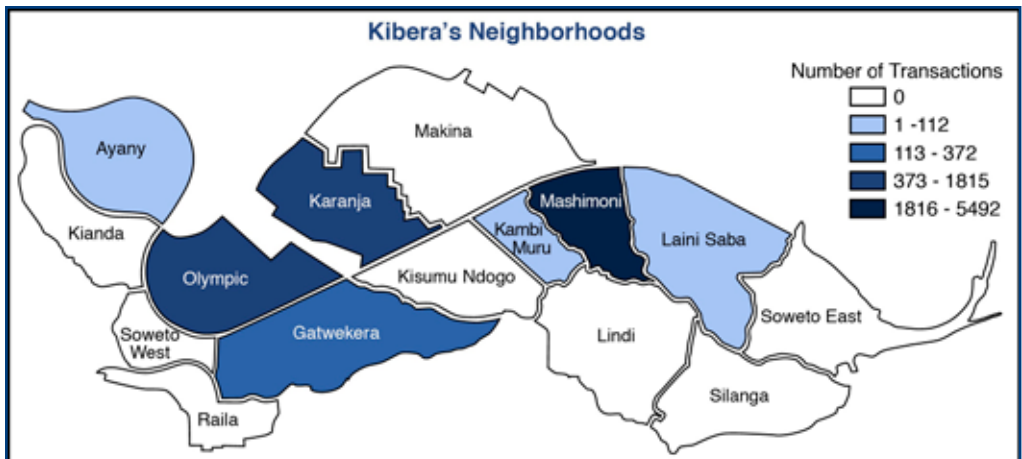


TABLE 1
FINANCIAL SERVICE PROVIDERS IN KENYA

Provider	Branches	ATMs	Combined
Banks (as of 12/2009)	996	1,717	2,713
Kenya Postbank	89	25	114
Deposit-taking MFIs (as of 12/2010)	47	0	47
PESA Point ATMs	0	110	110
SACCOs (as of 2010)	3,466	0	3,466
Total	4,598	1,852	6,450
M-PESA Agents (March 2010)	17,652	660	18,312
M-PESA Agents (Dec. 2010)	23,397	660	24,057

TABLE 2
FINANCIAL SERVICE PROVIDERS WITHIN RESEARCH SITES

	Banks	Deposit-taking Microfinance	Postal Savings Bank	M-PESA Agent
Kibera	0	1	0	158
Kitui	7	3	1	58
Murang'a	8	1	1	39

LOCATION OF RESEARCH SITES

As noted above, the research sites selected for our study were Kibera (specifically its neighborhoods of Mashimoni and Olympic), the town of Kitui and its surrounding villages, and the town of Murang'a and its surrounding villages (Figure A). Kibera is an informal settlement approximately four kilometers to the southwest of downtown Nairobi. It is composed of a number of distinct neighborhoods, as defined by the MapKibera Project, and which our respondents also identified as places where they conducted many of their transactions (Figure B).

Murang'a is about 70km northeast of Nairobi in the lush, northern part of the district of Murang'a in the Central Province, while Kitui is approximately 130km east of Nairobi in a drier part of the district of the same name in the Eastern Province (Figure A).

The population of Kibera has been the subject of considerable debate since the 2009 census put the number of residents of the area at 170,070 (Karanja, 2010).

Official neighborhood-level data on the populations of Olympic and Mashimoni are not available. Data from the most recent census for the populations of Kitui and Murang'a are also not available, but we estimate them to be roughly 26,000 and 30,000 respectively.³

In 2010 there were 1,132 deposit-taking financial institution branches and 1,852 automated teller machines (ATMs) in Kenya, for a total of 2,984 financial institution service outlets. All the financial institutions offered savings, credit and account transfer services (Table 1). In addition, there were 3,466 SACCOs (Savings and Credit Cooperative Societies) ranging in size from large urban societies of professionals to small rural societies (Gakunu, 2011)⁴, but only 20 of these were licensed under the new regulations governing such societies (SASRA, 2011).

The combined number of financial institution branches and ATMs, however, was dwarfed by the number of M-PESA agents, which had reached 17,652 in March 2010 and grew to 23,397 by December of the same year. These agents offer a limited number of financial services, their primary purpose being to act as the go-betweens who convert cash into

³ In 1999 their populations were 13,000 and 11,000 respectively. Since then the districts of which they are the capitals have grown by two times in the case of Kitui and 2.7 times in the case Murang'a. If the towns grew at the same pace as their districts, then Kitui's population would be about 26,000 and Murang'a's would be about 30,000.

⁴ http://www.sasra.go.ke/index.php?option=com_content&view=article&id=83:chairman&catid=44:press&Itemid=108

e-money and back again. M-PESA agents may also offer other services and goods for sale, which vary considerably from groceries to electronic goods.

The financial landscapes in both Kitui and Murang'a are a microcosm of the national landscape (Table 2). Both towns have several commercial banks (seven and eight respectively) as well as deposit-taking microfinance institutions (three and one, respectively); and each has a branch of Kenya Postbank. Kitui has one licensed SACCO, the Kitui Teachers SACCO Society. They both have a large number of M-PESA agents—58 and 39 respectively.

Kibera is slightly different. There is no commercial bank in Kibera itself (though there is an Equity Bank branch on the edge of the settlement, just over one kilometer from the geographic center). There is no Postbank, but there is one deposit-taking microfinance institution (MFI) and 158 M-PESA agents who identify their locations as Kibera.

SAMPLE OVERVIEW

To understand the way low-income individuals use M-PESA, we endeavored to study a variety of individuals employing the service, as well as comparable individuals not using it. The goal was to put together a sample of approximately 80 households (oversampled initially by about 20 percent to offset any drop-outs) divided evenly between clients and non-clients. The sample's geographic distribution was to be roughly half in Kibera, one quarter in Murang'a, and one quarter in Kitui.

SAMPLE SELECTION

To build our sample, we worked through mobile-banking shops and agents who had been identified by MFO's research partners at the University of Maryland's IRIS Center (IRIS). By way of context, the Financial

Diaries study belongs to a larger project known as the Financial Services Assessment (FSA), which was funded by the Bill & Melinda Gates Foundation (the foundation) to assess the impact of innovations in microfinance by the foundation's grantees. MFO and IRIS implemented this assessment project over the course of the five-year period ended July 2011. The division of labor was largely IRIS on the quantitative research and MFO on the qualitative side, though our Diaries research spans both realms. (See Annex A for a list of past studies in the FSA series from locations including Malawi, Pakistan, and Peru.)

The financial landscapes of Kitui and Murang'a are a microcosm of the national landscape.

From among the IRIS participants in Kenya, MFO's research team selected certain M-PESA shops and associated agents based on two criteria:

Geographic diversity. We chose a range of M-PESA shops whose locations covered all the target areas of the study. In Murang'a and Kitui, the selection included agents based both in the provincial towns and in the smaller trading centers in the surrounding countryside;

Willingness to participate. Although these agents had signed on to the IRIS study, they were under no obligation to assist MFO.

Once our field team secured permission from a range of agents meeting these criteria, we began a two-tiered recruitment process for clients who conducted business at those shops.

The first half of the client sample was selected at random. We approached every third client visiting the shop, introduced ourselves and the project, and asked whether the clients would be amenable to a home visit by one of our team members. Those who agreed received the visit and a more detailed presentation on the project, followed by the execution of a consent form for those who agreed to join.

The second half of the client sample was selected purposively in collaboration with the agents. We asked the agents to help us identify “heavy users” of M-PESA, or those clients who visited the shop and used the services most often. (We did not impose a universal definition of “heavy user;” we simply asked the agents to direct us to their most frequently-seen clients.) In some cases, the “heavy users” were identified as they visited the shop. In other cases, the agents helped arrange introductions at the clients’ homes or places of business. The same consent protocol used with the randomly selected cohort was followed for those “heavy users” who agreed to join.

From there, another level of purposive sampling was applied to the recruitment. Due to the demands of the interview schedule, and that fact that the project budget could not accommodate a vehicle for each field worker, some degree of geographic clustering was a necessity (as it has been in all of MFO’s Financial Diaries projects). Fieldworkers needed to be able to reach all participants on a reasonable weekly route, as opposed to the arbitrary spread of a random sample, in which each participant might be many kilometers away from the next. To achieve this, we employed the “snowball sampling” technique, whereby we identified a participant and then followed word-of-mouth leads to find other suitable M-PESA users in the same area.

To recruit the comparison group (i.e. non-users of M-PESA), we employed the “peer referral” technique. This entailed first recruiting a client using one of the above methods, and then asking that client if he or she could introduce us to someone who lived in the area and did not use mobile-banking services, but otherwise matched the client on key demographic variables (in other words, someone “like them” except a non-user of M-PESA). The demographic requirement was initially that the comparison participant should match the client participant on at least three of the following four demographic variables: age (plus or minus five years), family structure (single, single with children, married, married with children), profession, and level of food security.⁵

ADJUSTMENT/FINALIZATION OF THE SAMPLE

MFO approaches all of our Financial Diaries research with a pragmatic eye. This often means making adjustments to the original sampling plan. This Kenya study was no exception in that regard, and two significant adjustments should be noted.

First, we added filters on an as-needed basis to achieve an adequate and reasonable distribution of the major observable variables in the study. For example, if the sample taking shape began to tip too much toward one gender, or toward a particular livelihood, we instructed field workers to focus on recruiting outside the dominant area.

Second, we adjusted the recruitment to overcome a particular complication that we had not foreseen in the original planning. The “peer referral” technique to recruit the comparison group proved impractical for a specific and rather interesting reason: M-PESA use is so widespread in Kenya that

⁵We were advised by our Kenyan consultants that food security is an observable variable among Kenyans, and that it would function well as proxy for relative poverty level.

non-users tend to be demographic outliers almost by definition. That meant that it was very difficult, nearly impossible in some cases, to recruit non-users who matched up demographically with our M-PESA users. We had unknowingly exacerbated this problem by including the requirement that a non-user individual had to be part of a household in which no one used M-PESA (the idea being that the use of M-PESA within the household could impact all members of that household).

In the end, we recruited the non-users in two groups, using the following revised criteria:

- 20-25 non-users of M-PESA based on matches to the age and family structure criteria, with matches on the other two criteria as optional.
- 20-25 non-users of M-PESA matched on all four criteria, but free of the requirement that the whole household had to be non-users of the service.

This strategy was successful, and we began the study with respondents in just over 100 households total, spread appropriately across the three geographic areas, and divided evenly between clients and non-clients.

FINAL SAMPLE DESCRIPTION

After data cleaning, we ended with a sample of 92 respondents. During the study, we encountered problems in recruiting all members of a household where there was more than one economically active adult. As a result, we use the individual rather than the household as the unit of analysis.

The final sample included 53 M-PESA users (58%) and 39 non-users (42%), where a user is defined as someone who conducted any sort of transaction using M-PESA during the course of our study. This breakdown roughly

TABLE 3
SAMPLE DEMOGRAPHICS

a	Area	Women	Men	Total
	Kibera	30	20	50
	Kitui	11	11	22
	Muranga	12	8	20
	Total	53	39	92
b	M-PESA Use	Women	Men	Total
	Used	30	23	53
	Did not Use	23	16	39
	Total	53	39	92
c	HHStat	Women	Men	Total
	Married	34	26	60
	Single	19	13	32
	Total	53	39	92

reflects the breakdown in the country between those with an M-PESA account and those without one.⁶ The sample included 42% men and 58% women (Table 3).

The over-representation of women may be due in part to a self-selection into the study by women, but in a sample this size over a study period of eight months, some deviation from a 50:50 distribution is to be expected. The over-representation of women in the sample as a whole translates into their over-representation in the sub-sample of M-PESA users (Table 3), with women making up 57% of M-PESA users. Finally, the sample includes both single (including those widowed and divorced) and married individuals, with the latter constituting 65% of the sample.

The median respondent household consisted of four people. The median of average weekly income was about \$29 (see prior notation about conversion of Kenya shillings to international dollars) when we include only earned income and exclude cash gifts received from friends or family.⁷

⁶ With 13.5 million subscribers M-Pesa has about 70% of the adult population of Kenya as customers.

⁷ Calculating income in Kenya is complicated in many ways by the prevalence of e-money, including how to count non-business remittances that might, nevertheless, be a regular part of the money a person relies on to survive. For the sake of consistency, we have excluded all cash gifts, whether given directly or through remittances, from our income calculations (a departure from our practice in Malawi where e-money was not an issue). But the income calculations do include net e-money business income, which is the difference between remittances received for business purposes minus the income sent for business purposes.

If we assume that the median four-person household contains two adults earning roughly the median income of our respondents, then the median per capita income of our respondents is \$14.50 per week, or just over \$2 per day. This is well below the average per capita daily income of \$4.40 (CIA World Factbook, 2011) for the population of Kenya as a whole, but about the national median, which falls roughly at the poverty line of \$9 per week for rural areas and \$17.60 per week for urban areas.⁸ M-PESA users in our sample were better off than non-users, with the former having a median weekly income of \$38 and the latter having a median weekly income of \$23.

A user is defined as someone who conducted any sort of transaction using M-PESA during the course of our study.

Our sample was split fairly evenly between wage or salary workers, on the one hand, and microentrepreneurs, on the other (Table 4). We had a handful of respondents whose activities were predominantly farming, but in the rural areas, even those who earned most of their income through their microenterprise activities also did some farming.

A widely held premise is that the younger segments of the population will be early adopters of cell phones. The proposition has been put forward that this segment will also be early and perhaps primary users of cell phone banking. Our data do not support this

⁸ 46.6% of the population in Kenya lives below the poverty line (CIA World Factbook, 2011). According to Republic of Kenya (2007) the poverty line is derived from Kenya Integrated Household Budget Survey (KIHBS) data using the Cost-of-Basic Needs (CBN) method yielding overall poverty lines of KES 1,562 and KES 2,913 for rural and urban areas, respectively. We converted these Kenyan shilling figures into 2007 PPP dollars using an exchange rate of \$1:KES 38.672, and we have assumed that the PPP dollar in 2007 was worth roughly the same as it was worth in 2010. A closer analysis of our urban and rural respondents suggest that our urban respondents are more likely to be below the urban poverty line than our rural respondents, many of whom live in the provincial towns of Murang'a and Kitui.

TABLE 4
RESPONDENTS' LIVELIHOODS

Livelihood	Kibera	Kitui	Muranga	Total
Farmer	0	2	3	5
Microentrepreneur	22	13	10	45
Wage/salaried	27	6	5	38
Other	1	1	2	4

assertion. The median age of our respondents was 30 (average was 31.7), the oldest respondent was 66 and the youngest was 19. There was very little difference in the ages of M-PESA users and those who did not use M-PESA during the course of our study. One explanation may be that younger segments of the population have introduced the M-PESA technology to older users in their networks—such as a young man who sends remittances home to his parents.

Finally, because we targeted low-income households our sample's access to financial services was slightly different from the national pattern captured by, for example, the FinAccess survey in 2009. (See Figures C and D for comparison.) That survey showed that 32.7 percent of respondents lacked access to any sort of financial service other than friends and family. In our sample, we looked to see whether a respondent had used any of the financial services listed in the FinAccess survey:

- Formal entities such as a commercial bank, postbank, or insurance provider.
- “Formal other” service providers such as non-bank financial institutions like SACCOs (savings and credit cooperatives) and microfinance institutions.
- Informal service providers such as merry-go-rounds or *chama* funds.

We found that 46 percent of our respondents did not access any form of financial service during the period of the study, higher than the national average, but, given the target population, not

FIGURE C
DIARIES: ACCESS TO FINANCIAL SERVICES

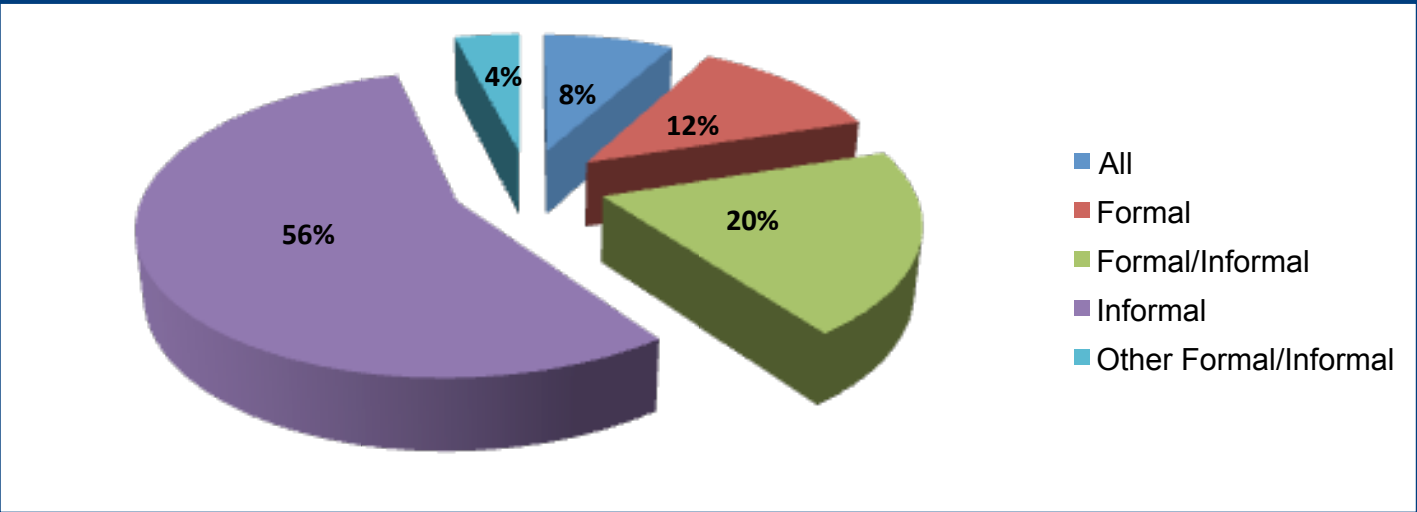
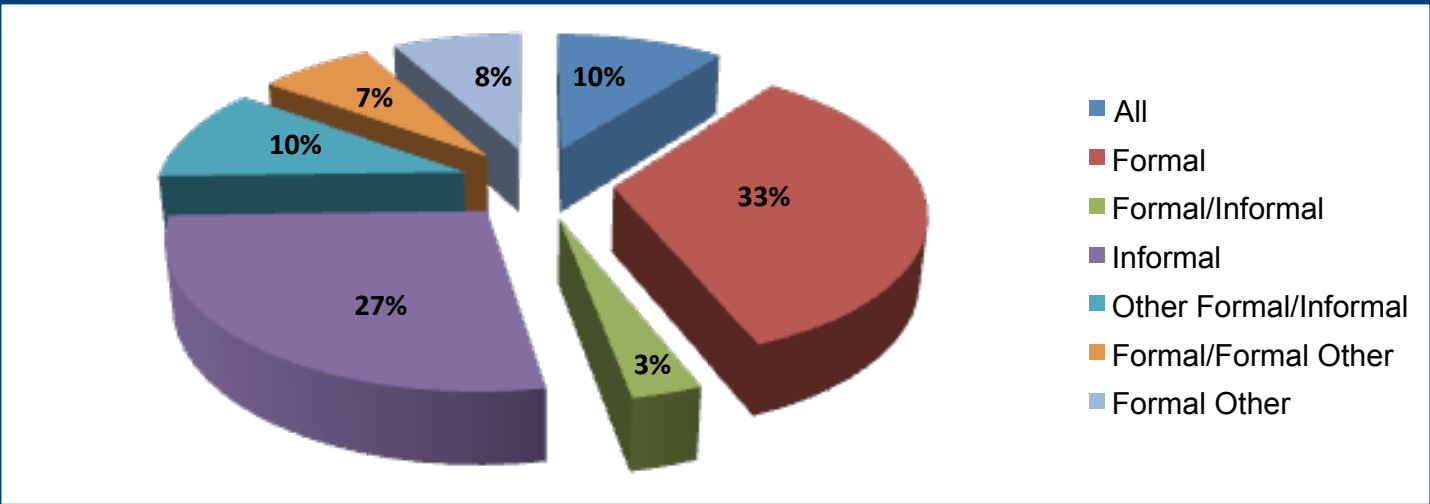


FIGURE D
FINACCESS: ACCESS TO FINANCIAL SERVICES



surprising. Among those who did use a financial service we found that a majority (56 percent) used only informal services. Another quarter (24 percent) used a combination of informal services and some type of formal service. In the FinAccess survey, about a quarter (26.8 percent) of those who had access to a financial service only used an informal service, and 20 percent used a formal/informal combination. Finally, in our survey only 12 percent of those with access to financial services used just formal services, whereas in the FinAccess survey 32.7 percent did so. Again, these discrepancies make sense given the different population that our Diaries targeted. It especially makes sense given that in one of

This report provides a quantitative analysis of the Diaries data interspersed with profiles of individuals whose transactions patterns provide a specific illustration of the general picture we draw.

our research sites, Kibera, the nearest bank branch was over a kilometer from where our respondents lived or worked.

A NOTE ON THE PROFILES DATA

This report provides a quantitative analysis of the Diaries data, but we have interspersed this with profiles of individuals whose transactions patterns provide a specific illustration of the general picture we draw. To generate these data we conducted in-depth interviews with 35 low-income individuals in Kenya and combined those with a second round of Financial Diaries data gathered from the same respondents. The respondents are residents of Kibera and of Murang'a, and are, for the most

LONG-DISTANCE HOUSEHOLD SENDER

Joseph works as a night security guard at a hotel in Nairobi. He wishes he had a bicycle to get to his job, a two and one-half hour walk each way from the single room he rents by the railroad tracks, but instead "I am footing everywhere."

He started using M-PESA in 2007 because he heard about it from a fellow security guard. He saw that it was a useful way to send money to his wife in their hometown about 136 kilometers away. Originally she borrowed a phone to receive the funds Joseph sent home. But in 2008 (a year after he had bought his own phone), Joseph said he managed to buy his wife her own phone after considerable struggle.

There was a fairly regular pattern to Joseph's M-PESA transactions during the Financial Diaries study. When he got paid (\$95 per month), he sent about a third or a half of the money to his wife. He reported that she uses the money to meet her and their four children's needs – for clothes, school fees, consumption and farm inputs. Towards the end of the study, he also reported paying his monthly \$21 rent via M-PESA. He said that he does not have any trouble using the service because there are M-PESA agents everywhere.

Although he did not receive any remittances, Joseph did report that the hotel once sent him his salary via M-PESA when payday fell on a date when Joseph was home visiting family. He also reported that his economic circumstances make saving money "very tough."

part, people we also interviewed for the main Diaries on which the quantitative analysis in this report is based.

We omitted Kitui for logistical reasons. We had a limited budget for this second phase of data-gathering, which required us to focus on either Kitui or Murang'a. We felt we could get better results in Murang'a because we had good field workers still in place there.

The interviews took place in January and early February 2011, and the second phase of

Diaries data collection ran from late October 2010 to mid-March 2011, resulting in 20 weeks of data for 80% of respondents. This second phase of data-gathering focused on whether M-PESA was being used for savings, and the role being played by the then-new M-KESHO service provided by Equity Bank and Safaricom. M-KESHO allows users to move money electronically from their M-PESA accounts into an account at the bank, their M-KESHO account. As a result, we deliberately sampled heavy users of M-PESA,

and those who might be saving in their M-PESA account, using the results of the first round of Financial Diaries to help us identify such respondents. We also targeted users of M-KESHO. Despite the second phase's focus on savings, the interviews generated very valuable, detailed data on the overall use of M-PESA that we draw on in our profiles. More information on the savings patterns we uncovered can be found in Ferguson and Stuart (2011).



M-PESA's Market Segments – Distance and Purpose

M-PESA is an e-money innovation. It uses a simple and highly scalable technology to enable Kenyans to transmit money to each other digitally through text messages. E-money has several distinct advantages over cash: distance, security, speed and tracking.

- Distance—It is easy to move across distances, including the classic “city to countryside” scenario.⁹
- Security—It can be secured more cheaply than cash over long distances.
- Speed—It moves money instantaneously across distances that would take days for the postal service or a courier.
- Tracking—It automatically generates a record of its own use.¹⁰

The mobile phone platform (unlike, for example, a card used for e-money transactions) provides the added benefit of letting people move money via the same mobile phone they already use on a regular basis. The functionality of M-PESA suggests that the attraction of the service is the ability to transact from anywhere and to move money across distances, without having to physically carry cash. Thus, in our framework for understanding how Kenyans use M-PESA it makes sense to analyze the data by distance.

The functionality of M-PESA also suggests that Kenyans might use M-PESA as substitute for cash, because it is more secure than cash and its use generates a tracking record that might be useful for someone who is running a business or simply trying to keep to a budget. In our sample, the median amount of cash that a

⁹ Through a combination of satellite-enabled technology and on-the-ground field work, this study was able to calculate both the distance through space across which every remittance traveled and the distance on the ground that a person traveled to conduct a cash transaction. In every Diaries study, MFO asks the respondent to report the location where the transaction they report took place. In the case of remittances, we also asked for the location of the sender/recipient of the remittance. Through the use of data from the US National Geo-Spatial Agency, Google Earth, and the local knowledge of our field workers, we were able to geo-code (assign latitude and longitude positions to) almost all the locations reported to us in the Diaries. We verified these geo-coded locations using satellite imagery from Google Earth to confirm that a place really exists where the latitude and longitude coordinates placed it. The nature of geo-coding means that we are able to locate the position where a transaction took place fairly accurately so long as the place names supplied by the respondent describe a small area. Fortunately many of our respondents did just that, including supplying the neighborhood name of the places where they conducted transactions in Kibera. We were able to use data from Map Kibera to identify the locations of those neighborhoods. Finally, our field workers took the latitude and longitude coordinates of the respondents at the place where they interviewed them (once during the whole study period), which was a place that was highly convenient to the respondent. As a result, for cash transactions we are able to calculate the distance that a person traveled from where they usually are during the day (work or home most likely) to conduct a transaction. In the case of remittances, as noted, we were able to calculate the distance over which the remittance traveled.

¹⁰ E-money can operate on numerous platforms: card-based (e.g., smart cards and debit and credit cards); internet-based (e.g., PayPal); bank platforms (e.g., wire transfers); and mobile phones. These platforms are not mutually exclusive: credit card purchases can be made over the internet, and the chip that makes a card “smart” can sit as easily on a mobile phone as it can on a card. A web-enabled mobile phone that allows a person to manage his bank account, make small payments via a third-party entity such as PayPal, use a credit card, and directly pay for services (e.g., a ride on a bus with a smart chip-enabled fare collection kiosk) would combine all the platforms.

respondent handled *per week* was \$90, which is more than many middle-class people handle in the increasingly cashless societies of developed countries.

One might expect then that Kenyans would start to use M-PESA as a substitute for cash. We will address this issue more in a subsequent section, but for now we want to highlight a particular aspect of the amount of cash handled by our respondents as a way to better understand the use of M-PESA.

The Diaries asked respondents to identify whether a reported transaction was for business or household purposes. The former are transactions related to the work people do to earn an income, whether it is the receipt of a wage or salary, payment for a service performed (e.g. wage paid out to a helper), or the purchase and sale of goods. Household transactions, as the name implies, are those transactions related to the functioning of the respondent’s household, such as the purchase of food or payment of rent or utilities.

For people who earn a wage or salary, the split between “business” and “household” is likely to be roughly 50:50. Half the money—the half they earn—comes from business. The other half—the half they spend—goes to household, assuming that most of what they earn does get spent and that household consumption is where it goes since, as employees rather than entrepreneurs, they do not “have to spend it to make it.”

This 50:50 split is unlikely to be exact, of course. Savings, whether in the mattress or in an institution of some sort, mean that not all the money does get spent, and the receipt of cash gifts or loans means that not all money spent on household consumption was earned (i.e. was “business”). Note also that salary- and wage-earners typically spend money daily or weekly while earning it weekly, biweekly, or monthly depending on how often they get paid.

For microentrepreneurs, the story is different. They not only earn money through business transactions, and do so on a daily basis, but they also spend money through business transactions to pay for inventory and other business expenses. Our median Diaries microentrepreneur reported handling \$1.50 for every dollar earned.¹¹

Given these characteristics of our sample's cash flow (which are consistent with MFO's findings from our Malawi Diaries study [Stuart et al, 2010] and those of other researchers [e.g. Collins et al, 2009]), we also looked at the Diaries data in terms of the purpose of the transactions involved. When combined, the purpose and distance data for both cash and e-money¹² transactions, suggest that:

- Cash is still “king” for both household and business transactions.
- 96 percent of all transactions by count performed by our sample were in cash (94.4% by value of transactions).
- The use of cash is highly localized.
- 99 percent of all cash transactions by count performed by our sample were performed within 20 km of where they live or work (92.5% by value).
- 83 percent of all cash transactions by count

¹¹ This is likely an underestimate because some of our microentrepreneur respondents refused to provide us with both business income and expenses, preferring to report just net business income, despite our pushing them, over many months, to provide us with more detail.

¹² This discussion includes only M-PESA under e-money. The MFO data contained Zap transactions which were statistically insignificant and one very large Western Union transaction which was distortive.

M-PESA AT A GLANCE

- For-profit venture between Vodafone and Safaricom, with initial support from the United Kingdom's Department for International Development (DFID).
- Processes more transactions domestically than Western Union does globally.
- A total of \$415 million (US) is transacted in person-to-person transfers, equal to 17 percent of Kenya's 2009 GDP on an annualized basis.
- According to one survey, 90 percent of users believed their money was safe with M-PESA.
- 90 percent said they were “happy,” “very happy,” or “extremely happy” with the service.
- 92 percent said they would be “worse off” without M-PESA.
- Customer perceptions are steadily improving: the percentage who trust their agent rose from 65 percent in August 2008 to 95 percent by December 2009 even as the number of agents quadrupled during the same time period.
- M-PESA has stayed poor-focused. The share of poor households who are registered M-PESA users went from 28 percent in 2008 to 51 percent in 2009 (with “poor” being defined as the bottom half of Kenyans who earn on average about PPP \$2 per capita per day). Similarly, the percent of rural households using M-PESA grew from 29 percent to 59 percent, and the percent of unbanked using M-PESA went from 25 percent to 50 percent.

Sources: Expanding Customers' Financial Options through Mobile Payment Systems: The Case of Kenya and How Mobile Money has Changed Lives in Kenya. Conference papers from Global Savings Forum 2010, Bill & Melinda Gates Foundation. Customer satisfaction figures are taken from Tavneet Suri and William Jack, The Economics of M-PESA: An Update (October 2010) as quoted from the same conference papers.

performed by our sample were performed within 1 km of where they live or work (71 percent by value).

- Business transactions dominate household transactions by value.
- 61 percent of cash transactions were for business measured in terms of the amount of money exchanged (we cannot give an accurate count of business transactions because respondents aggregated business sales each week).

In contrast:

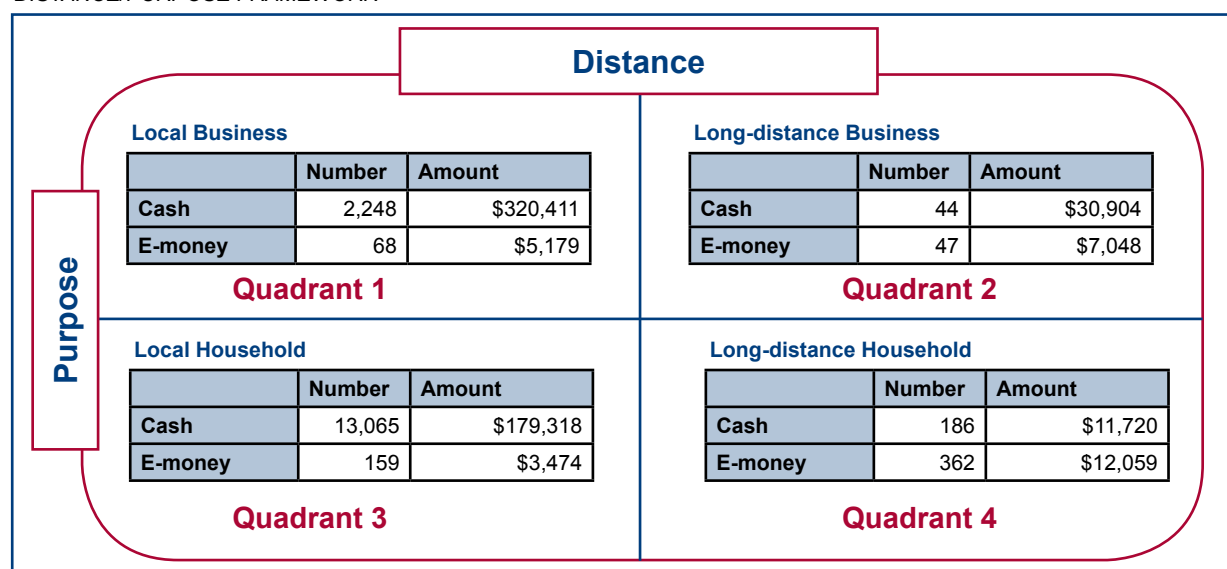
- E-money is a small part of the overall economy.
- By count, e-money constituted four percent of all transactions (5.6% by value).
- E-money travels much longer distances than does cash.
- 66 percent of e-money transactions by count traveled more than 20 km (67 percent by value).
- 18 percent of e-money transactions by count were sent to someone in the same town or neighborhood or within 1 km of the sender's location (22 percent by value).
- E-money transactions are more likely to be household transactions.
- 79 percent of e-money transactions by count were household transactions (54 percent by value).
- 57 percent of e-money transactions by count were household transactions traveling over 20 km (42 percent by value).
- 9 percent of e-money transactions by count were household transactions traveling within the same town or neighborhood as the sender or within 1 km of their location (5 percent by value).

The Distance/Purpose Framework (Figure E) of the market identifies where the e-money market is currently very active, and where it is not. It demonstrates that e-money activity is greatest in Quadrant 4, the “long-distance/household” segment, where cash transactions are relatively small in number and amounts. Even there, e-money has not completely replaced cash—the amount of money over 20 km from where a person lives or works is roughly the same as the amount of money carried in cash to make a household purchase, though the average size of the cash transaction far exceeded the average size of the remittances. In the local market segments cash is king, and e-money transfers are limited.

Given the current market segmentation, where might e-money go next in Kenya? Can it replace cash in its local kingdom in the local market segments (Quadrants 1 and 3)? Or is there still a lot of room to grow in Quadrants 2 and 4, the long-distance market, either by penetrating deeper into the Quadrant 2 business transactions segment, or by helping Quadrant 4 grow and growing along with it?

To answer these questions we must look at two other factors currently structuring both the e-money and the cash markets.

FIGURE E
DISTANCE/PURPOSE FRAMEWORK



One factor is the network of relations that bind Kenyans to each other and thereby structures the flow of money within these segments. The second is the transactional *pathways* through which e-money travels, and the costs they incur along

the way. Once we have these pieces in place, we will be better able to understand the prospects for growth in the use of e-money in the different market segments.



Embeddedness

As we noted in our description of the research sites, both Kitui and Murang'a are served by several financial institutions and many M-PESA agents. Kibera is less well served by financial institutions but has a large number of M-PESA agents. The Diaries data reveal that in all three sites there is an active informal financial system that heavily relies on existing social relations – the term for this in economic sociology is “embeddedness.”

The term “embeddedness” was coined by Mark Granovetter, and has since been used extensively by economic sociologists to analyze the social relations and social norms that govern market behavior (Granovetter, 1985).¹³ The basic idea behind embeddedness is that people do not weigh economic decisions in isolation based solely on what is the narrowly optimal economic course of action but rather that economic behaviors are “embedded” within existing social relations and are governed by social norms.¹⁴

Economic decisions are not made in isolation but rather are “embedded” within existing social relations and are governed by social norms.

The Diaries methodology allows us to examine how e-money usage reflects the users’ social networks and behavioral norms. The data show *with whom* the respondents exchanged cash vs. *with whom* they exchanged e-money, enabling us to see whether e-money is entirely embedded in existing social relations or whether it fosters the creation of new ones. We can also look at *how* people use e-money and see whether or not it mimics *how* they use cash. If it does, that suggests that people are conforming to existing norms of behavior in their management of e-money, established through their long experience in working with cash.

NETWORK EMBEDDEDNESS

We categorized the respondents’ financial transactions (e.g. account deposits and

¹³ The discussion of embeddedness in this section is also informed by the author’s earlier work on the U.S. mortgage lending industry and financial cooperatives in Andhra Pradesh, India (Stuart 2003 and 2007).

¹⁴ The idea has much in common with the approach that behavioral economics takes towards how people make economic decisions, except that the embeddedness approach pays more attention to the role social structures (networks and norms within those networks) play in shaping actions, not just the internal mental processes of individuals.

withdrawals and loan disbursements and repayments), by whether our respondents enacted them with another individual or with some sort of organization. When it was an individual, respondents further identified whether the person was a family member (often telling us the exact nature of the relationship), a friend, or someone else. The last we classified as “associates.” Respondents also told us, in most cases, the gender of the other person. As expected, the Diaries data show many transactions with other individuals, especially family and friends (Table 5).

Among the organizations with which our sample of respondents interacted, the most common transactions were those with community-based rotating savings and credit associations (ROSCAs)¹⁵, followed by transactions with M-PESA agents. Transactions with commercial banks were much fewer, but both the average and median amounts per transaction were much larger. This last point is consistent with Diaries data from Malawi, where we also found that banks capture fewer but more momentous transactions while day-to-day financial life is mediated by the less-formal alternatives (Stuart et al, 2011).

The data confirm the socially embedded nature of finance in Kenya. Most financial transactions take place with friends and family or with community-based organizations such as ROSCAs that themselves rely heavily on pre-existing social networks for their effective operation (Rutherford, 2000; Johnson, 2004).

E-money transactions mirror those of cash flows between individuals in that they are also embedded in networks of relations: 80 percent of remittances in our sample were

¹⁵ Known locally as merry-go-rounds, or *chama* (meaning “association”) funds.

TABLE 5
SOURCES OF CASH FINANCE

Type	Number	Amount (PPP\$)	Average (PPP\$)	Median (PPP\$)
Individual				
Associate	135	4,394	33	21
Family (excl. spouse)	188	7,444	40	15
Friend	263	8,427	32	16
Missing	10	160	16	11
Individual Total	596	20,424	34	21
Organization				
Bank	146	26,236	180	70
ROSCAs	708	20,184	29	15
M-PESA	487	18,127	37	22
Other	36	3,838	107	40
Organization Total	1,377	68,385	50	21
Total	1,973	88,809	45	21

within families or between friends. The remaining 20 percent were almost all business transactions. In other words, M-PESA is enabling the flow of e-money between individuals who already know each other.

This is likely a strong reason why M-PESA has been adopted so widely in Kenya. There is a general culture of informal cash gifts and loans flowing within families and between friends, and M-PESA has facilitated that flow by enabling it to take place across long distances. Furthermore, the fact that people on each end of the transaction know each other makes it much easier for M-PESA users to verify that the system is working as it should. A friend or family member is far more likely to accurately verify the receipt of a remittance than someone the sender does not know as well.

This finding is consistent with past research indicating how critically important it is to low-income users of formal financial services that they obtain a written record of their transactions (Cohen et al, 2008). M-PESA could conceivably make paper receipts available verifying not only that the money

left the sender's account but also made it into the recipient's, much as a bank will provide – for a fee – a copy of a cancelled check or written proof of a wire transfer. But in light of Cohen's findings, it makes sense that for now users of M-PESA, which only provides a "digital receipt," would concentrate their e-money activities around transactions they can confidently verify themselves.

The direction of the flow of these funds reflects the demographic changes in Kenya over the past 10 years. Even though the total urban population rose by 26 percent (from 9.9 million to 12.5 million) between 1999 and 2009, the percentage share of urban population relative to the total population declined slightly during this time period, from 34.5 percent of the population to 32.4 percent (AllAfrica.com, 2010). This means there is both a large and growing urban population and a large and growing rural population, creating ample opportunity for businesses that connect the two.¹⁶

Safaricom has capitalized on this opportunity with its M-PESA service. In our sample just

¹⁶ <http://allafrica.com/stories/201009060493.html>

TABLE 6
FLOW OF HOUSEHOLD REMITTANCES

Flow of M-PESA Household Remittances			
(N=530)	Receiver		
Sender	Rural	Urban	Total
Rural	24%	9%	33%
Urban	52%	14%	67%
Grand Total	77%	23%	100%

over half the remittances flowed from urban to rural areas (Table 6), where, for the sake of this report, we define any location within Nairobi and Mombasa as urban and any other location as rural.

But it should also be noted that one quarter of the remittances were between rural areas, indicating the utility of M-PESA to people living in these areas. Furthermore, the direction of flow is structured by age. The average age of senders was 30 while the average age of receivers was 37.¹⁷

In sum, the M-PESA users in our sample conducted most of their financial transactions (savings, loans, cash gifts, and remittances) in a manner that was embedded in existing social networks. In the case of cash transactions, their most common financial interactions were with family and friends and community-based organizations such as ROSCAs. In the case of e-money transactions, our respondents conducted four out of five of these with family and friends.

In other words, e-money flows through the same existing social networks that cash does. This suggests that M-PESA built its success on the existing practice of cash gifts within families and between friends, taking advantage of those existing networks of financial flows to engender trust in their new e-money network. This evidence however

¹⁷ This difference is statistically significant even after controlling for the gender and location of the respondent, and taking into account the clustered nature of our data.

comes with a corollary. If the e-money market remains primarily limited to its users' networks of trusted familiars, its growth prospects will be correspondingly and severely circumscribed.

BEHAVIORAL EMBEDDEDNESS

Turning now to the question of whether e-money use mimics cash use, we can examine whether existing norms of behavior established through long experience with cash shape the way people use e-money. One strong norm that we know to be at work in Kenya is that of gender dependency. Women tend to be economically dependent on men, whether they are their spouse or another family member or friend. The Diaries data on cash gifts are consistent with this idea. Our Diaries asked respondents to report cash gifts from spouses. The resulting data show that invariably cash flows from husband to wife, 97% of the time. The same is true for M-PESA flows between husband and wife. In other words, within the relationship between husband and wife, we see e-money behavior mimicking cash behavior. This is true even though e-money transactions take place across long distances between spouses who are at a geographical remove from each other, a factor that might be expected to alter the marital relationship in any number of ways, including economically.

Outside of marriage, the evidence regarding the role of gender in determining the flow of cash gifts is less strong. The data show that the flow from women to men is the least likely of the four possible flows, but that the other three types of flow are roughly equal in instance (Table 7). Once again, e-money flows mimic cash flows.

But as will be discussed in more detail, the amounts men and women outside of marriages give each other are different,

TABLE 7

COMPARISON OF FLOWS OF CASH GIFTS VS FLOWS OF REMITTANCES BETWEEN FRIENDS AND WITHIN FAMILIES

CASH GIFT FLOWS BETWEEN FRIENDS AND WITHIN FAMILIES (CASH GIFTS BY NUMBER OF TRANSACTIONS)						
a		Receiver				Total Number
	Giver	Men #	Men %	Women #	Women %	
	Men	118	29%	139	34%	257
	Women	45	11%	106	26%	151
	Grand Total	163	40%	245	60%	408
	Missing	43				
HOUSEHOLD REMITTANCE FLOWS BETWEEN FRIENDS AND WITHIN FAMILIES (REMITTANCES BY NUMBER OF TRANSACTIONS)						
b	All Areas	Receiver				Total
	Giver	Man	%	Woman	%	
	Man	101	32%	96	30%	197
	Woman	47	15%	75	24%	122
	Grand Total	148	46%	171	54%	319
	Missing	86				

depending on whether they remit it to each other or give it to each other in cash. In particular, the median amount women remit to men electronically is twice the amount they give to men in cash. As a result, the data suggest a mixed message on the role of gendered norms in shaping e-money transactions. The evidence is clear that e-money transfers within marriages replicate cash transfers. There is also evidence that outside of marriages the general structure of the flows of e-money and cash are the same, but there are differences in amounts flowing, suggesting a potential disruption in gendered norms in the e-money sphere.

We can also look at the extent to which e-money flows for household purposes mimic cash gifts for the same purpose. Here the data show some interesting patterns.

In both cases a sizable majority of transactions (87 percent of e-money and 84 percent of cash gifts) were below \$50. But when we look more closely at the distribution of transfers below this threshold, we see some differences in the pattern of flows.

The most striking difference is between local and long-distance e-money transactions, where the

former tend to be smaller, on average, than the latter.¹⁸

Cash gifts are almost all local. Local remittances tend to be smaller, on average, than cash gifts. By contrast, long-distance remittances tend to have the same distribution (that is, occur in similar per-transactions sizes) as local cash gifts.

We can see these differences in Figures F and G. In Figure F, we have plotted the cumulative distribution of household remittances and cash gifts. The plot line for e-money transactions (the purple line) climbs more steeply than the line for cash gift transactions, indicating a greater concentration of e-money transactions at the lower amounts – even taking into account the fact that there are cash gifts that are less than the minimum M-PESA remittance amount of KES 100.

If we focus more closely on the distribution of transactions at or below KES 2,525 (~\$50 PPP) in Figure G and break out the distribution of e-money transactions into local and long distance, we can see that:

¹⁸ The difference in the means of the amount sent locally and long-distance are significant at the 5 percent level taking into account clustered standard errors.

FIGURE F
CUMULATIVE DISTRIBUTION OF E-MONEY AND CASH GIFTS

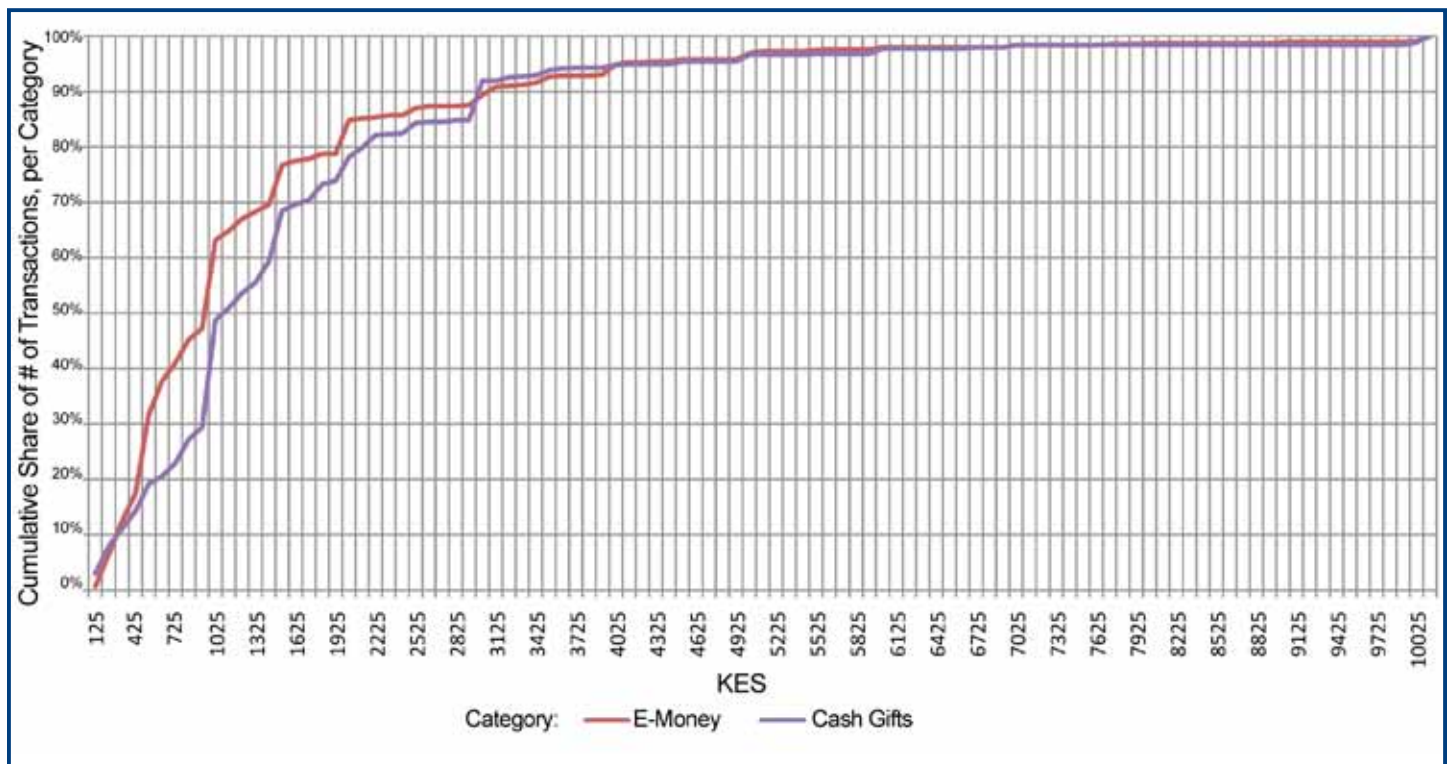
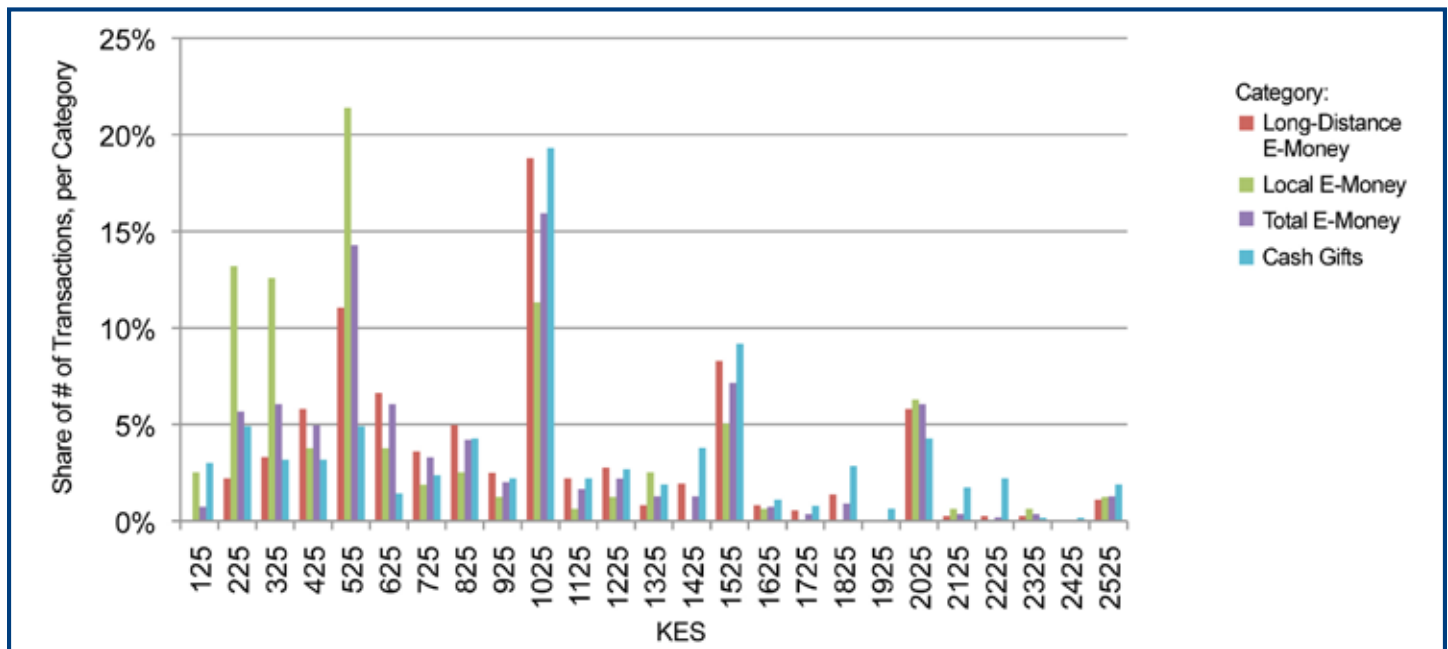


FIGURE G
DISTRIBUTION OF E-MONEY AND CASH GIFTS



- 20 percent of local e-money transactions were in the range of KES 426 to KES 525 (driven by the large number of KES 500 and KES 525 remittances).
- Only about 5 percent of cash gifts were between KES 500 and KES 525.
- Only 10 percent of long-distance remittances were in the KES 500 to KES 525 range.
- Almost 20 percent of long-distance e-money and all cash gift transactions were in the range of KES 926 to 1,025.
- Just over 10 percent of local e-money remittances were in the KES 926 to 1,025 range.

It is unclear what is driving the different patterns in local e-money and cash gift transactions. Our data show that local e-money transactions are far more likely to be between friends than are long-distance e-money transactions, but if one excludes spousal cash transfers, it is also true that cash gifts are more likely to be between friends than are long-distance e-money remittances. It could be that e-money, when used locally, is enabling friends who live near each other to help each other out conveniently by “M-PESA-ing” each other small amounts of cash, but we are not sure that this is what is going on.

Cohen et al (2008) examined the potential for branchless banking to reach low-income individuals and households in developing countries. They found that low-income individuals tend to use financial services that require a certain amount of payment discipline as a way to force themselves to manage their money well (*ibid.* 18–21), a finding that is consistent with Ashra et al (2006). (Cohen et al also found that low-income individuals have very little trust in

formal systems and that for that reason, they strongly prefer, as noted earlier, to have paper records of their financial transactions. This, they argue, is why such individuals prefer passbooks which provide a tangible, paper record of their banking activities, despite the fact that passbooks are actually less private than PIN-protected electronic records.)

As noted above, ROSCAs were very popular among our respondents, and many of them made regular payments into their “accounts” as a way to save money. ROSCAs are clearly a means by which people impose financial discipline upon themselves because most ROSCAs require their members to contribute a set amount on a regular schedule in order to be eligible to borrow from the fund (Rutherford, 2000, p. 33).

Our data also show another form of self-imposed discipline. We looked at respondents’ airtime purchases to see how they managed their airtime “accounts.” We found that they made a large number of small purchases of airtime—1,386 in total (just over one every two weeks per person or just under one every week for the median respondent). The median amount of those purchases was roughly \$2 (the equivalent at the time of about 20 minutes of airtime), and 85 percent of the purchases were under \$5 (the equivalent of about 50 minutes).¹⁹ Given, as noted above, how much cash our respondents handle on a regular basis, one interpretation of these data is that low-income Kenyans buy only as much airtime as they need for immediate purposes because they know that if they have a lot of minutes on their phone, they will use them up.

The airtime data revealed another remarkable finding. All but nine of the 1,386 airtime purchases were paid for with cash. There were

¹⁹ Kenya is experiencing a mobile phone price war, and prices have plummeted between the start of the Diaries study and the time of writing. The average price of a minute of airtime in the January to March 2010 period was \$0.10. See Communications Commission of Kenya (2010, p 8).

only nine instances when someone purchased airtime through M-PESA, even though such purchases were free. We do not have national data on the distribution of airtime purchases between cash and M-PESA. But it is notable that in November 2009 Safaricom introduced paper vouchers in the amounts of \$0.10 and \$0.20 to enable low-income Kenyans to buy very small amounts of airtime, even though Safaricom was already allowing them to buy in

Low-income people strongly prefer to obtain paper receipts for financial transactions. Because M-PESA provides only digital “receipts,” it makes sense that M-PESA has grown fastest in that market segment—family and friends—where users can trust each other’s word that the money went through.

such small increments through M-PESA. Our respondents showed a strong inclination to pay cash for their airtime, an inclination that Safaricom also seems to have recognized.

Our fieldworkers confirmed the cash-based nature of airtime purchases, noting that people were often in a store buying goods where airtime was also sold, so it was very convenient for them to buy scratch cards as they needed them. In contrast, our respondents did not always have a balance on their M-PESA account when they needed to buy airtime.

These findings provide more evidence of the power of habit—and of the fact that people adopt or fail to adopt tools to the

extent to which those tools help them do what is already important to them. Kenyans have found a very good use for M-PESA—sending money to loved ones living elsewhere -- but continue to behave as if it did not exist when it comes to buying the stuff of daily life. Even if, as with airtime, the use of M-PESA costs them nothing, they may not see that it gains them anything either. And in instances where change comes at no cost but also no perceived gain, the *status quo ante* tends to rule.

Do we see signs that low-income individuals try to impose the same sort of discipline on themselves in their use of e-money that they do when using cash? The data suggest that they do, and in a way that has important implications for the costs they incur, the marginal cost of serving them, and the value they derive from e-money.

We will discuss these in more depth in the next two sections, but to preview the implications of our findings, our data suggest that low-income individuals tend to “clear out” inflows into their M-PESA accounts very quickly. In particular, when they deposit cash into their accounts, they do so with the intent of sending a remittance to someone, and they are most likely to send that remittance on the same day that they make the deposit. Our sense is that low-income individuals try to limit themselves to using M-PESA for a particular purpose, which (at least for now) is to send and receive money immediately. As we will see in the next two sections, this has cost implications for the e-money system and its low-income users, and it affects the value the users derive from the system.

In sum, our findings suggest that e-money behavior mimics cash behavior to a large extent:

- Cash gifts and e-money remittances are gendered in the same way.
- Flows of long-distance e-money move in unit sizes similar to the sizes of typical local-level cash gifts (though local e-money flows differ in surprising ways from local gifts of cash).
- Low-income people impose similar strategies of discipline upon themselves in their uses of cash and of e-money.

More detailed evidence on this last point requires us to understand the transactional pathways that e-money users follow, which is the subject of our next section.

PESA

Notice

or Deposit cash at any
be required to present
document:

Military ID, Diplomatic ID

expired identification
be accepted.

cannot be verified or
registration, deposits
be declined.



Transactional Pathways: E-money Supply and Demand

The most expensive steps in an e-money transaction occur at “cash in” and “cash out,” or when cash is converted into e-money or vice-versa. These steps require the presence of agents physically near to customers and within range of a mobile phone tower. Both of these are fixed costs. An e-money system also requires management of large sums of cash flowing into and out of those agent locations, a variable cost.

Safaricom already had its phone tower network largely in place when it launched M-PESA. It has since built an extensive network of agents across Kenya, which enables M-PESA users to use e-money with some confidence that they can easily convert it into cash, which, as noted above, is “still king.” This confidence comes at a price. For Safaricom it is the price its agents and super-agents incur in managing the cash flowing into and out of the system (the variable costs cited above). For the customer it is the transaction fees Safaricom charges them for cashing out (but not cashing in).

Compared to the costs involved in converting cash to e-money and back again, moving e-money around generates very low costs—so long as it remains e-money. The cost of managing an additional text message and an additional debiting and crediting of customers’ M-PESA accounts is very small. In fact, given that the cashing out process involves the customer sending e-money to an agent, who gives them cash in return, remitting money to someone else (thereby lengthening the e-money loop) adds no additional electronic traffic to the texting and accounting systems above and beyond the traffic generated if the e-money had been cashed out. Nevertheless, Safaricom charges customers KES. 30 (\$0.64) for the service of moving e-money from one place to another, which is more than the KES. 25 (\$0.53) it charges customers to cash out less than KES. 2,500 (\$53; See Figure H for full fee/tariff schedule).

In this section, we will examine more closely how respondents in our study moved money through M-PESA. We will look at how often they cashed in and out relative to how often they sent or received e-money, and we will look at the amounts they sent and received, segmented by the Distance/Purpose

Framework. In this way we can understand the cost implications for both e-money providers and their customers of serving different market segments.


Before delving into the Diaries data, it will be useful to discuss some data from a 2008 audit of Safaricom by the Kenyan Central Bank, which gives some indication of the extent to which Kenyans cash in and out of M-PESA. The audit found that “the system transacted about (\$362 million PPP, rounded) in August 2008,” which Mbiti and Weil (2011) interpret to mean that this figure represented the combined sum of cash deposits and withdrawals, while Safaricom reported that the amount of person-to-person transactions within the system was just about half that amount. This suggests that people are doing very little on-sending of e-money, but instead are cashing in to send money, and cashing out when they receive it.²⁰

More technically, Mbiti and Weil note that the length of the “e-money loop” is roughly one—one unit of e-money is used only once (for a remittance) before it is cashed out again (see Figure I). It may be possible for an e-money system to continue to grow by growing the number of one-unit e-money loops. But a more cost-effective way is to grow the length of the average e-money loop by increasing the number of times each unit of e-money gets pushed around before getting cashed out. This, in turn, requires both making e-money more palatable as a means of payment and lowering the cost of using it as such.








The Diaries data are consistent with the macro-data reported in the Central Bank audit, and



²⁰ A way to understand this is to think about the flow of money in three stages: cashing in, moving e-money within the system once it's there, and cashing out. If the amount cashed in is \$1 million, and the amount cashed out is \$1 million, then the total amount of money moving *into and out of* the system is \$2 million. If every dollar deposited into the system is moved once and then withdrawn from the system (by being converted to cash), then if \$1 million is deposited, we would see \$1 million being moved *within* the system. Thus, in the one-unit scenario, the sum of cash moving *into and out of* the system is twice (\$2 million) the sum of e-money moving *within* the system (\$1 million). But what if every dollar deposited were moved twice before cash out? Then the total moving through the system would be \$2 million, and so the total cashed *into and out of* would be the same as the total moved. And if each of our hypothetical million dollars were moved 10 times *within* the system prior to cash out (resulting in \$10 million moving *within* the system), then the total moving *within* the system would be five times the amount moved *into and out of* it.

FIGURE H
TARIFF SCHEDULE



Transaction type	Transaction range (KShs)		Customer Charge (KShs)
	Minimum	Maximum	
Value Movement Transactions			
Deposit Cash	100	35,000	0
Send money to a registered M-PESA user	100	35,000	30
Send money to a non-registered M-PESA user	100	2,500	75
	2,501	5,000	100
	5,001	10,000	175
	10,001	20,000	350
	20,001	35,000	400
Withdraw cash by a registered M-PESA user at an M-PESA Agent outlet	100	2,500	25
	2,501	5,000	45
	5,001	10,000	75
	10,001	20,000	145
	20,001	35,000	170
Withdraw cash by registered M-PESA user at PesaPoint ATM	200	2,500	30
	2,501	5,000	60
	5,001	10,000	100
	10,001	20,000	175
Withdraw cash by a non-registered M-PESA user	100	35,000	0
Buy airtime (for self or other)	20	10,000	0
Pay Bill Transactions	—	—	0 - 30
<ul style="list-style-type: none"> Transaction fees of between KShs 0-30 applicable depending on the organization you are paying to Confirm that the company you intend to pay to accepts payment via M-PESA before transacting 			
Information Transactions			
Show Balance			1
Change Secret Word			0
Change PIN			20
Update Menu			0
Change Language			0
SIM Replacement			20

 **FREE REGISTRATION**
 No minimum balance required
 Maximum Account Balance KShs 50,000
 Maximum daily transaction value KShs 70,000
 No monthly fees / No hidden charges
 All SMS sent to and from M-PESA are FREE
 To use M-PESA, your Safaricom phone needs to be ACTIVE

 All charges are deducted by M-PESA from your M-PESA account
 To send PESA you must first deposit money into your own M-PESA account. You cannot deposit money directly into another person's M-PESA account.

To register or transact at any M-PESA agent you will need your original identification document: National ID, Passport, Military ID, Diplomatic ID or Alien ID.

Customer Care: Dial 020-4272234 (Chargeable) or Dial 234 FREE from your Safaricom Mobile.
Registered Customers: Safaricom Ltd, Safaricom House, Wanjau Way, P.O. Box 90303, 00100 Nairobi. Tel: 020-427 2272
www.safaricom.co.ke Terms and conditions apply.




FIGURE I
E-MONEY LOOP

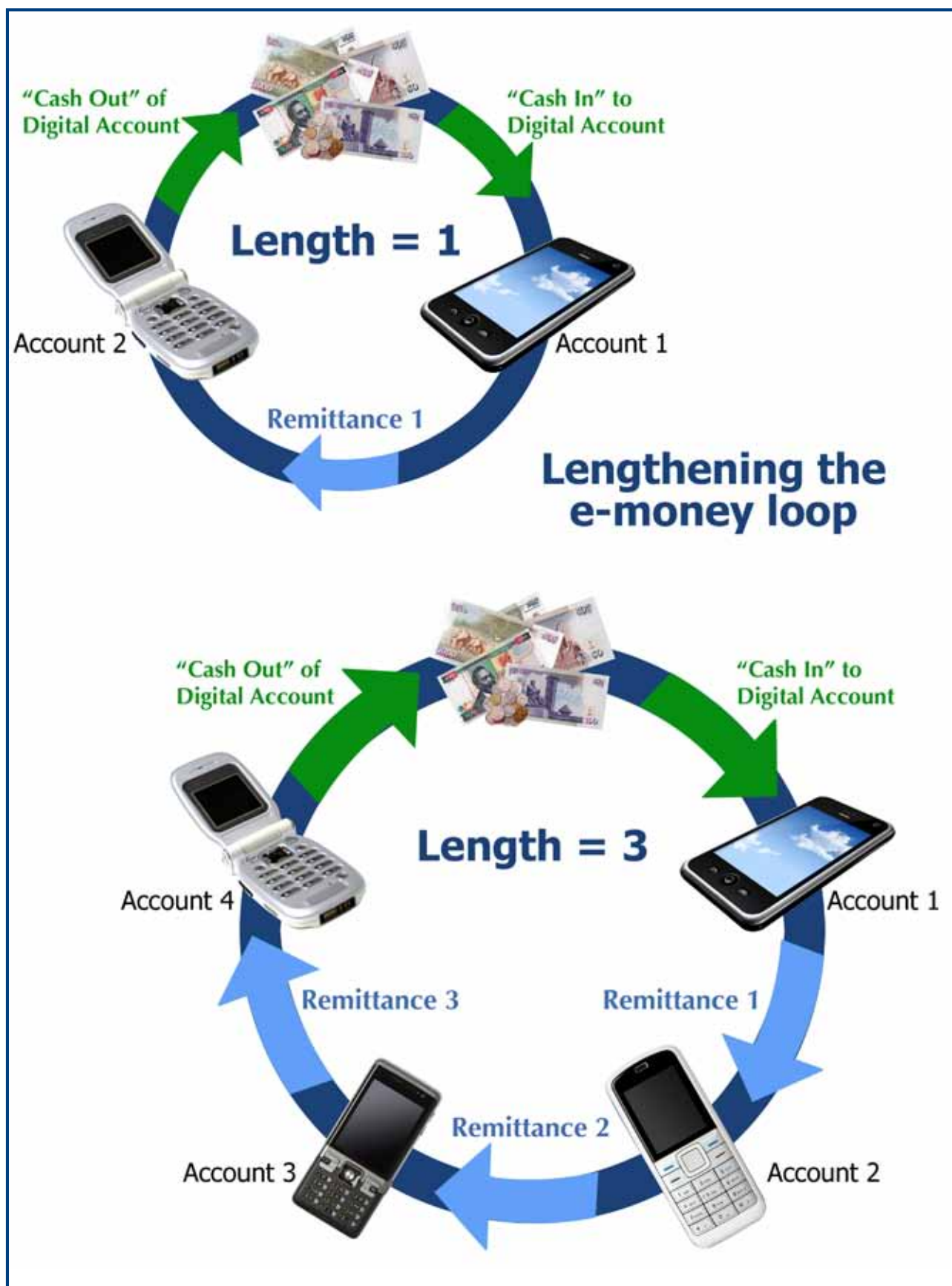
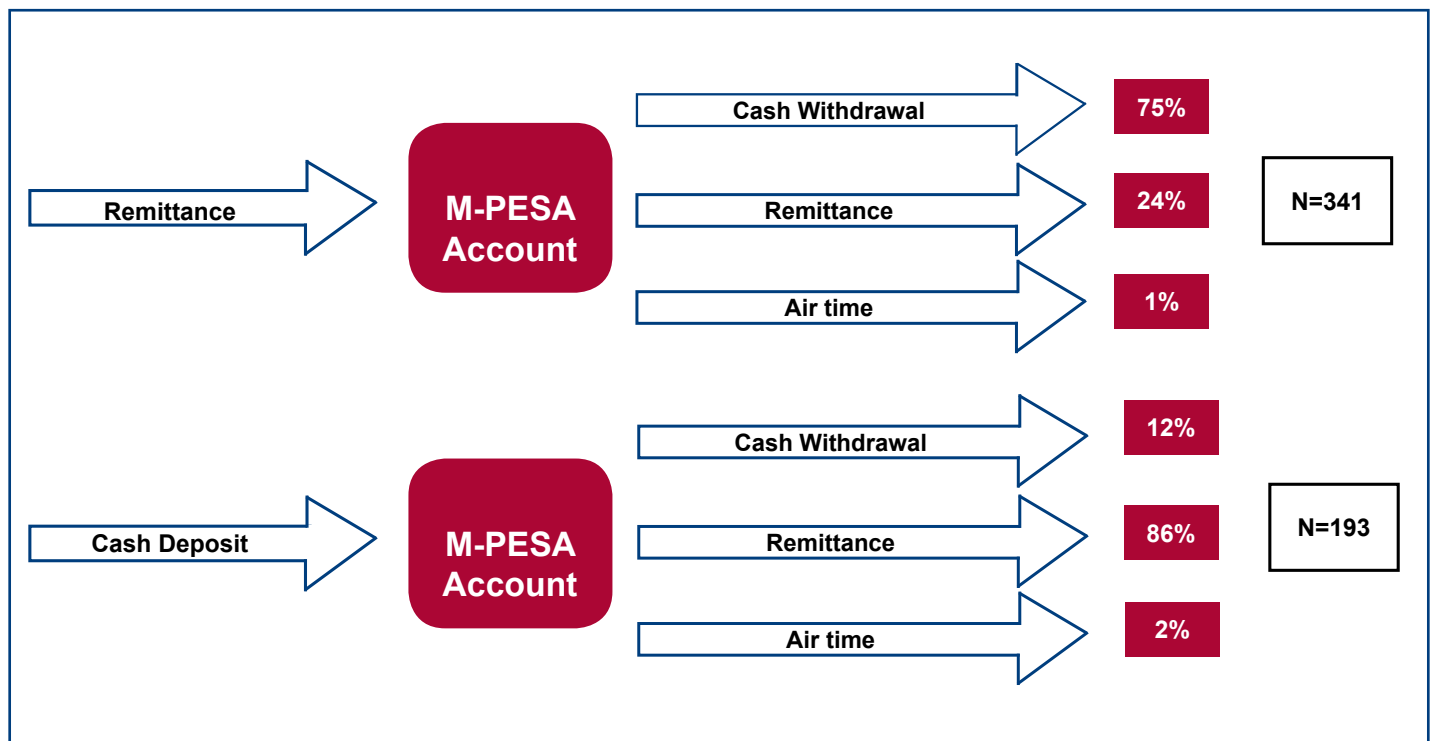


FIGURE J
CASH DEPOSIT AND REMITTANCE PATHWAYS



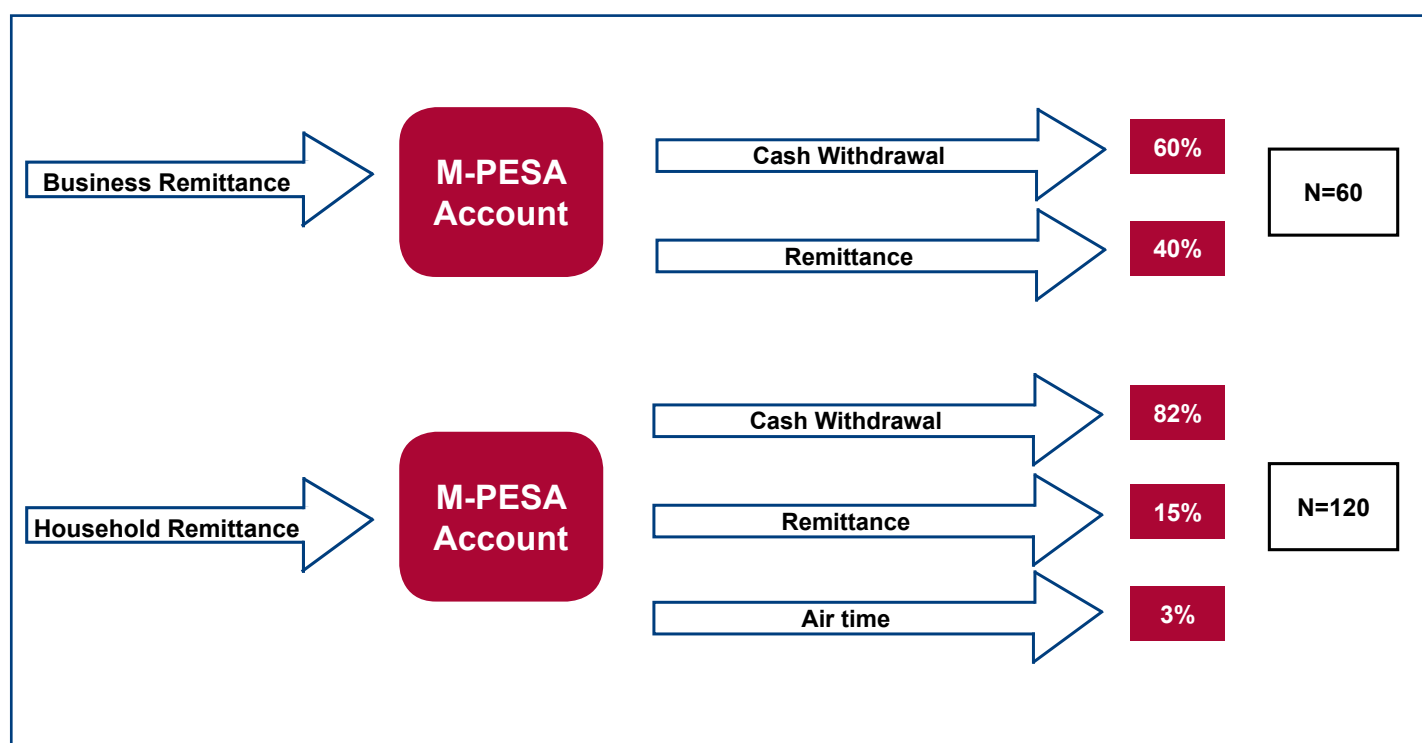
permit us to dig deeper to determine how the e-money economy works. To determine the relationship between flows into someone's M-PESA account and flows out of his account, we started with inflows for each individual and identified all the outflows that occurred on the same day or after the date of the inflow, but before the next inflow occurred.

In the Diaries, a person depositing money into an M-PESA account or receiving a remittance exercised three options. They either sent out a remittance, withdrew cash or bought airtime (Figure J). They could also store the money, but eventually they would have to exercise one of the other three options. Looking at the data where we can identify a clear relationship between the inflow of e-money into an M-PESA account and the subsequent outflow, we see some patterns that one might expect. Remittances received were withdrawn three-quarters of the time and a quarter were on-remitted to someone else, while cash deposits were remitted to someone else 86 percent of

the time. There were occasions where the use of M-Pesa mimicked the use of a regular bank account, whereby an individual deposited cash onto their M-PESA account and then subsequently withdrew it – a cash deposit and then a withdrawal. This happened 12 percent of the time (Figure J).

Looking only at those respondents who conducted at least one business transaction through M-PESA (either a deposit, withdrawal or remittance), we see a slightly different pattern emerging for their business remittances (Figure K). The business respondent was more likely than the general case (40 percent vs. 24 percent) to send on a remittance received as another remittance to someone else. And this is not because such respondents were more likely to on-send non-business-related remittances they had received. To the contrary, business people were as likely as the general sample (82 percent vs. 75 percent) to cash out non-business-related remittances shortly after receiving them.

FIGURE K
RESPONDENTS WHO MADE AT LEAST ONE BUSINESS TRANSACTION THROUGH M-PESA



In sum, the purpose—the reason why the e-money was sent—appears to make a difference to how long it stays within the system, and the e-money loop seems to be longer for a business transaction compared to a household one. To the extent that this is true, e-money providers will incur lower marginal costs in the business segments of the Distance/Purpose Framework (Quadrants 1 and 2) relative to the household ones (Quadrants 3 and 4) given that, as we have seen, the longer the e-money loop, the lower the cost to the e-money provider for each e-money transaction.

On the demand side, the remittance data suggest that M-PESA users either are willing to pay quite high fees, or are not fully aware of the fees they are paying. In our sample, 30 percent of the remittances were in amounts that resulted in a final fee rate of 10 percent or more (Table 8). The median fee rate was 5.5 percent, on a cash amount of KES 1,000.²¹

²¹ This discussion has been left in Kenya shillings (rather than converted into international dollars as has been done elsewhere) because the price breaks around which the fee structure is built are based on evenly divisible round numbers which would simply look

The average fee rate of remittances ends up varying by the nature of the relationship between sender and recipient. A respondent was more likely to send/receive a remittance with a lower fee rate (and hence larger amount) to/from someone who is **not** a friend or a member of their family, in our terminology an “associate.” The average fee rate for such remittances was 5.6 percent. In contrast, remittances to friends or family were likely to be smaller and thus incurred a higher fee rate: 9 percent (Table 8).

Two factors are likely driving this phenomenon. First, most of the transactions with associates were business transactions, which tended to be larger, and thus resulted in lower fee rates. Second, it is likely that people are prepared to pay the higher effective fees associated with sending the smaller, family- and friend-focused remittances because in those instances, it is not just about getting the money from point A to point B but also a “touch,” a way of strengthening bonds of affection, reciprocity, or obligation.

confusingly random if converted. As a reminder, the conversion rate used throughout this report is 47 KES: 1 PPP.

TABLE 8
DISTRIBUTION OF REMITTANCES BY FEE RATE

Fee Rate	Less than 10%		10% or more		Total	
Relationship	Share of Remittances	Average Fee Rate	Share of Remittances	Average Fee Rate	Number of Remittances	Average Fee Rate
Associate	86%	3.3%	14%	19.3%	132	5.6%
Family or Friend	66%	4.6%	34%	17.9%	531	9.0%
Grand Total	70%	4.3%	30%	18.1%	663	8.4%
Detail						
Family	67%	4.7%	33%	16.5%	263	8.6%
Friend	55%	4.3%	45%	20.5%	149	11.6%
Spouse	77%	4.6%	23%	16.1%	119	7.2%
Total					531	

TABLE 9
MEDIAN AMOUNT GIVEN IN CASH OR REMITTED IN E-MONEY (KES) (W/ FEE INCURRED)

Giver	Receiver			
Cash Gifts	Man (KES)	Woman (KES)	Man (Fee)	Woman (Fee)
Man	1,000	1,200	N/A	N/A
Woman	500	750	N/A	N/A
Remittances	Man	Woman	Man	Woman
Man	805	975	6.8%	5.6%
Woman	1,000	1,000	5.5%	5.5%

Interestingly, remittance amounts and hence fee rates did not vary depending on the distance the remittance traveled.

As noted above, remittance transactions are also embedded in gender relations, though the amounts flowing from women to men are different in the e-money world in comparison to the cash world. In fact, regardless of the gender of the person on each end of the e-money flow, the median amounts varied little. As a result, the data suggest that the gendered structure of e-money flows (in terms of numbers of transactions) had no implications for the fees paid (Table 9).

The Diaries also provide some interesting insights into the way remittance amounts are shaped simply by the way we count. The data show the following patterns:

- For remittances where the total amount sent is less than KES 1,000: the amount is likely to

be a multiple of KES 100, or KES 25 above a multiple of 100

- For remittances where the total amount sent is equal to or greater than KES 1,000: it is a multiple of 500 rising in increments of either KES 25 or KES 45 above multiples of KES 500.

The additional KES 25, or KES 45 when the amount to be cashed out is above KES 2,500, is the cash-out fee that M-PESA charges. This behavior is consistent with the theory of “anchoring,” whereby consumers “anchor” the amount they are willing to pay for something to a particular number (Kahneman & Tversky, 1974). In the case of M-PESA users, they “anchor” the amount sent to multiples of 100 or 500. Note also that around many of the anchor numbers the “cash out” amount is either the anchor amount or the “cash out” fee below that amount. This suggests that

some remitters are sending the “cash out” fee along with the requested remittance amount, while others are not. For example there were 52 remittances that would cash out for KES 1,000 and 30 that would cash out for KES 975. This suggests that 63 percent of remittances of KES 1,000 included the fee.

In sum, the data suggest that people are willing to pay fairly high fee rates to use M-PESA. We should note that this willingness may be facilitated when the fee is split between sender and receiver, with the former paying the sending fee of KES 30 and the latter paying the cashing out fee of KES 25 or more.

There are a couple of ways consumers can decrease the fees they pay within the current tariff structure of M-PESA. One is for senders to start remitting larger amounts on a more intermittent basis. M-PESA does not charge people to deposit cash into their M-PESA account—it only charges the customer when that e-money leaves the account. So a husband who normally sends KES 500 each week to his wife could decide to deposit that KES 500 each week as normal, but not *send* it until the fourth week. If the husband normally includes enough in the remittance for the cash-out fee, then under the first scenario the husband would incur fees in the amount KES 220 every month (4 weeks @ KES 55 / week), whereas, under the second scenario, he would incur only KES 55 in fees to send the same KES 2,000 amount.

This seems like a very simple way to reduce fees by 75 percent. But there are a couple of catches. First, it requires that the husband be sufficiently disciplined to stockpile the money, and just like everyone else, low-income people face temptations to spend. Second, the wife must be willing to accept a monthly payment of KES 2,000 instead of the weekly KES 500, and she must be able (both in terms of her own personal discipline and in terms of

having a safe place to save) to make the larger sum last throughout the longer time horizon.

The wife’s own M-PESA account could itself be that “safe place to save,” but only at a cost. If she cashes out the full KES 2,000 at one go, the cash-out fee would have been absorbed by the KES 55 the husband included. But if she chooses to leave some money in the account to be taken out later in increments (if, in other words, she treats her M-PESA account as a *de facto* savings account) she incurs an additional cash-out fee each time she taps it.

So at least in terms of fees, the husband’s gain would effectively be the wife’s loss if, for whatever reason, she is not in a position to take possession of the whole amount at once. In short, the “bulk sending” of remittances makes a lot of sense from a fee point of view, but it requires fairly substantial behavioral adaptations on the part of the sender and the recipient—adaptations they may not be willing or able to make.

Another way for consumers to lower the amount of fees they incur is to lengthen the e-money loop, and thus avoid cash-out fees, *but only in amounts greater than or equal to KES 2,500*. M-PESA’s current tariff structure makes it more expensive to on-send a remittance than to cash it out for amounts less than that—the flat fee for on-sending remittances of any size is KES 30, while the cash out fee for amounts up to KES 2,500 is KES 25, rising to KES 45 for amounts between KES 2,501 and KES 5,000.

So how often did individuals in our sample spend KES 2,500 on any single good or service? The short answer is: Not very. Our Diaries survey instrument is structured to have respondents report their cash transactions for each week. In cases where they bought the same good or service at many different times during the week we asked

TABLE 10
DISTRIBUTION OF NON-FINANCIAL OUTFLOWS BY AMOUNT AND PURPOSE

	Less than KES 200		Between KES 200 & 2,500		KES 2,500 or More		Total	
Purpose	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Business	27	4%	336	47%	347	49%	710	100%
Household	5,666	48%	5,660	48%	367	3%	11,693	100%
Mixed	39	16%	172	70%	34	14%	245	100%
Grand Total	5,732	45%	6,168	49%	748	6%	12,648	100%

them to aggregate the amount they spent on that particular good or service for the whole week (so as not to overwhelm our data-gathering system with transaction records). Furthermore, we found that many respondents either spent money “in bulk” or aggregated transactions involving goods that were not exactly the same but fell into the same broader category such as “groceries” or “food.” As a result, our data exaggerate the size of transactions that respondents performed.

Nevertheless, almost half of all the transactions (both single and aggregated) reported in our study involved an amount less than KES 200 (Table 10), or about \$4.25. Most of these were household transactions. Only six percent of the transactions reported in our study were \$53 or more, the magic number at which on-sending e-money begins to make economic sense under M-PESA’s current tariff structure. Half of those were business transactions and half of them household transactions. But it is worth noting that half the business expenditures were in amounts of \$53 or more. As a result, under the current tariff structure, it makes most sense for business people to extend the e-money loop through their business expenditures, because those expenditures are of a sufficient size to make it more cost effective to on-send money for business purchases than to cash out and then use cash for those purchases.

Our respondents’ e-money transactions reflect the cash transaction patterns and highlight the supply-and-demand logic that might make business transactions, especially long-distance business transactions, the locus of growth for e-money use. The median e-money business transaction was much larger than the median e-money household transaction, resulting in a lower fee rate for the former than the latter. At the same time, if business users have a longer e-money loop—as they appear to do—then the cost of serving them is likely to be lower. In essence, business transactions represent a “sweet spot” where the relative price of the service is lower and the marginal cost of supplying the service is lower, as will be discussed more fully later in this report. But, as was noted above, this logic only applies if issues of trust are solved—a point to which we return in the final section.

In sum, assuming that every remittance sent was cashed out fully, the median remittance fee in the sample was 5.5% of the amount cashed out (KES 1,000), while the average remittance fee was about 8 percent. As noted above, our data suggest that the fee may be split between sender and receiver or borne fully by the sender, so the fee rate for any particular individual in a transaction varied depending on their relationship with the other party.

Despite the fact that the M-PESA users in our study have shown themselves to be willing to pay these fees, our data on cash transactions

suggest that we are a long way from seeing Kenyans using M-PESA for small, regular household transactions. The economics of transaction fees militate against this.

But there is also something else going on. As noted earlier, one surprising finding from the Diaries data was that almost all the airtime purchases reported by our respondents were paid for using cash, even though buying airtime through M-PESA is free. Our respondents reported 1,377 cash airtime purchases during the course of our study—about one every two weeks for each respondent in our study, in the amount of \$5,829. One explanation of this phenomenon offered to us by our field workers is that people value the convenience of buying airtime when they are shopping for other things, like groceries, and it is easier to pay cash for a scratch card than to buy airtime from an M-PESA account that may not have a balance on it.

Taken together, the evidence of the importance of convenience, the evidence of the power of habit, and the sheer economic realities of the tariff structure suggest that the e-money loop is unlikely to lengthen due to household transactions. On the other hand, the data do suggest that business transactions may result in the lengthening of the e-money loop. And it may be the case that as business people get accustomed to sending e-money, that this behavior spills over into their household transactions.

COMMINGLED HOUSEHOLD / LOCAL BUSINESS “CHECKING ACCOUNT”

Robert and Julie operate a photo studio and to supplement that income, Julie sells baskets and other goods that she hand-weaves out of used plastic bags. Their business was burned to the ground during the post-election violence of 2008. “I watched my shop go down,” Robert said, adding, “Whatever I had here was left to ashes.” They rebuilt with the help of a neighbor who lent them a camera.

Long before, in 2002, Robert had bought his first phone to stay in closer touch with friends and family. Eight years later, their daughter bought his wife her first phone. It was supposed to be used for business purposes, but both Julie and Robert report that they routinely use it for household purposes as well.

Between May and June 2010, Julie made four M-PESA deposits in the amount of \$112 and six withdrawals in the amount of \$72. By October 2010, both Julie and Robert were actively using M-PESA on a fairly regular basis to deposit and withdraw money from photo sales. Robert made 19 deposits and 22 withdrawals while Julie made 15 deposits and 15 withdrawals. The withdrawals, they say, were used first for food and household items, and second for materials related to the business (e.g. photo supplies and weaving materials). Julie reported that she also sometimes uses M-PESA to remit money, mostly to friends but also to relatives when they are in need.

Robert and Julie do not see M-PESA's role in their financial lives as transformative. They describe their circumstances as difficult and predict that their children's lives will be even harder. But although they are not able to save money on their phone – incoming funds sit in their M-PESA account for just a few days before being cashed out and spent -- they report that M-PESA is nevertheless saving them money.

“I used to have a bank account, but the trips to the bank ate up time and money, as did the bank fees,” Robert said. “It's the convenience of getting the money locally.”

SNAPSHOTS: STORING THE SHORT-TERM SURPLUS

There is no universal definition of what constitutes “savings.” Among the Diaries respondents, the overwhelmingly dominant pattern that involved leaving money in an M-PESA account was short-term cash storage. These were individuals who consciously and explicitly left money on their phone for periods longer than it took them to reach the nearest M-PESA agent. These storage periods ranged widely from a day up to a month (with a month being the Diaries own working definition for crossing over into “net savings”). Three examples help illustrate:

- Matthew, a college student, has parents who send him money about every two weeks—usually KES 1,000. He uses the money little by little until his next remittance. His usual pattern is to withdraw about KES 300 every three days or so, planning those withdrawals to coincide with expenses, leaving the balance on his M-PESA account. He pays all his living expenses this way, although he often runs out of money two or three days before the next round of money arrives from home.
- Sara runs a soap-making enterprise whose customers sometimes pay in M-PESA e-money. She will sometimes let those revenues sit in M-PESA until they build up enough to be transferred to her savings club, known locally as a merry-go-round. She typically sends her merry-go-round payment from M-PESA on a weekly basis. Sara does not plan what she is going to do with her M-PESA balance very far in advance and sometimes diverts it for bus fare.
- Robert owns a moto-taxi business and a barber shop in Murang’a. Whenever the revenue from his businesses builds up, he deposits into his M-PESA account, about once a week. He likes the quick and easy deposits. When his M-PESA balance gets too big, he transfers the excess into a savings account at Equity Bank. “If the money is in M-PESA, I will be looking at the balance all the time and smiling,” he explained. “I will be tempted to spend.”

In sum, in one way or another, M-PESA for most Diaries respondents is a short-term vehicle for “the money I use,” as one participant put it. Others described M-PESA as being “for saving for a short time, two days to a week” and as being “more like a wallet than a bank.”

Source: Ferguson, M. & Stuart, G. (2011, forthcoming). “E-Savings? Evidence from Low-Income Kenyans’ M-PESA and M-KESHO Use.” (working title) Washington, DC: Microfinance Opportunities. Assessing the Impact of Innovation Grants in Financial Services project.



The Value of M-PESA to its Users

In this section we describe the benefits that M-PESA brings to its users by tracking the flow of e-money and how it is used when it is translated into cash. In examining the potential benefits M-PESA brings, we are guided by the idea that poor people use financial resources to protect themselves against risk, to reduce vulnerabilities, and to build assets (Sebstad & Cohen 2001). Risk is the likelihood of loss multiplied by the severity of the loss. Vulnerability is the level of exposure to risk and the ability to respond to it.

Assets can be financial, physical, social, or human and refer to both “stocks” of each type (for example, a stock of land) or rights or claims (for example, the right to move freely around one’s community is an asset that is denied to women in some parts of the world). What role, if any, does M-PESA play in helping the poor decrease their vulnerability and accumulate assets?

Unusually large expenses present a cash-flow challenge that M-PESA plays an important role in helping low-income Kenyans meet.

We focus on three facets of coping with risk and accumulating assets:

- Cash flow management
- Risk management
- Financial asset accumulation

Consistent with the findings from our Malawi Financial Diaries (Stuart et al, 2011), and with the literature on low-income households generally, our Kenya respondents reported inconsistent weekly cash flows both in terms of income and expenditures. Many of the inconsistencies resulted from timing issues (such as monthly paychecks or school fee payments at the beginning of new term) or else were within the control of the respondent, such as the purchase of a new asset.

These sorts of inconsistencies presented our respondents with a problem of *cash flow management*, which, if not handled properly could result in a person not having enough to eat or not being able to purchase the inventory needed to keep a business going. As

such, a financial tool that can help someone manage cash flow is of value. Looking at cash flow management through the framework developed by Sebstad and Cohen (2001), we can think of it as a way for low-income individuals to avoid risk (the losses stemming from not having enough money to meet basic needs) or to protect assets (which otherwise might have to be sold off to generate the necessary cash).

In addition, our respondents experienced inconsistencies in their cash flow due to unpredictable flows, such as a bad week for business or an emergency payment. Note that such problems may be foreseeable in an abstract sense—people know they are likely to run into such difficulties at some point during a year—but the timing is unpredictable. These types of inconsistencies presented our respondents with a problem of *risk management*. Again, a tool that helps someone manage risk is of value because it may enable them to pay for a service that mitigates the impact of an emergency (such as knowing one can pay a hospital bill rather than skipping or deferring treatment due to lack of money). Or again, the risk management tool may enable a person to avoid depleting their assets.

Finally, people value the ability to accumulate assets. Financial assets have value because they help both with cash flow and risk management. This will be the focus of our analysis of M-PESA’s role in helping people to accumulate assets. In particular, do people use M-PESA to accumulate savings—do they save on their M-PESA account?²² Note that this question highlights a potential trade-off between accumulating a *financial* asset through M-PESA and accumulating a *social* asset through M-PESA. That is, although an

²²As noted earlier, the question of M-PESA and its uptake as a savings vehicle is explored in greater depth via a smaller, purposive “study within the study” subsegment of our Diaries population. (Ferguson & Stuart, 2011 forthcoming)

individual may desire to accumulate financial assets (savings), doing so may incur a social cost—the denying of a remittance to a friend or family member. This might be especially fraught if that remittance is an obligation, intrinsic to maintaining that bond—a social asset. More generally, as one moves from a social to an individual system of savings, the amount available to an individual when needed (savings) may stay the same, but control and relational dynamics change. As individuals increasingly control their personal savings, they become less financially intertwined with their social networks and those social ties change, perhaps not always in desirable ways.

We have already seen that M-PESA connects friends and family and enables them to help each other out. We can consider this a real benefit of M-PESA insofar as those connections between friends and within families maintain these social connections and are an asset to the individuals involved. The trade-offs arise if individuals choose to accumulate a financial asset as *individuals*, and, in doing so, use M-PESA less as a tool to maintain or grow their social relations.

In the following sections, we examine the financial tools people use in situations where they face a cash flow or risk management problem, or to accumulate assets. We focus on the extent to which people used M-PESA in these situations. Finally, we place these uses in the context of the Distance/Purpose Framework.

CASH FLOW MANAGEMENT

Rutherford (2000) argues that an important function of financial services is to generate “usefully large” lump sums of cash, which low-income households can then use to purchase goods and services that they could not otherwise manage out of normal cash flow.

We looked at the way in which our respondents used financial services to pay for such unusually large expenses, which we defined as amounts that exceed the average household transaction by three standard deviations.

Our respondents reported 451 non-emergency transactions that fit this criterion (one every six weeks), and another nine emergency transactions. About one-third of these transactions (169) occurred during weeks when the respondent had sufficient

There is little indication that M-PESA remittances help microentrepreneurs plug routine holes in cash flow during no-income weeks—but clear evidence that they help manage emergencies, especially medical ones.

cash flow to pay for the unusual expense out of what they made in earnings. In some of these situations the respondent also received some sort of financial inflow such as a cash gift or a withdrawal from an M-PESA account, but the data suggest that these were not essential to cover the cost of the expense.

The other two-thirds of the transactions (282) occurred during weeks when the respondent did not have enough cash flow to cover the unusual expense (one every nine weeks). We looked at whether the respondent had gained access to any sort of external financing during the week in which they had these expenses, or in the week immediately prior. In just under half the cases (132) the respondent got some sort of external financing, and it is highly likely that in the other half of the cases

TABLE 11
SOURCES OF FINANCING TO PAY FOR LARGE CASH OUTFLOWS

Financing Source	Number	Percent	Average Amount
Spouse	71	31%	48
Family	17	7%	41
Friend	34	15%	43
Associate	30	13%	38
Bank	16	7%	404
CBO	16	7%	141
M-PESA	45	20%	39
Grand Total	229	100%	75

the respondent used money they had saved up at home to pay for the unusual expense.²³ In these 132 cases, respondents used 229 different sources of financing, including 71 cash transfers from their spouses (Table 11).

In other words, in each case of an unusually large expense there was often more than one source of finance that paid for it. As one might expect, spouses are the most common source of external financing, followed by cash withdrawals from M-PESA. Financing from banks was not very common, but when it occurred it involved considerably larger amounts, on average than any of the other sources of finance.

Looking more closely at the distances involved in gaining access to these sources of financing, we see that they were extremely local: respondents gained access to 82 percent of the sources of financing for unusual expenses within one kilometer of where they lived or worked. One might assume that this result was face-to-face exchanges of money between spouses. But excluding spouses from the analysis only reduces the share of transactions that were highly localized from 82 percent to 80 percent.

The top line in Table 12 indicates the distance

²³ It is likely that in some cases the respondent did not report a financial inflow that they used to pay for an unusual expense. We were not able to verify with complete certainty that respondents used money that they had saved up at home because we found the respondents very reluctant to discuss any such money.

traveled to pick up the cash to pay for an unusual expense, including going to an M-PESA agent to withdraw cash. But where did the cash withdrawn from M-PESA come from? In all but one case, we can match a withdrawal to an incoming remittance, and we have distance data for all but one of those remittances. We report these on the third line of Table 12. The data suggest that respondents were getting remittances that they subsequently withdrew to pay for an unusual expense from distances greater than 20 km – this is the case 74 percent of the time. All but three of the remittances came from within the family (including spouses living away from home) or from a friend. Furthermore, 43 of the 45 cash withdrawals used to pay for unusual expenses were withdrawn on the same day that they were received, one was withdrawn the day after, and one was withdrawn nine days after.

In sum, unusually large expenses present a cash flow challenge for low-income households (in fact for all households). In many cases, our respondents paid for these expenses out of their cash flow, and in other cases they paid for them with money they kept at home. In the cases where respondents used “external” financing (including money from spouses) M-PESA played an important role, bringing needed funds from family and friends across long distances to be quickly cashed out.

RISK MANAGEMENT

Low-income households are especially vulnerable to risk. They live and work in poor conditions that are more likely to result in illness or injury in the first place, and they have fewer and less reliable resources to respond to such events. To assess how our respondents manage, we looked at two types of risk: lapses in income and emergency expenditures.

TABLE 12

DISTANCE TRAVELED TO PICK UP CASH AND DISTANCE COVERED BY REMITTANCE TO PAY FOR LARGE OUTFLOWS

		0-1 km	1-20 km	>20 km	Total
Distance Traveled to Receive Cash	Transactions	183	37	2	222
	Percent	82%	17%	1%	100%
Distance Covered by Remittance Source of M-PESA Cash Withdrawal	Transactions	4	7	32	43
	Percent	9%	16%	74%	100%

For the former we isolated the subset of respondents who are microentrepreneurs because it is they who are most likely to experience unpredictable, week-to-week variations in their income. (Wage and salary workers could and did experience weeks without income, but this had more to do with paydays that occurred on biweekly or monthly regular schedules, the opposite of the chronic unpredictability confronting the microentrepreneurs.)

The 46 microentrepreneurs (27 women, 19 men) in the Financial Diaries study reported earning no income in about one out of five of the weeks (18 percent) in which they reported data to us, 241 weeks in total. During these weeks their household expenditures were the same whether they earned income or not, suggesting at first blush that not earning income in a particular week was not a problem. But in reality, they were using sources of finance to maintain their consumption. Of the 241 weeks when they had no income, they gained access to financing two-thirds of the time. Furthermore, in those weeks when they did have access to some sort of financing, their expenditures on household items were 4 percent *higher*, on average, than their normal expenditure levels; whereas in weeks when they did not have financing their expenditures were, on average, 8 percent *below* normal. In other words, a week that was both without income *and* without financing resulted in an 8 percent drop in expenditures on household items, but an income-less week *with* financing resulted in a

4 percent rise in household expenditures.

M-PESA played a minimal role in helping to maintain routine consumption during weeks without income—there were only 12 cash withdrawals from M-PESA during these weeks. But for non-routine expenditures, notably the critical issue of hospital care, M-PESA plays a far more significant role.

M-PESA AND HEALTH CARE

Hospital bills are very likely emergency expenditures. Our respondents reported paying 60 such bills. We looked at whether the respondent had gained access to any sort of external financing during the week in which they paid these bills, or in the week immediately prior. In two-thirds of the cases (40) the respondent got some sort of external financing. In these 40 cases, respondents used 95 different sources of financing, including 14 cash gifts from their spouses (Table 13). In other words, respondents often had to tap more than one source of financing to pay a hospital bill.

TABLE 13
SOURCES OF FINANCING TO PAY FOR HOSPITAL BILLS

Source	Number	Percent	Average Amount
Spouse	14	15%	26
Family	7	7%	329
Friend	11	12%	60
Associate	16	17%	47
Bank	4	4%	633
CBO	4	4%	56
M-PESA	36	38%	50
Western Union	1	1%	2128
Zap	2	2%	96
Grand Total	95	100%	115
Missing	2		

TABLE 14

DISTANCE TRAVELED TO PICK UP CASH AND DISTANCE COVERED BY REMITTANCE TO PAY FOR HOSPITAL BILLS

	0-1 km	1-3 km	3-5 km	5-20 km	>20 km	Total
Distance Traveled to Receive Cash	52	29	12	2	2	97
	54%	30%	12%	2%	2%	100%
Distance Covered by Remittance Source of M-PESA Cash Withdrawal	2	0	7	2	23	34
	6%	0%	21%	6%	68%	100%

Cash withdrawals from M-PESA were the most common source used to finance hospital bills. ***Indeed, in the Diaries study, 35 percent of hospital bills were paid with remittances through M-PESA.***

Next in importance were cash gifts from associates and from spouses. This finding has important implications for raising health standards in rural areas. Speedy access to needed cash translates into quick access to health care, both in terms of paying for transport to a health facility as well as paying the direct costs of the treatment. There may also be implications for preventive care, if knowing that you can safely and quickly receive the necessary funds leads a person to seek non-emergency care that might otherwise be deferred.

Looking more closely at the distances involved in gaining access to these sources of financing for health care, we see that they were local, but not as localized as the financing of the unusually large non-emergency expenditures. Given the prominent role M-PESA played in financing hospital bill payments, it is worth looking at the source of the cash withdrawn from M-PESA. In all but one case, we can match the withdrawal with a remittance, and we have distance data for all but one of those remittances. (See second line of Table 14.) The data suggest that respondents are getting remittances that they subsequently withdraw to pay for an unusual expense from distances greater than 20 km; this is the case two-thirds of the time. Nine of the remittances (one quarter) came from people other than

family or friends, which is different from the pattern of financing of unusual expenditures. Furthermore, 34 of the 36 cash withdrawals used to pay for remittances were withdrawn on the same day that they were received, one was withdrawn the day after, and one was withdrawn four days after.

In sum, there is little indication that M-PESA plays an important role in consumption smoothing among microentrepreneurs in our sample—there were very few instances when an M-PESA remittance coincided with a week when someone received no income. But there is clear evidence that M-PESA plays a role in helping with emergency expenditures (especially medical emergencies) and that, once again M-PESA is facilitating the long-distance transfer of money. This finding is consistent with data reported by Jack and Suri from their panel surveys (2009).

ASSET ACCUMULATION

There are many ways to save money. There is the prototypical setting-aside of a regular amount at regular intervals that gradually builds to a large amount over time. There is the sporadic setting-aside of regular or irregular amounts. There is the non-spending of a large amount that an individual happens to receive because they took a particular entrepreneurial risk, they got a windfall of some sort, or some other means. There is the setting aside of money that an individual taps into every now and then, but in amounts less they put in, resulting in an accumulating balance. And so on. There are numerous

different patterns of saving, and saving can occur over a wide variety of time periods—days, weeks, months, years—and for a wide variety of purposes, including emergencies, planned large expenditures, income-generating investments, and old age.

For the purposes at hand, we refrain from any single definition of savings, although later in the analysis, we will distinguish between people who hold balances on a savings account for periods of more or less than a month. What we will focus on in this section are three very simple questions:

- Are people holding balances on M-PESA?
- If so, what is the average daily balance on the account?
- How are they generating those balances?

Before we proceed, it is important to remind the reader of the limitations of the data.

Diaries data capture the inflow and outflow of cash into and out of the hands of an individual. In Kenya, where M-PESA is so prevalent, our Diaries also captured the inflow of cash into an e-money account, the outflow of e-money into another e-money account, and the outflow of e-money into cash.

The data we discuss below are *balances*. To establish the *balance* on an e-money account we added the inflows and subtracted the outflows, but we did not know how much had been in each account at the start of the study because people were unwilling to share that information with us. They were especially insistent in their refusals during the first few weeks of the interviews, but they continued to be unwilling to share it throughout the course of the study, even though our field workers built up a good rapport with many respondents over time.

As a result, our balance calculations are based on the balance during the study period, and

TABLE 15
PERCENTAGE OF INFLOWS INTO M-PESA ACCOUNT
CLEARED OUT AND DAYS ELAPSED

Time Elapsed	Number	Percent
Same day	344	88%
One day	19	5%
2 days to a week	20	5%
1 to 2 weeks	3	1%
More than 2 Weeks	6	2%
Grand Total	392	100%
Total Days with Flows into Account	579	
Share of Days when Account Cleared Out	68%	

do not take into account the balance brought forward at the start of the study. Furthermore, because we are calculating the balance based on reported transactions of inflows and outflows, the data are very vulnerable to misreported or unreported transactions. We expended considerable effort in verifying that we had not missed any inflows or outflows, but we know that we missed some.²⁴ With these cautions in mind, we calculated the average daily balance for each respondent based on the their inflow and outflow data. The median respondent's average daily balance was \$3.68.²⁵ We also looked at how often and how quickly an individual “cleared out” their account after receiving a remittance or depositing money into their e-money account. We found that just over two-thirds of the time the respondents cleared out what had come into their accounts before they received another inflow (remittance or cash deposit), and that 88 percent of the time the clearing-out happened the same day (Table 15).

²⁴ To understand the vulnerability of our calculations to such data errors, imagine the following situation. A respondent reports 15 transactions ranging in amount from KES 500 to KES 3,000. But he omitted to report one cash withdrawal of KES 2,000 early in the study. We would “only” have missed one out of 16 transactions, but that particular missed withdrawal means that we see a KES 2,000 (about \$40) sitting on his account for a large number of days through the study period. Is this long-term savings, or is it a data error? It matters less if the missed transaction is at the end of the study period than at the start, because the inflated balance will only be counted for the few days remaining in the study period. But alas, such errors of omission are in fact more likely to occur at the start of the study, when the rapport with the respondent is still forming.

²⁵ The average of the respondents' average daily balances was much higher, skewed by a few respondents with high average daily balances. Note also that these data do not necessarily contradict the finding reported by Jack and Suri (2011) that 81 percent of M-PESA users in their sample indicated that they saved on M-PESA. Our understanding is that a user only had to hold money on their account for a day or more to count as a saver in the Jack and Suri analysis. Any disagreement here has more to do with the definition of saving.

PAYING HOSPITAL BILLS

Arthur lives on a farm six kilometers west of Murang'a with his wife. They have seven grown daughters living in Mombasa, Nairobi, and the United States. He and his wife earn income from the farm and from a general store they have owned and operated for at least 30 years in a nearby trading center. In early April 2010 Arthur's wife became sick and had to be admitted to the Kenyatta Hospital in Nairobi. She remained in that hospital for the next month, but seems to have moved to the Menelik Hospital in Nairobi around the beginning of May, where she remained until she was discharged in early June.

During his wife's hospitalization, Arthur paid nine hospital bills in the combined amount of \$8,138. Initially he was able to pay for the bills by drawing on a combination of the cash flow from his business and by drawing down savings. In fact, it seems like he increased his earnings from his business in early April, and paid for two of the bills (one for \$600 and one for \$450) that way. In mid-April he withdrew about \$200 from his bank account via an ATM in Murang'a and his son sent him an additional \$70. He used some of these funds to pay off two relatively small (~\$60) April hospital bills, and then combined the remaining balance with two remittances of \$2,100 each from two of his daughters to pay additional bills totaling \$4,268.

After this Arthur withdrew \$1,425 from his account at Equity Bank in Murang'a to cover a \$1,700 hospital bill, and another \$468 from his account at Family Bank to pay another bill in that amount. At last in mid-June, Arthur received \$425 from his sister-in-law via M-PESA, and he traveled to the hospital in Nairobi to pay the final bill in person. Fortunately for the family, his wife had been released from the hospital the week before even though it is common in Kenya for hospitals to refuse to discharge a patient until the account has been paid in full.

During the period of his wife's hospitalization, Arthur received a number of small remittances from family members and business associates. (The latter remittances were business payments.) But these remittances were small (~\$30 to ~\$70) compared to the payments he was making. He also tried to keep up with merry-go-round commitments during this time, despite his scramble for cash to pay his wife's hospital bills. He made five contributions to his merry-go-round during his wife's hospitalization, about once every two weeks in amounts ranging from \$32 to \$70.

When the Diaries research team caught up with Arthur again in late 2010 for a second round of interviews, he was still running his store. In late November he had to pay another hospital bill for a visit to a doctor in Nairobi, this time for \$215. His daughter living in Mombasa sent him the money to pay for this. Although this cannot be verified, it appears that his wife's hospitalization in spring 2010 may have exhausted Arthur's savings, both formal and informal, except for his merry-go-round account. In January he received a \$380 pay-out from his merry-go-round and another in February for \$530. It appears that he tapped his own savings to the extent possible to cover the less-daunting hospital bills, used remittances to cover the biggest ones, and is now rebuilding his reserves via the merry-go-round.

These data suggest that M-PESA is mainly used for transactional purposes—moving money from one person to another digitally, and then converting the e-money to cash. Nevertheless, there were many cases when respondents did not clear out what they had received or deposited before they received or deposited another inflow into their account. In some cases, 24 that we could identify (an additional 4 percent), the respondent cleared out both his previous inflow and his new inflow after receiving the second inflow, but

this still leaves over 163 instances (28 percent) where this did not occur.

Looking at respondents on a case-by-case basis we see a number of different patterns where respondents did not clear out their remittances or deposits. (See text box “Some Exceptions to the Rule.”) There were a number of respondents who seemed to accumulate a number of remittances in a short period of time, and then “sat on” them. One respondent received three remittances in late November, did not report another remittance

until late February, which she also did not cash out, received three remittances that she did cash out in March and April, and then drew down some of the money she had stored at the beginning of May. After a couple of other cashed-out remittances in June, she received remittances in July, at the end of the study.

Another respondent received a number of remittances in April, an additional one in May, and then started drawing down the accumulated amount plus a couple of new remittances in June.

A variation on this pattern was a respondent who reported receiving and cashing out a number of remittances between November 2009 and early May 2010. And then for the rest of the study period, he reported making deposits onto his M-PESA account, without sending a remittance or withdrawing the cash, except in one case when he deposited money and then immediately remitted it.

There was also a case where a respondent reported receiving a large remittance, which they left in their account. A respondent received a remittance of \$212 from which they withdrew \$23, leaving the rest on account, with the

addition of another remittance of \$26 two days later, and a partially withdrawn remittance of \$86 in late March. After all this activity the M-PESA account went quiet.

More generally it should be noted that most of the inflows into the M-PESA accounts of respondents that were not cleared out were remittances, not cash deposits. Of the 190 transactions that were not cleared out, 146 were remittances and only 44 were cash deposits.²⁶ In other words, the most likely way in which individuals in our sample ended up leaving money in their M-PESA accounts was by failing to withdraw or only partially withdrawing a remittance sent to them, not by parking their own cash there.

In sum, the predominant use of M-PESA is for transactional purposes. Nevertheless, there are indications that some of our respondents accumulated money in their M-PESA accounts. They did so in a variety of ways, but one dominant pattern was that they were more likely to leave money in their account after receiving a remittance, rather than after making a deposit.

²⁶ The number of transactions, 190, is different from the number of days in which these transactions occurred, 163, because there days when a respondent received more than one inflow.



New Markets for E-Money: Networks, Pathways and Costs within Market Segments

In the previous three sections we have discussed the structure and dynamics of the e-money market in Kenya in terms of:

- *Segmentation by distance and purpose,*
- *Networks and embeddedness, and*
- *Transactional costs and pathways.*

Segmenting the transaction data by distance and purpose yields the Distance/Purpose Framework, which we can use to analyze each of the four resulting market segments based on what we know about the nature of the interpersonal relationships each quadrant contains and the transactional pathways that each is likely to follow. From there, we can start to speculate about the potential within each market-segment quadrant for e-money to evolve and expand.

IMPLICATIONS FOR E-MONEY PROVIDERS

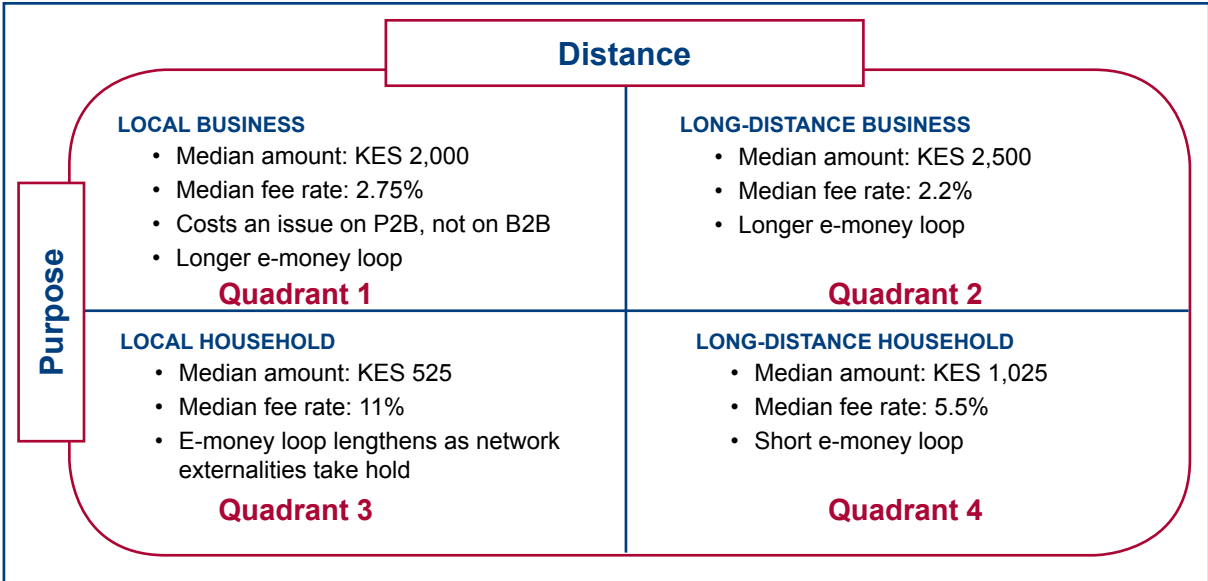
As noted, our data reveal that the “send money home” segment is still the dominant one in the Kenyan e-money market. This market segment is characterized by long-distance/household remittances embedded in existing networks of relations within families and between friends, where the “e-money loop” is most likely to have a length of just one. The evolution of this market segment is likely inherently limited both in terms of the size of the network (each person has a limited number of friends and family) and by the amount transacted (each person also has a finite amount of spare cash they can “send home”).

Thus one might reasonably conclude that Quadrant 4 (Figure L), the long distance/household segment, will continue to grow as long as the customer base of the e-money market as a whole grows, but will level off once that customer base stops growing. Furthermore, without growth in the other segments, it is likely that the e-money loop will continue to have a length of about one, with all the costs that short length implies for both the e-money provider and for consumers.

Our data suggest that the other market segments are in their infancy. But do they have potential? In Quadrants 1 and 2, the business segments (both local and long-distance), the networks are less constrained by existing social relations. Our data suggest that business transactions are more likely to take place between people who are not friends and family. In addition, business transactions appear to involve longer e-money loops. If both these conditions exist then the business remittances market segment has the potential for growth, because it is not constrained by the limits of individual customers’ family and friends networks, and it may grow in a way that reduces the overall cost of the system for each transaction performed. Furthermore, given the larger sums involved in long-distance business transactions, the transactions costs incurred in cashing in, sending, and cashing out e-money by the customer are relatively low.

There is also potential for growth in Quadrant 3, the “local/household” market. This segment is the flip-side of a considerable part of Quadrant 1, the local/business segment, with the two often representing two sides of

FIGURE L
PRICE AND MARGINAL COST WITHIN THE DISTANCE/PURPOSE FRAMEWORK



the same coin. For a vendor of household goods, for example, the sale of a broom is a business transaction. For his customer, the purchase of that same broom is a household transaction. In such a scenario, the “local/household” use of e-money is no longer defined by the limits of the individual’s social network. In a real-life scenario that is becoming increasingly common, Kenyan taxi drivers, who appreciate receiving fares via M-PESA rather than cash for reasons of personal security, already operate at this nexus where business, household, and e-money provider interests all converge.

All predictions and prescriptions come with caveats. In the case of the potential for growth in the Quadrant 2 long-distance/business segment, it is important to note that trust in the e-money system remains a significant issue. Viewed in light of the importance of trust, it makes sense that the “send money home” scenario was the first e-money application to take off. A son working in the capital city who sends his mother \$100 can call her to make sure she received it – and can take her word for it if she says she did not or that she only got \$50. This ability to verify transactions enabled users to get comfortable over time with the e-money concept. The question now is whether enough trust has built up in the system for people to be willing to send money to someone with whom they may have weaker ties, trusting the confirmation messages the e-money system generates as sufficient verification.

This issue was raised by some respondents in in-depth interviews for a second phase of this study (on which we report more extensively elsewhere [Ferguson and Stuart, 2011]). These respondents expressed their reluctance to save on M-KESHO, the then-new bank account offering from Equity Bank, which allowed people to deposit money into their account

from their M-PESA account. The source of their reluctance was the fact that making a deposit into their M-KESHO account meant having to trust that the transfer from their M-PESA account to their M-KESHO account actually went through. In essence, with an M-KESHO transaction there is no trusted recipient who can independently verify receipt of the transfer.

Could trusting an e-money system to handle business transactions be like the real-world example of asking a fellow market trader to watch your stall for you?

If the Diaries interviewees are representative of the general population of e-money users, then growth of the long-distance/business market may take a while absent some means to permit independent verification that transactions are going through. In the informal economy, where a lot of Diaries respondents earn their living and spend their money, formal mechanisms for registering complaints and settling disputes (e.g. consumer protection agencies, law enforcement and judicial systems) are not sufficiently developed to solve the trust problem. People instead rely on informal norms to govern business behavior that enable, for example, urban traders to exchange favors such as guarding each others’ stalls (Lyons and Snoxell, 2004).

But it is unclear whether such physical-world norms can address the trust problem associated with an e-money system. In the same article, Lyons and Snoxell (2004) report that when they asked market traders in the

TAKING CARE OF BUSINESS

James moved to Kibera in 2000, leaving home to attend college in Nairobi. There was nothing for him at home. “Life there is not all that comfortable,” he said. At the time, his stepbrother lived in Kibera and helped him get settled. He started working as an assistant manager at a grocery store before starting his own business. But the post-election riots of 2008 left him without a shop. “They took everything, including the spoons and the wires for the electricity,” he said. In the aftermath of the riots, James’s father gave him the money to start over. He now sells chickens and also owns a bar and liquor store. He says his new businesses are picking up but that he has not made it back to where he started before the riots.

When he first purchased his phone, James used it to communicate with business partners and family members. He started using M-PESA as soon as it became available. He needed to send money to his mother and wife upcountry. But now he frequently uses it for business as well. “My business would not work without the phone,” he said. He pays workers and suppliers over the phone and uses it to purchase stock. Indeed, 44 of his 61 withdrawals supported his business. And 67% of all his transactions went toward a business or mixed purpose. Speaking about how frequently he uses M-PESA for his business, he remarked, “I have 3,000 (shillings) in my pocket but I’ve transacted over 50,000 today.”

He does not simply use M-PESA to facilitate and support his business. He uses M-PESA to ensure the financial security of his business. In the past, he was robbed of cash and finds M-PESA a safer way to handle receipts and payment. He directs whatever is left into his M-Kesho account. He moved a total of KES 50,500 from M-PESA to M-Kesho in 35 transactions. “I thought it was very, very convenient and very secure,” he said.

His phone, in other words, has become an all-in-one business management tool. To be sure, he often made a number of large purchases for his business from a local wholesaler. He would deposit cash of the same amount shortly before the transaction took place. For example, in week eight he bought KES 35,000 worth of goods from his wholesaler. That same week he remitted KES 55,150 to his sister. Just two days before doing so he made cash deposits of KES 90,000 (likely in two tranches as the limit for deposits was KES 70,000 at the time). This wasn’t uncommon. The same pattern of cash deposits shortly preceding wholesale business purchases occurred in weeks seven, nine, twelve and thirteen.

Reflecting on what his life would be like without M-PESA, he remarked, “It would not be the same. We are so used to these things. They’re like food.”

Kenyatta and Westlands markets of Nairobi whether they would trust another trader to return a lost wallet only 11 percent of them responded that “most people” would return the wallet, while 44 percent reported that most *friends* would do so (*ibid.* 1087).

If sending a remittance to a business associate is the equivalent of losing your wallet and hoping someone will return it, then it is unlikely that informal norms will enable long-distance business remittances to flourish. But if e-money is more comparable to asking someone to guard your stall – or if such a feeling of comparability could be

elicited through some social reinforcement mechanism – then perhaps informal norms could be leveraged to allow long-distance business remittances to take root.

While social norms are necessary for users to trust each other, it is also vital for e-money providers to engender trust in the system itself, through a combination of “learning by doing,” competent service, and customer recourse. By “learning by doing” we mean the process by which people get comfortable with a system by using it. The current users of M-PESA are learning to trust it by using it. But obviously, learning by doing only

generates trust if the system in fact proves itself to be trustworthy. This means that the e-money provider has to focus on making sure that it delivers good customer service continuously. One obvious facet is to ensure that the system is never down. This, in and of itself, should engender trust, as it will reduce the likelihood of errors or confusion about payments resulting from system outages. Furthermore, given the power of word-of-mouth, positive individual experiences with the system have the potential to spread trust in the system rapidly.

An e-money system can further enhance trustworthiness by giving a customer some recourse in cases where the system fails him, or, more ambitiously, if someone uses the system to cheat him. This last suggestion is not as far-fetched as it seems, given that credit card companies already absorb losses resulting from stolen credit cards. Alternatively, the e-money provider can offer some sort of escrow account in which a buyer's payment is held until he has a chance to inspect the goods purchased with e-money via long-distance. The specifics of these solutions may make them difficult to implement in practice, or may make them bad ideas. But the point here is to highlight the role trust will have to play for the business market segments to expand. Furthermore, service innovations designed to build trust in the system will also have to be accompanied by a marketing campaign that explains the innovations and specifically encourages the use of M-PESA for business.

The question of verification is not an issue in local business transactions, where people are using M-PESA directly as a cash substitute, sending and receiving money while standing face-to-face. Such a transaction mirrors what e-money users are already used to. It is the same type of transaction they perform every

time they cash into or out of their M-PESA account at a local agent. The only difference is that in these new local business settings they will be exchanging a good or service for the e-money and not cash. Nevertheless, the desire for receipts as proof of purchase will likely persist and will remain a challenge that it is hoped will be overcome with time and practice.

Despite the familiarity of the face-to-face business transaction our data suggest that there may be other challenges in expanding the business market. The convenience and force-of-habit issues are substantial, as illustrated by the example of people overwhelmingly paying cash for airtime even though they could buy it from M-PESA with no service fee. The other daunting constraint on growth in the local/household segment (Quadrant 3 of our Distance/Purpose Framework) is, as noted, simply the very small amounts of money involved. Even when aggregated by category, half the weekly transactions reported were less than \$4.25. So customers or merchants or both would have to be willing to pay a fairly large transaction fee if they were to use M-PESA for regular household transactions.

E-money providers can address this issue by altering their pricing to make it more attractive for businesses which have a lot of small transactions to accept e-money payments. We can see how this might work by returning to the example of the taxi driver. The e-money provider offers the taxi driver a significant discount on transaction fees if he meets a minimum number of transactions per day, week, or some other period, say a drop in the fee from \$0.63 per transaction to \$0.06 per transaction for 10 or more transactions per day. With such a discount, the driver may be willing to accept payments from customers over the phone, and absorb the \$0.06 fee,

especially if he operates in neighborhoods where driving around with a lot of cash is a bad idea.

When it came time to buy gasoline, the taxi driver could pay for it with e-money. The e-money provider might encourage the filling station to accept the payment by providing them with a discount for accepting e-money payments for even small amounts of gas purchases, and they both might get an additional discount for being in each other's preferred associates network, as a way to get businesses to encourage each other to use e-money for payments.

Again, the specifics of this idea may make it fail in practice, but the insight here is that an e-money provider needs to find a way to differentiate small retail business transactions and price them differently as a way to encourage growth in the local business market segment. Safaricom is trying to do some price-differentiated product development with some of its new offerings, targeting large, formal organizations such as utilities and large employers (the former with a bill payment service, the latter with a salary payment service). But the discussion here is focused on how to differentiate the millions of small businesses in the informal economy.

Furthermore, the discussion in the preceding paragraph highlights the fact that e-money providers should be thinking about how they can cascade the use of e-money through a business' supply chain as a way to grow the market virally. Note that in both Quadrants 1 and 2, the local and long-distance business market segments, an e-money provider's marketing would be very different from the marketing that Safaricom has traditionally used to promote M-PESA. Almost since the beginning, Safaricom has marketed M-PESA as a "send money home" product. Their

first advertisement showed an urban young man sending money on his phone, and an older woman in the fields (by implication his mother) receiving the money. Clearly this ad hit the spot, but has nothing to do with the new market segments discussed above.

In sum, if we look within the market segments identified in the Distance/Purpose Framework, at the networks of relations that undergird the current remittance patterns, at the transactional pathways, and at the associated transactions costs we can see why "send money home" was such a successful basis on which to launch M-PESA. But as noted, that market segment likely has organic limits based on the size of individuals' personal networks and the amount of spare cash they have. The other market segments are less constrained by those particular factors, but have others of their own. The long-distance business segment (Quadrant 2) requires people to place more trust in the e-money system, and the local market segments (Quadrants 1 and 3) require either a willingness of customers to pay high transaction fees, or the willingness of the e-money provider to lower them.

IMPLICATIONS FOR FINANCIAL SERVICE PROVIDERS

The original impetus for this report was consumer-led: to understand the role e-money could play in expanding formal financial services into underserved communities, especially hard-to-reach rural ones. The previous section examined how e-money providers might advance that work by growing their operations into new market segments. In this section we consider more closely the implications of our findings for financial service providers.

The Diaries methodology produces transactional data that can be used for

product development. Traditional approaches to product development in microfinance start with a functionality for which the service provider believes there may be a demand. The service provider then commissions market research to see whether there is such a demand, and, if so, how best to meet it.

A transactional data approach to product development, by contrast, starts with the customer's inflows and outflows of cash and works out how the financial service provider can intermediate those flows of cash in such a way that they add value. For example, the data from MFO's Malawi Financial Diaries demonstrated to executives at Opportunity International Bank of Malawi (OIBM) the surge in spending that even low-income Malawians engage in around Christmas time during the "hungry season," and the dramatic drop off in spending after Christmas. This suggested to OIBM that low-income Malawians were accumulating money at home ("under the mattress") in anticipation of Christmas spending, and that there was an opportunity for OIBM to offer their customers an alternative place to save for Christmas. So OIBM refocused its "Nkhokew" Christmas savings product (meaning "food granary"), which had formerly been available only to salaried employees, and extended it to farmers and the self-employed as well.

One important consequence of this transactional approach to product development is that financial service providers can observe how low-income individuals use informal financial services, and, as a result, work out their own role in relationship to those informal services. For example, our data suggest that low-income individuals in Kenya use M-PESA to enhance their ability to tap into informal financial networks—networks that might not otherwise work very well when spread

over long distances. In this regard, M-PESA has "strengthened the competition" if we believe that banks are competing against low-income individuals' social networks to be the preferred provider of financing. Regardless of one's position on this question, it is not a very productive way to look at the challenge facing banks which is this: How can they use e-money systems to adapt their own products and services to the way in which low-income individual currently manage their money?

E-money providers should be thinking about how they can cascade the use of e-money through a business' supply chain as a way to grow the market virally.

One obvious strategy is for banks to get into the e-money space themselves. They will need to partner with a telco to ensure their agents are connected to the bank's servers, but they do not have to replicate the M-PESA "telco-led" model whereby customers have an account with the telco, and the bank's services are an add-on rather than integral to the e-money system.

Integration is what banks are doing under the "bank-led" model, in cooperation with the mobile phone provider Orange. E-money users do not have an e-money account with Orange, but rather have a bank account that they can deposit cash into or withdraw cash from via their phones. In addition, they can send or receive e-money directly from their bank account. In such a situation, at the very least, a bank can earn fees from the transactions performed in and out of their customers' accounts, just as banks in developed economies earn fees from their customers' use of their debit and credit cards.

Beyond becoming an e-money conduit themselves, banks are faced with a challenge in using e-money effectively to enhance their operations. Clearly banks (and also other formal financial service providers such as licensed microfinance institutions [MFIs] and cooperatives) can use e-money transfers to lower their operating costs, by reducing the amount of cash handling they have to do, both internally (in terms of paying employees and suppliers) and externally (with customers who can perform all sorts of transactions by phone). It would also be feasible to offer customers something more akin to a checking account on their phone, as a way to differentiate accounts used for cash flow management from accounts used to manage risk and accumulate assets.

But two critical questions emerge from the findings presented here about how far banks and MFIs can go with e-money. One has to do with distance, and the other has to do with money discipline. With respect to distance, e-money offers the possibility that banks and MFIs can serve their customers at a distance, through agents. Note that a bank or MFI can take advantage of the ways e-money reduces cash-handling costs while still interacting with their customers face-to-face (not unlike our taxi driver from the earlier discussion about the local business market segment).

But what about taking the next step of cutting back or doing away with face-to-face transactions, thus using e-money to lower the fixed overhead costs of keeping client-facing staff on payroll? More particularly,

SOME EXCEPTIONS TO THE RULE

“Cash in, cash out” is by far the dominant pattern of M-PESA remittances. Users receive e-money into their M-PESA accounts and quickly convert it into cash, often the same day. The account is usually cleared out of one remittance before any new one is received. Here are a few deviations from that practice:

RESPONDENT A

Late November 2009	Received 3 remittances	Let them sit
Late February 2010	Received 1 remittance	Let it sit
March & April 2010	Received 3 remittances	Cashed them out
May 2010	(Nothing incoming)	Partial withdrawal
June 2010	Received 2 remittances	Cashed them out

RESPONDENT B

April 2010	Received remittance	Let it sit
May 2010	Received remittance	Let it sit
June 2010		Partial withdrawal
Late June 2010	New remittances received	

RESPONDENT C

Nov 2009-May 2010	Various remittances	Received and cashed out
May 2010-study end	(Nothing incoming)	Deposits made, with nothing outbound except one quick deposit made and sent

should banks and MFIs do away with face-to-face meetings for loan transactions – disbursements and repayments? Before making such a decision, banks and MFIs should think very carefully about the value that face-to-face meetings generate for risk management and for cross-selling other products. Furthermore, given the fact that an e-money system operating on a mobile phone platform inherently means that a customer is also connected to the bank or MFI by voice communications, financial service providers will want to think hard about how they might substitute some face-to-face interactions with voice communications. There is no right answer here. But it is important to differentiate between e-money's clear benefits of reduced cash handling costs, and the assumed benefits of being able to conduct transactions at a distance. The first is an obvious gain; the second carries significant ambiguities.

With respect to financial discipline, the e-money platform presents a dilemma. Low-income individuals discipline their use of e-money by making sure they load money onto the system on an as-needed basis. But a

financial service provider wants low-income individuals to load money onto their accounts and keep them there—to save. Furthermore, they want to avoid having customers run their savings down as quickly, or more quickly, than they accumulate them. This is not only important for their customers' risk management strategies, but also for the banks' liquidity management strategies.

As noted above, one possibility is to acknowledge that customers will find it hard to hold onto money in a regular e-money account, and that, in fact, the value of such an account is its convenience (meaning its flexibility, accessibility, and ease of use). Having acknowledged this, and having priced flows into and out of the account to generate some revenue, the bank can offer an associated savings account, or a set of e-wallets that customers can use to set aside money that they want to use for risk management and asset accumulation. With some experimentation, and with accompanying financial education, a bank might be able to design a set of e-wallets that offer a mix of convenience and discipline, priced accordingly.



Next Steps

The Diaries data provide considerable insights into the way Kenyans use e-money. But the sample from which we drew these data is small, and there is room for further exploration of the questions we have raised, both for research and practical purposes. In particular, an e-money provider trying to decide whether they should change their marketing, product offerings, pricing or service-delivery strategy might want to verify these results with a larger sample of data.

E-money providers and financial service providers are already in possession of much of those data. On what basis do we make this assertion?

The Diaries data are transactional data— the unit of analysis is a transaction. This is the same unit that e-money providers deal in— their job is to enable transactions and get paid for that service. To enable transactions they have to track them, which means that they have a wealth of transactions data in their management information systems (MIS). In the same way, financial service providers have a lot of data on the transactions of their customers in their own MIS.

MIS data along the lines suggested here could provide information on how to address the issue of dormancy operationally.

Such an analysis of MIS data is most powerful when accompanied by transactional data from Diaries gathered from both customers and non-customers alike. The latter data play two roles. First, they provide information on non-customers that can be used to determine the ways in which they are different from or similar to customers in their transactions activity. Second, they provide contextual information for the customer transactions observed in the MIS data—they help explain why a particular set of customers has a particular pattern of e-money or

financial transactions by providing information on all their other cash flows. As a result, the combination and analysis of these two types of data can generate valuable insights into how e-money and financial service providers can intermediate the cash flows of low-income individuals in ways that add value to the lives of those individuals.

M-PESA AND EDUCATION

Bridge International Academy, a for-profit primary school franchise in Kenya, has instituted a policy wherein all payments coming in from parents or going out to vendors and staff must be made via M-PESA (or via an account with Equity Bank, a leading financial services provider in Kenya). Bridge has developed an automated system whereby school managers use text messages to request or deny payments to staff and suppliers without ever handling the money themselves which provides greater security and lowers rates of fraud. The automated cashless system also facilitates record-keeping, minimizes error, and provides real-time access to data on the school's financial condition.

Source: Ignacio Mas, "Micro e-payments are Low Cost Schooling in Kenya," NextBillion blog (September 2, 2010) <http://www.nextbillion.net/guest-post-micro-e-payments-and-low-cost-schooling-in-kenya> as quoted in How Mobile Money Has Changed Lives in Kenya (Conference paper from Global Savings Forum 2010, Bill & Melinda Gates Foundation).

An analysis of MIS data can reveal patterns of transactions conducted by e-money and financial service providers' customers, which can be used to segment the market. In addition, such an analysis can offer insights into the differences between uptake (the opening of an account) and usage (the use of the account) rates. Dormancy, the non-use of an account, is common amongst low-income account-holders. Transactional analysis of

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