



FSD Research Brief

THE M-PESA EFFECT: ARE FINANCIAL TRANSACTION COSTS A BARRIER TO MORE EFFECTIVE INSURANCE FOR FAMILIES IN KENYA?

Mobile money users in Kenya are better protected from shocks than non-users. Cheaper and easier remittances using M-PESA allow users to deal with the consequences of risk more effectively.



This brief features three studies by Tavneet Suri, William Jack, Thomas M. Stoker and Adam Ray:

Jack, William, and Tavneet Suri. 2014. *"Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution."* American Economic Review, 104(1): 183-223. DOI: 10.1257/aer.104.1.183

Suri, Tavneet, Jack, William and Thomas M. Stoker. 2012. *"Documenting the birth of a financial economy."* PNAS, 109(26): 10257-10262. DOI: 10.1073/pnas.1115843109

Jack, William, Adam Ray, and Tavneet Suri. 2013. *"Transaction Networks: Evidence from Mobile Money in Kenya."* American Economic Review, 103(3): 356-61. DOI: 10.1257/aer.103.3.356

Exposure to risks such as sickness, drought, theft, or the death of a loved one is a fact of life in Kenya and with limited government safety nets and private insurance options, unexpected setbacks can be devastating. In Kenya, as in much of the developing world, individuals distribute the costs of the consequences of risk among their social networks, such as friends, extended family and neighbours. This behaviour is known as risk sharing. The trouble is that informal risk sharing mechanisms are an insufficient and imperfect form of insurance. Take for example Monicah, a participant in FSD Kenya's financial diaries study¹. Monicah was diagnosed with throat cancer but the costs of the required surgery far exceeded her ability to pay. Although she tried, she could not raise the amount required to pay for the surgery in time. She died.

Economists have studied and identified information asymmetries as one reason why informal risk sharing is often unable to provide full insurance

¹ Findings from the Financial Diaries can be found at <http://www.fsdkenya.org/financial-diaries>.



to people. Many potential transactions between parties are deterred when unequal amounts of information are held between the parties. In the case of Monicah, it was hard for her social network to verify the presence and severity of her illness, and this may have deterred some participants in her network from contributing to her surgery.

In addition to information asymmetries, transaction costs can also be an important deterrent to insurance by making it harder or too costly to transact

with people who are geographically distant. Technological innovation however, is reducing these costs. In Kenya, mobile money in particular has given many households - who previously had very limited and inefficient means to send money - access to reliable and instant money transfer services. Previously, most sent cash physically in person or by ground transport.

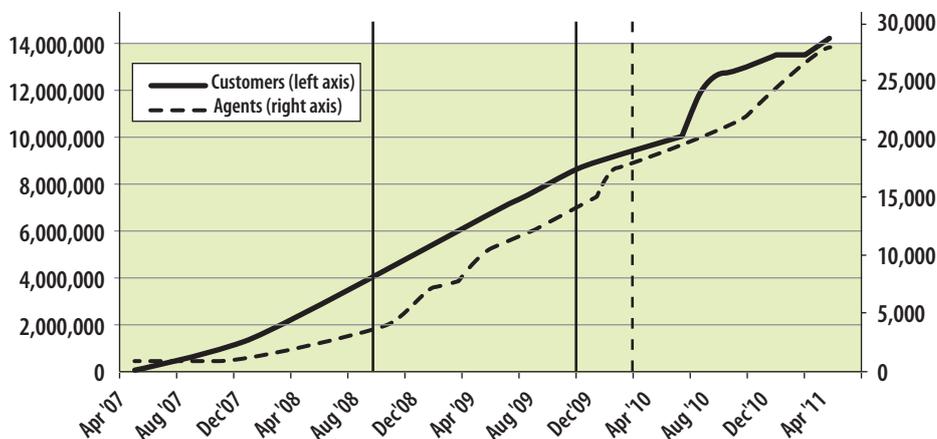
A landmark study by Tavneet Suri and William Jack, based on three rounds of an almost nationally representative household panel survey² in Kenya conducted between 2008 and 2011, tests the importance of transaction costs as a barrier to full insurance in the context of the rapid expansion of M-PESA. Launched in 2007 by Vodafone Safaricom, M-PESA allows individuals to transfer money by simple short messaging service (SMS) via a network of retail outlets known as agents that are spread densely across the country. Figure 1 shows that by 2011, the number of M-PESA agents reached 28,000 and the number of registered users reached 14 million. Ignoring multiple accounts and those held by foreigners, the numbers imply that about 70 percent of the adult population signed up to M-PESA in the four years after its launch³.

² The surveys were conducted in August-October of 2008, October 2009-January of 2010, May-August of 2010 March-June of 2011 and a fifth survey to explore longer term impact was conducted in June-September of 2014. With the exception of 8% of the national population in areas of Northern Kenya, which had to be dropped for logistical reasons, the surveys were nationally representative.

³ As the results of the study are based on household surveys conducted between 2007 and 2011, only agent, user and penetration data for this timeframe are reported here. There are now over 125,000 registered mobile money agents, and 25.4 million registered mobile-money accounts.

Figure 1: Registered M-PESA customers and agents, 2007-2011

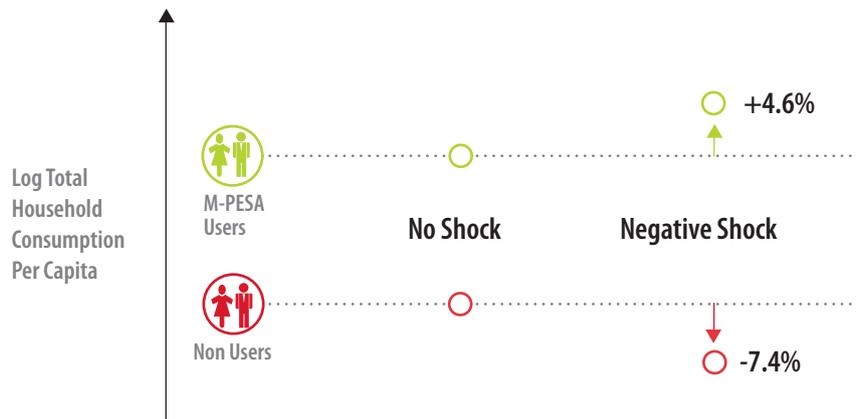
The 4 years after M-PESA launched saw an unprecedented expansion first in registered customers and then in the agent network.



Source: Safaricom.

Notes: The solid vertical lines indicate when household survey rounds were conducted; the dashed vertical line represents when the agent survey was administered

Figure 2: Effects of a negative shock on total household consumption per capita, by user status
Households using M-PESA are better able to protect consumption levels from negative income shocks



Source: M-PESA household panel survey

Between 2007 and 2011 new M-PESA agents were added primarily within locations that already had agent presence, rather than to new locations that did not have any agents. By 2011, only 4% of households reported gaining access to a new agent within 1 km, while there was a 100% increase in the number of agents within 1 km for households that had access to an agent within 1 km in 2008.

Data from the first round of the panel survey in 2008 give estimates of how much cheaper sending money through M-PESA was relative to other options. On average, fees incurred per transaction amounted to KShs 158 by bus, KShs 173 with Postbank and KShs 108 with Western Union. In addition, a large number of transactions were delivered in person where no fees were paid but transportation costs had to be incurred. In the 2008 survey, the average distance a transaction travelled was over 200 km, to cover such a distance would have required about a KShs 460 bus ride. An M-PESA transaction, on the other hand, incurred no transport costs on average, and the fees averaged KShs 35 per transaction.

ANALYSIS AND RESULTS

To examine the impacts of M-PESA usage on the risk-sharing behaviour of households, the study compared the responsiveness of consumption to income shocks⁴ for M-PESA users and nonusers. To validate the results, the authors also considered proximity to an M-PESA agent as a proxy for access

⁴ The income shocks that were considered in the analysis included: death or illness of a household member, accidental or violent injury, loss of employment, failure/loss of business, death of livestock, crop disease, theft/robbery/burglary/assault, fire, drought/floods and price rises.

to the mobile money service. Being at a large distance from an agent, just like not having the service at all, seems to act as a deterrent to insurance by failing to alleviate transaction costs.

Figure 2 above shows that, although M-PESA users have higher per capita consumption than nonusers, how they respond to income shocks is quite different. The left side of the figure shows the “no shock” scenario, where users have higher expenditures than non-users. The right side of the figure shows how these levels of per capita consumption change when users and nonusers experience negative income shocks. The per capita consumption for nonuser households falls by 7 percent when hit by a negative shock⁵. On the other hand, M-PESA users were able to maintain consumption levels steady in the aftermath of shocks. The authors then show that these smoothing effects are largely due to improved risk sharing and not due to any effects that M-PESA may have on savings.

The effects are stronger for the poorest in society, which is expected as the better off have access to other mechanisms that allow them to smooth consumption, regardless of M-PESA. The results are also similar when households in Nairobi and Mombasa (the largest and second largest cities in Kenya) are excluded from the sample. Results are also consistent when only looking at the impact of becoming sick on consumption. M-PESA users seem able to finance health care expenditures without compromising other consumption, while nonusers must reduce non-medical expenses to finance the illness shock (Box 1).

⁵ For context 7% of per capita household consumption is the same as total expenditure per capita on education and almost double total expenditure per capita on medical expenses.

Box 1: A closer look at how households with access to mobile money are better able to cope when illness strikes

In a separate analysis of the impact of health shocks on household welfare, Tavneet Suri, William Jack and Thomas M. Stoker find that households using M-PESA avoid having to reduce household expenditures to finance medical care, while households that do not use M-PESA have to re-allocate resources from within their budget to finance health care costs.

- M-PESA users significantly increase their total consumption expenditure by 11.8%, while nonusers reduce theirs by 3% (the latter is not statistically significant but the difference between users and nonusers is).
- To understand where the variations come from, the authors break total expenditure into medical and non-medical expenses. This analysis reveals that M-PESA users spend 6.7% more on nonmedical expenses (all expenses except those that are medical related), whereas nonusers spend 9.6% less (a statistically significant difference between users and nonusers).
- When hit by illness, both users and nonusers spend more on medical care. The increase in the propensity to spend on medical care for M-PESA users compared to nonusers is 4 percentage points. Although this difference is not significant, users are able to increase nonmedical expenditure, while nonusers substitute from nonmedical expenses to finance the costs of the health shock.
- In an attempt to understand what nonusers are substituting away from, the authors take a closer look at different types of expenditure. Nonusers reduce their food expenditures by 4.4% (not statistically significant), although users significantly increase theirs by 4.7%. This difference between users and nonusers is statistically significant.
- M-PESA users are able to increase non-food subsistence expenditure by 10.2%, while nonusers reduce theirs by 13.7% (a significant difference between users and nonusers). Nonusers therefore seem to reallocate their money by substituting away from non-food subsistence expenditure to finance the costs of the health shock.

MECHANISMS

To get a better idea of how and why M-PESA users are able to smooth consumption when faced with shocks, the authors take a closer look at the mechanisms by which M-PESA improves the ability of households to absorb income shocks. The analysis shows that remittances, rather than savings, seem to be the main mechanism that allows M-PESA users to improve their ability to share risk.

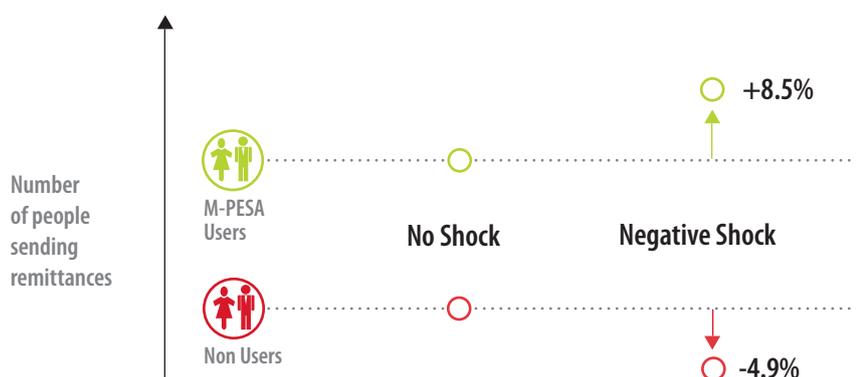
Figure 3 below shows that, again users are more likely to receive remittances

than nonusers, but how they respond to shocks is different (the figure structure is similar to Figure 2 above). After a shock, the likelihood of receiving remittances increases by 4.8% for users, while it decreases by 3.7% for nonusers, suggesting that the consumption smoothing documented earlier is due to risk-sharing arrangements enabled through remittances.

Likewise, figure 4 below shows that the number of people sending remittances increases by 8.5% for users, while it decreases by 4.9% for nonusers. Results also show that the frequency of receiving remittances and the magnitude of those remittances are higher for households using M-PESA.

Figure 4: Effect of a negative shock on the number of people sending remittances, by user status

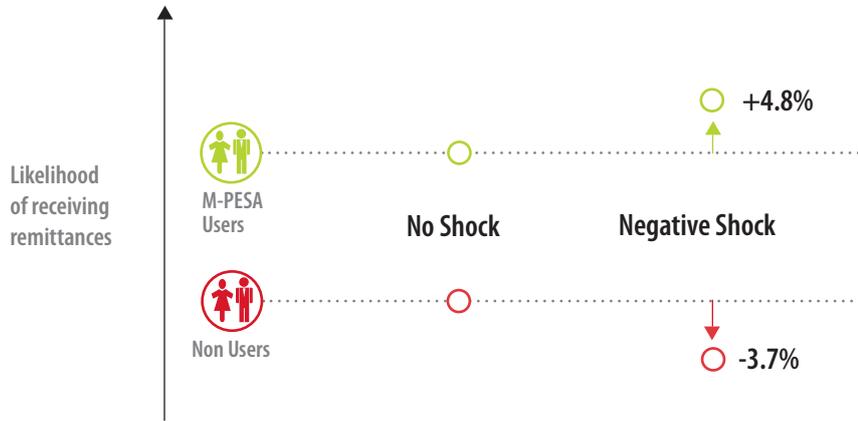
Households using M-PESA mobilize remittances from a larger network than non-using households



Source: M-PESA household panel survey

Figure 3: Effect of a negative shock on the likelihood of receiving remittances, by user status

Households using M-PESA are better able to mobilize funds from remittances after negative income shocks



Notes: The sample used in this analysis excluded observations from Nairobi

Source: M-PESA household panel survey

Finally, the data shows that transactions received in response to negative shocks come from a wider network in that they come from more different people who are farther away from the recipient. This suggests that mobile money users are able to reach deeper into their networks when in need of risk-sharing mechanisms after a shock. This is particularly important when shocks affect entire communities in the case of, for example, a

flood. A geographically small network would be unable to react as all would be similarly affected, but M-PESA allows people who haven't been flooded to help. The results exploring underlying mechanisms are similar when considering samples excluding Mombasa and when considering illness rather than overall shocks. Box 2 explores the impact of M-PESA on remittance networks more closely.



Box 2: A closer look at how mobile money affects remittance networks

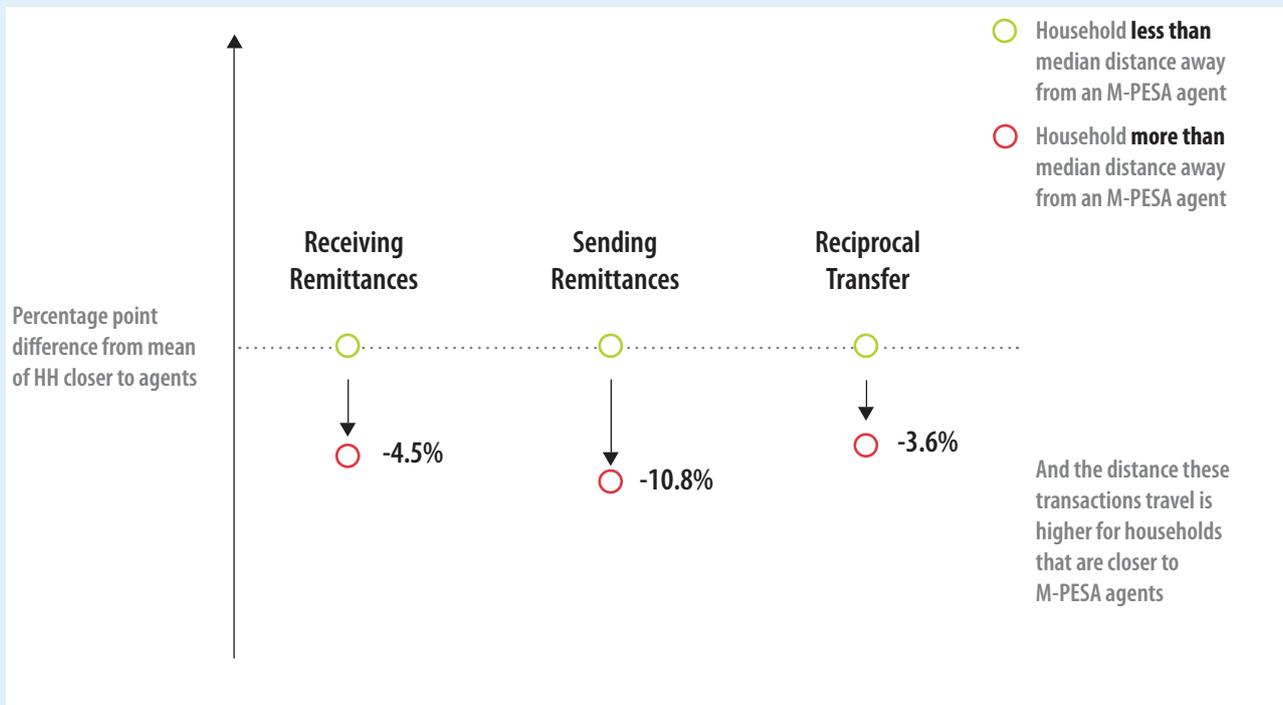
Using observations from 2,018 households from the first two years (2008 and 2009) of a five-round panel survey (conducted through 2014) plus interviews of approximately 7,700 M-PESA agents across Kenya, William Jack, Tavneet Suri and Adam Ray explore the impact of M-PESA on the volume and reciprocal nature of remittances (peer-to-peer money transfers). The study finds that households using M-PESA were 37.4 percentage points more likely to receive remittances and 34.3 percentage points more likely to send remittances than households that were not using M-PESA. M-PESA households also sent or received transfers more frequently, at higher values and over longer distances – about 100km more than nonusers. Finally, M-PESA users were about 13 percentage points more likely to engage in reciprocal transfers with other members of their network than nonusers.

To validate these results, the study also considered the impacts of household proximity to M-PESA agents on remittance patterns⁶. While statistical significance declines, it seems that being further than the median distance (0.9 km) to an M-PESA agent yields results that are in the same direction as those for nonusers. Figure 5 for example, shows that households that are more than the median distance away from an M-PESA agent are 4.5 and 10.8 percentage points less likely to receive and send remittances. In addition, households living more than the median distance away from an agent are 3.6 percentage points less likely to engage in a reciprocal transfer than households living less than the median distance to an agent.

Finally, households that use M-PESA and who are closer to agents, carry out transactions with people that are further away (by 39.2 km, on average) compared to M-PESA users who are further away from an agent. Hence proximity to agents enables users to access a larger catchment area of people to support risk sharing.

Figure 5: Impacts of M-PESA on transaction frequency and reciprocity

Households using M-PESA are more likely to receive and send remittances compared to non-users



Source: M-PESA household panel survey

⁶ Distances to agents were measured using the GPS coordinates of the household and nearest agent to the household

CONCLUSION

The evidence synthesized in this brief highlights how mobile money has influenced the welfare of households that adopted the technology in the first few years of its roll-out and how it is shaping the emergence of a new financial economy in Kenya.

Firstly, mobile money has a significant impact on the ability of households to share risk, which is attributable to the reduction in transaction costs. Households that do not use M-PESA suffer a 7 per cent drop in consumption when hit by a negative shock, while households using M-PESA are able to keep consumption steady. Considering how prevalent risks are in the day-to-day life of Kenyans, the fact that there is now a tool available to most households to help them cope more effectively with those risks suggests that M-PESA is having a large aggregate impact on welfare.

When health shocks hit households, M-PESA users are able to spend more on medical expenses after an illness, while also increasing expenses on food and maintaining education expenditure. Nonuser households, or households far from agents, are unable to increase expenditure on food after the shock, decrease their non-food subsistence expenditure, and reduce education expenses and hence might be pulling children out of school to finance health care costs. Pulling children out of school to finance health shocks may have longer term negative consequences on households. M-PESA therefore allows

households to reallocate expenses in a way that may preserve not just their health by spending on health and food, but also their longer-term investments in their children's education.

Lastly, the data provides evidence of the usefulness of mobile money systems in the developing world as a means for financial integration. M-PESA users seem to engage in more reciprocal transactions, and on average transact more frequently, with larger amounts, and over larger distances. It also seems that users expand their network to include friends and relatives outside the immediate family. It is not clear from the data whether mobile money makes reciprocity feasible through reduced transaction costs, or whether its accessibility leads to the inclusion of previously excluded people who happen to be inherently trustworthy or well suited to sustainable reciprocal relationships. In all cases, mobile money fundamentally altered the "terms" of reciprocity by making it easier to transfer resources among households.

What is clear across the board is that mobile money improves its users' lives. By enabling transfers over longer distances relatively cheaply and reliably, mobile money users can foster a wider and more diverse social network so that in times of financial distress, they are better able to cope with this distress. In this way, mobile money has been not only a tool for moving money across space, but also a tool that helps cushion people from shocks.

This report was commissioned by FSD Kenya. The findings, interpretations and conclusions are those of the authors and do not necessarily represent those of FSD Kenya, its Trustees and partner development agencies.

The Kenya Financial Sector Deepening (FSD) programme was established in early 2005 to support the development of financial markets in Kenya as a means to stimulate wealth creation and reduce poverty. Working in partnership with the financial services industry, the programme's goal is to expand access to financial services among lower income households and smaller enterprises. It operates as an independent trust under the supervision of professional trustees, KPMG Kenya, with policy guidance from a Programme Investment Committee (PIC). In addition to the Government of Kenya, Current funders include the UK's Department for International Development (DFID), the Swedish International Development Agency (SIDA), and the Bill and Melinda Gates Foundation.

