An Experimental Impact Evaluation of Introducing Mobile Money in Rural Mozambique

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Bank of Mozambique/IGC/NOVAFRICA Workshop
‘Alargando a Adopção de Serviços Financeiros em Moçambique: Desafios e Inovações’
Maputo – July 8, 2015
Motivation

- **Financial inclusion in Sub-Saharan Africa in 2011:**
  
  - Data from the Global Financial Inclusion (Global Findex) database show that 24% of adults in Sub-Saharan Africa had an account at a formal financial institution.
    - The most frequently cited reason for not having a formal account is lack of enough money to use one; but cost, distance, and documentation requirements are cited by more than 30% of non-account-holders.
  
  - Gallup reported that in 11 Sub-Saharan African countries, 32% of households received internal remittances (the majority of which were received through informal channels).
Motivation

• **In rural areas of Mozambique** access to financial services is still very limited:
  
  – **Formal savings products:**
    only 1.3% of adult rural population (Finscope, 2009) vs. average 20% in SSA (Gallup 2009)
  
  – **Formal money transfers:**
    used in less than 20% of urban-rural remittance flows (Finscope, 2009)

• **But the picture is changing, Global Findex, 2014, shows that:**
  
  – 34% of adults in Sub-Saharan Africa have an account
  – 12% have a mobile money account
  – 37% received internal remittances, 28% through m-money
Mobile Money: An Opportunity?

• **Mobile money typically allows:**
  – Cashing-in money to a cell phone account (through a local agent)
  – Using e-money to transfer to any person through a cell phone
  – Paying for products or services
  – Buying airtime
  – Cashing-out e-money (from a local agent)

• **Mobile Money has been a huge success in recent years**
  – In Kenya, M-PESA got 60% of the adult population conducting annual transactions worth 10% of GDP two years after inception in 2007
Literature on mobile money (M-PESA)

• **Jack and Suri (2011):**
  – While describing the M-PESA experience, raise a number of interesting potential economic effects of mobile money
    • M-PESA could affect the ability of individuals to share risk and to make more efficient investment decisions
    • By providing a safe storage mechanism, M-PESA could increase net household savings

• **Jack and Suri (2013):**
  – Does mobile money improve risk sharing?
    • Per capita consumption falls for a non-user household when they experience a negative income shock (7-10pp), as it does for households who lack good access to the agent network
    • M-PESA user households experience no such fall in per capita consumption
    • Users of M-PESA achieve some of these improvements in their ability to smooth risk via remittances: in face of a negative shock, user households are more likely to receive remittances (13pp more likely, equivalent to 6-10 percent of annual consumption)
Research Question

- What is the economic impact of newly introducing access to mobile money?

- Main outcomes of interest:
  - Adoption pattern
  - Savings
  - Remittances
  - Consumption
Methodology

• **Randomized field experiment**
  - 102 locations in rural (Southern) Mozambique
  - 51 with newly-recruited mobile money agents, community-wide dissemination (popular theatres and community meetings), individual dissemination to a rural sample plus their corresponding migrants in Maputo
  - Started mid-2012

• **Measurement through administrative records and household surveys**
  - Measurement until end of 2014, with 3 rounds of surveying
Treatment Intervention

- Treatment Part 1: Agent
  - Recruitment (March-May 2012)
    - Local vendors with full shelves
    - Needed licence to operate as vendors
    - Needed bank account
  - Training before remaining activities (June-July 2012)
    - Contract signed by Carteira Móvel
    - Materials handed-out (agent poster, other posters, agent cell phone)
    - Briefing:
      - Community theatre and meeting
      - Self-registrations
      - Cashing-in
      - Purchases in shop
      - Other mKesh operations
• Treatment Part 2: Community theatre and meeting

  – mKesh jingle played from mKesh agent shop

  – Theatre played after canvassing the location with the help of local authorities

    • Script including mentions of:
      – mKesh Safety (based on the mKesh PIN)
      – Savings using mKesh
      – Transfers using mKesh
      – Self-registration in mKesh

  – Community meeting after theatre with overview of the service, open for questions
Community theatre and meeting
• **Treatment Part 3: Individual treatment**
  
  – Based on leaflet which was distributed to households
  – Actual self-registration
    • Following menu, needed name and document (e.g., ID) number
  – Actual cash-in
    • At the local agent shop
    • 76 MT (around 3 USD) given to each treated individual
  – Actual balance checking
  – Actual purchase
    • At the local agent shop
    • Value of purchase had to be 20 MT (involving 1 MT fee)
  – Description of:
    • Cash-out (involving a 5 MT fee if remaining 50 MT withdrawn)
    • Transfer
mKesh leaflet distributed
Operations done as part of individual treatment:
self-registration, cash-in, checking balance, buying from agent
Como Levantar Dinheiro

1. **Digite *500#**
2. **Levantar**
   - 1. Digite **Cod. do Agente**
   - 2. **Enter**
   - 3. **Enter**
3. **Levantar**
4. **Confirmar levantamento**
   - 1. **Enter**
   - 2. **Enter**

Como Transferir Dinheiro

1. **Digite *500#**
2. **Transferir**
   - 1. **Enter**
   - 2. **Enter**
   - 3. **Enter**

mKesh - Preçoário de Cliente

<table>
<thead>
<tr>
<th>Tipos de Transações</th>
<th>Montantes em MRE/M3s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Levantamento no Agente</strong></td>
<td>20-100</td>
</tr>
<tr>
<td><strong>Transferência</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>Compra de Senha</strong></td>
<td>25</td>
</tr>
<tr>
<td><strong>Saldo</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Altoar PIN</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Extracto</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Pagamento ao Comerciante</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Levantamento de Senha</strong></td>
<td>Free</td>
</tr>
<tr>
<td><strong>Depósito</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Compra de Recargá</strong></td>
<td>10-200MRE - Gárdis</td>
</tr>
</tbody>
</table>

**Terms and Conditions:**
- **Transaction Limit:** 500 per day
- **Transaction Limit:** 2000 per week
- **Fee:** 1.00

**Other information:** cash-out, transfer, pricing
b. Sampling and randomization

- **Sampling process:**
  - Sampling base: 2007 census enumeration areas (EAs) in 3 southern provinces of Mozambique
    - Maputo-Province (only the North of the province was included)
    - Gaza
    - Inhambane
  - Eligibility criteria for EAs:
    - mCel coverage (using 5-km radius from mCel antennae)
    - having bank agency in the same district
  - In each EA, households recruited using:
    - Standard n-th house calls (household head or spouse)
    - Additional eligibility conditions:
      - Owning mCel cell phone (for all households in the sample)
      - Having a migrant (spouse or son/daughter) in the family (for half sample)
b. Sampling and randomization

• **Randomization:**
  – Blocks of 2 EA matched on observable characteristics
  – Randomization of the treatment within each pair
    => *Treatment conducted in 51 EAs* (51 control EAs)
  – Individual treatment not submitted to a randomly-drawn sub-group within treatment EAs (*untargeted individuals*)

• **Reach of the experiment**
  – 102 enumeration areas (EAs) in 3 southern provinces of Mozambique (Maputo-Province, Gaza, Inhambane)

• **Rural panel composed by 2040 individuals/households**
## Results: Adoption of Mobile Money

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.1%</td>
<td>0.4%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Treatment</td>
<td>63.1%</td>
<td>52.8%</td>
<td>61.8%</td>
</tr>
</tbody>
</table>

Source: Administrative data.

- **63% of individuals in treatment areas** performed at least one mobile money transaction in the first year after intervention.
- This number **decreased but did not fall dramatically** over the following two years.
- There are **no signs of important contamination or alternative sources of mobile money adoption** in our sample, besides the rural intervention we study in this project.
• Transfers received and remote payments have become increasingly important over time, at the expense of airtime purchase.
• Well functioning agent network and customer support seem crucial to promote consistent usage.
• No obvious pattern: but there seem to be spikes in the lean season (after plantation, before harvest);
Results: Transfers

• **Survey data (2014):**
  – 7% of total cash transfers received are made using mobile money; 12% of total cash transfers sent using mobile money;

• **1 year after intervention:**
  – probability of receiving remittances is significantly higher by 8.1pp for the treatment group;
  – there is a positive lower increase in the probability of sending remittances.

• **2 years after intervention:**
  – probability of receiving remittances is higher by 6.3pp for the treatment group;
  – there is a lower increase in the probability of sending remittances.
### Table: Transfers Received and Sent

<table>
<thead>
<tr>
<th>dependent variable -------&gt;</th>
<th>probability to receive transfers 2013</th>
<th>probability to receive transfers 2014</th>
<th>probability to send transfers 2013</th>
<th>probability to send transfers 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coefficient</td>
<td>0.081***</td>
<td>0.082***</td>
<td>0.060</td>
<td>0.063*</td>
</tr>
<tr>
<td>standard error</td>
<td>(0.031)</td>
<td>(0.030)</td>
<td>(-0.037)</td>
<td>(-0.037)</td>
</tr>
<tr>
<td>mean dep. variable (CI group)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.205</td>
<td>0.205</td>
<td>0.497</td>
<td>0.497</td>
</tr>
<tr>
<td>r-squared adjusted</td>
<td>0.008</td>
<td>0.015</td>
<td>0.003</td>
<td>0.005</td>
</tr>
<tr>
<td>number of observations</td>
<td>1,221</td>
<td>1,221</td>
<td>1,330</td>
<td>1,330</td>
</tr>
<tr>
<td>controls</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

Note: All regressions are OLS. Dependent variables are based on survey questions asked in the follow-up survey; controls are province fixed effects. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.
Results: Savings

• **Survey data (2014):**
  – For those who use mobile money, 6.6% of total savings are kept in the mobile money service;
  – Total savings of the treated individuals increase relative to the control (although non-statistically significant);

<table>
<thead>
<tr>
<th>Table: Savings</th>
<th>value of total savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>dependent variable</td>
<td>(1)</td>
</tr>
<tr>
<td>treatment coefficient</td>
<td>985.877</td>
</tr>
<tr>
<td>standard error</td>
<td>(966.519)</td>
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<tr>
<td>mean dep. variable (CI group)</td>
<td>3,917.307</td>
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<tr>
<td>r-squared adjusted</td>
<td>0.000</td>
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<tr>
<td>number of observations</td>
<td>1,245</td>
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<tr>
<td>controls</td>
<td>no</td>
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</table>

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### Results: Consumption and Risk Sharing

#### Table: Consumption and Vulnerability in 2013

<table>
<thead>
<tr>
<th>dependent variable -------&gt;</th>
<th>value of total consumption</th>
<th>no lack of food</th>
<th>no lack of drinkable water</th>
<th>no lack of medical care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>treatment coefficient</td>
<td>1,521.256</td>
<td>1,268.096</td>
<td>0.047</td>
<td>0.040</td>
</tr>
<tr>
<td>standard error</td>
<td>(1,803.400)</td>
<td>(1,682.565)</td>
<td>(0.051)</td>
<td>(0.047)</td>
</tr>
<tr>
<td>mean dep. variable (CI group)</td>
<td>23,321.111</td>
<td>23,321.111</td>
<td>2.755</td>
<td>2.755</td>
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<tr>
<td>r-squared adjusted</td>
<td>0.000</td>
<td>0.014</td>
<td>0.000</td>
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</tr>
<tr>
<td>number of observations</td>
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<td>1,199</td>
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<tr>
<td>controls</td>
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<td>yes</td>
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- Aggregate consumption does not change significantly;
- Treated individuals report being less vulnerable to lack of access to water, and to lack of medical care;
# Results: Consumption and Risk Sharing

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<th>no lack of drinkable water</th>
<th>no lack of medical care</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Treatment coefficient</td>
<td>-667.734</td>
<td>0.057</td>
<td>0.117*</td>
<td>0.104</td>
</tr>
<tr>
<td>(2) Standard error</td>
<td>(6,460.946)</td>
<td>(-0.049)</td>
<td>(-0.068)</td>
<td>(-0.071)</td>
</tr>
<tr>
<td>Mean dep. variable (CI group)</td>
<td>40,454.857</td>
<td>2.736</td>
<td>2.497</td>
<td>2.236</td>
</tr>
<tr>
<td>R-squared adjusted</td>
<td>-0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
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- Aggregate consumption does not change significantly;
- Treated individuals report being less vulnerable to lack of access to water, and to lack of medical care;
Summary and Implications

• Introduction of mobile money in rural areas of Southern Mozambique achieved good levels of adoption – however challenges remain regarding effective utilization of mobile money, which requires investment a well functioning agent network and customer support.

• Remittances are the obvious channel of impact of mobile money (due to an enormous decrease in transaction costs), namely through enlarging networks that can provide insurance against idiosyncratic risk.

• Our work points towards a role of mobile money in diminishing vulnerability to shocks – likely through remittances as savings are not significantly affected.