

# **An Experimental Impact Evaluation of Introducing Mobile Money in Rural Mozambique**

Cátia Batista

Univ. Nova de Lisboa  
CReAM, IZA, and NOVAFRICA

Pedro C. Vicente

Univ. Nova de Lisboa  
IGC, BREAD, and NOVAFRICA

**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





Agent recruitment

- **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



### Conta mini • Auto-Registo

1. Digite \*500#
2. Escolha o idioma: 1. Português, 2. Inglês, 3. Sesi
3. Escolha o tipo de registo: 1. Auto Registo, 2. 136, 3. Votar
4. Insira o nome: Auto Registo Nome
5. mKash confirma o registo: Auto Registo Anulado Sese. Confira o registo de adesão com sucesso. Favor de aguardar pela confirmação por SMS. Gratuito pela preferência.
6. Escolha o tipo de documento: Auto Registo Documento: 1. BI, 2. Passaporte, 3. DNI, 4. Carta Consolação, 5. Cédula Militar, 6. Cartão Euler
7. Insira o número do documento: Auto Registo Nº Documento:
8. Confirme os dados: Auto Registo em estado: 1. Aceitar, 2. Cancelar

### Como Depositar Dinheiro

1. Digite \*500#
2. Escolha Depositar: 1. Levantar, 2. Depositar, 3. Transferir, 4. Comorar, 5. Pagar, 6. mConta, 7. 136, 8. Sesi
3. Insira o número de celular do Agente: Depositar Celular Agente:
4. Insira o montante: Depositar Montante:
5. mKash Confirma o Depósito: Depósito Efectuado. Montante: 100 MT. Saldo disponível: 1429,00. Ref: 8334. Gratuito pela preferência.
6. Confirme os dados: Depositar no Agente: Anulado Sese. MASCARINA FAMY. Montante: 100 MT. 1. Aceitar, 2. Cancelar
7. Insira o PIN: Depositar Pin (3 dígitos):
8. Obtenha a confirmação do agente: Depositar O seu pedido de depósito de 100 MT foi enviado ao: 833478167 MASCARINA FAMY. Solicita confirmação ao Agente.

### Como Consultar Saldo

1. Digite \*500#
2. Escolha Consultar: 1. Levantar, 2. Depositar, 3. Transferir, 4. Comorar, 5. Pagar, 6. mConta, 7. 136, 8. Sesi
3. Insira o número de celular do Agente: Consultar Celular Agente:
4. mKash envia-lhe o Saldo da Conta: Saldo Saldo corrente: 633,00 MT. Saldo disponível: 633,00 MT. Gratuito pela preferência.
5. Escolha o tipo de documento: Consultar Documento: 1. BI, 2. Passaporte, 3. DNI, 4. Carta Consolação, 5. Cédula Militar, 6. Cartão Euler
6. Insira o número do documento: Consultar Nº Documento:
7. Confirme os dados: Consultar em estado: 1. Aceitar, 2. Cancelar

### Como Pagar Despesas

1. Digite \*500#
2. Escolha Pagar: 1. Levantar, 2. Depositar, 3. Transferir, 4. Comorar, 5. Pagar, 6. mConta, 7. 136, 8. Sesi
3. Insira o número de celular do Agente: Pagar Celular Agente:
4. Insira o montante: Pagar Montante:
5. Comerciante Confirma o pagamento: Comerciante ESTACAO DE SERVIÇO A67 confirma recibo: 300,00 MT. Ref: 8334. Gratuito pela preferência.
6. Confirme os dados: Pagar no Agente: Anulado Sese. ESTACAO DE SERVIÇO A67. Montante: 300 MT. 1. Aceitar, 2. Cancelar
7. Insira o PIN: Pagar Pin (3 dígitos):
8. Obtenha a confirmação do agente: Pagar O seu pedido de depósito de 300 MT foi enviado ao: 833478167 MASCARINA FAMY. Solicita confirmação ao Agente.

Operations done as part of individual treatment:  
self-registration, cash-in, checking balance, buying from agent

## Como Levantar Dinheiro

**01** **Acorda no Menu mKesh**

**02** **Insere o Número de Telefone do Agente**

**03** **Insere o Montante**

**04** **Confirma no Simão**

**05** **Insere o PIN**

**06** **Obtém a confirmação do Agente**

**07** **Agente confirma o levantamento**

## Como Transferir Dinheiro

**01** **Acorda no Menu mKesh**

**02** **Insere o Montante**

**03** **Insere o Número do Destinatário**

**04** **Insere o Montante**

**05** **Confirma no Simão**

**06** **Insere o PIN**

**07** **mKesh confirma a transferência**

### mKesh - Preço de Cliente

Tipos de Transações	Montantes em Meticals				
	20-100	101-1.000	1.001-5.000	5.001-10.000	10.001-25.000
Levantamento no Agente <sup>1</sup>	5	8	12	50	50
Transferência			5		
Compra de Senha			25		
Saldo <sup>2</sup>			1		
Alterar PIN			1		
Extracto <sup>3</sup>			2		
Pagamento ao Comerciante			1		
Levantamento de Senha			Grátis		
Depósito <sup>4</sup>			Grátis		
Compra de Recargas			10 - 2000Mts - Grátis		

1 Depósito mínimo 20 meticals.  
2 Pagamento mínimo 100 meticals.  
3 Montante máximo de extracção de 5000 meticals.  
4 O depósito é feito em Moeda.

Para mais informações consulte nos  
Pontos de Atendimento - Unidade Operativa - 100 - Av. da Liberdade  
Edifício No. 20, 2º andar - 1.º andar - Loja No. 1000  
Tel: 001 222 222 222 - 001 222 222 222

Termos e condições aplicáveis em MB. Todos os valores de transacção são válidos, quer seja, depósito ou saque de dinheiro - 100% de segurança na sua moeda.

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**



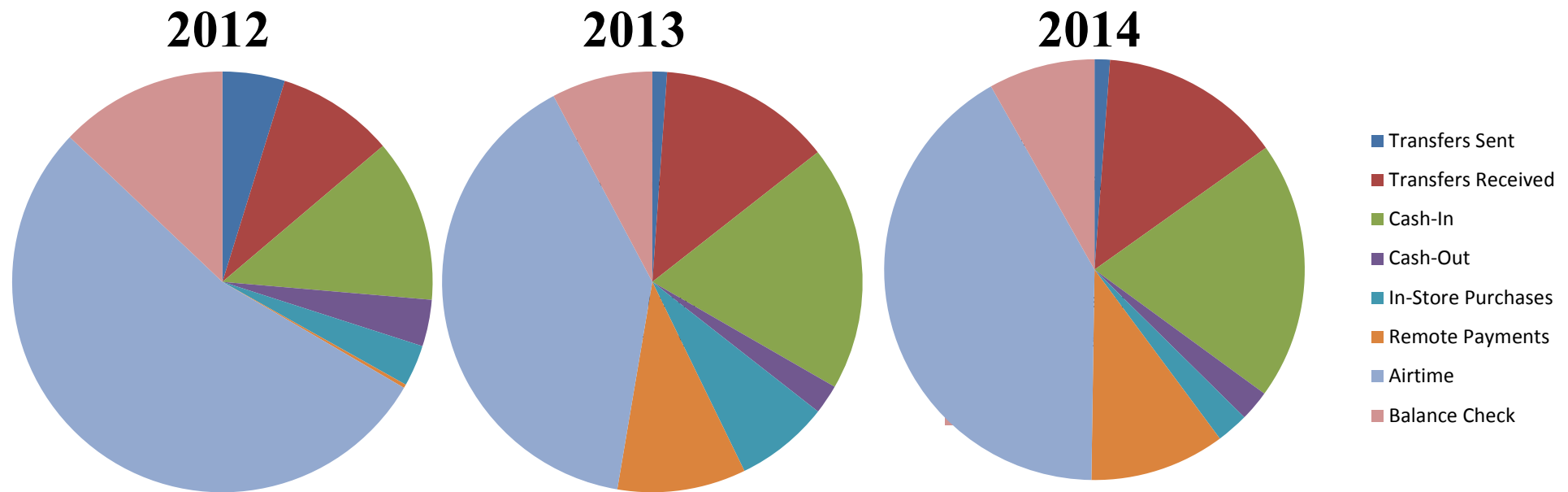
# Results: Adoption of Mobile Money

	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b>Control</b>	1.1%	0.4%	0.3%
<b><u>Treatment</u></b>	<u>63.1%</u>	<u>52.8%</u>	<u>61.8%</u>

Source: Administrative data.

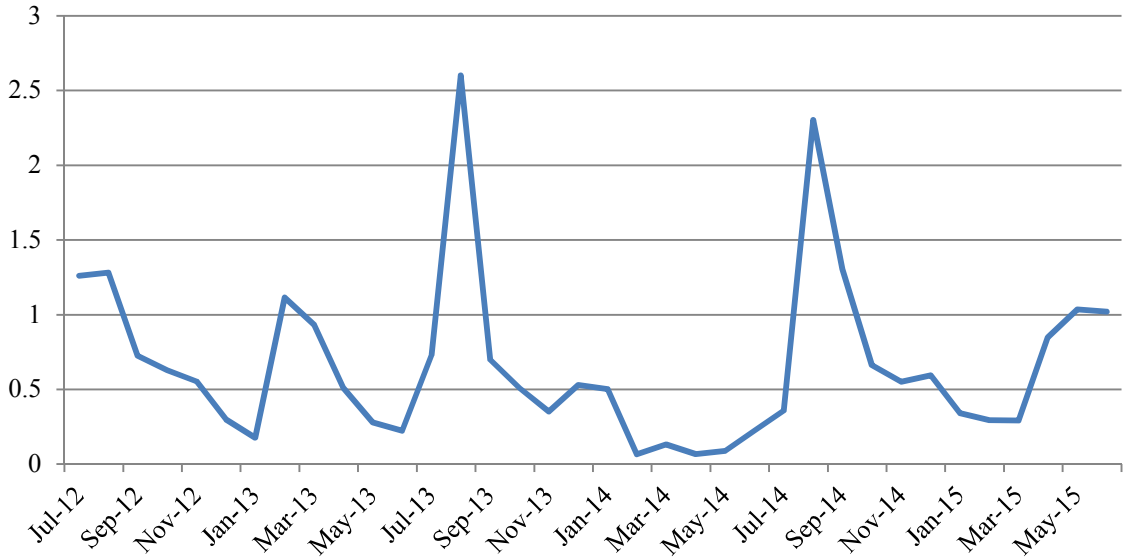
- **63% of individuals in treatment areas** performed at least one mobile money transaction in the first year after intervention.
- This number **decreased but did not fall dramatically** over the following two years.
- There are **no signs of important contamination or alternative sources of mobile money adoption** in our sample, besides the rural intervention we study in this project.

# Evolution of Transaction Types Performed



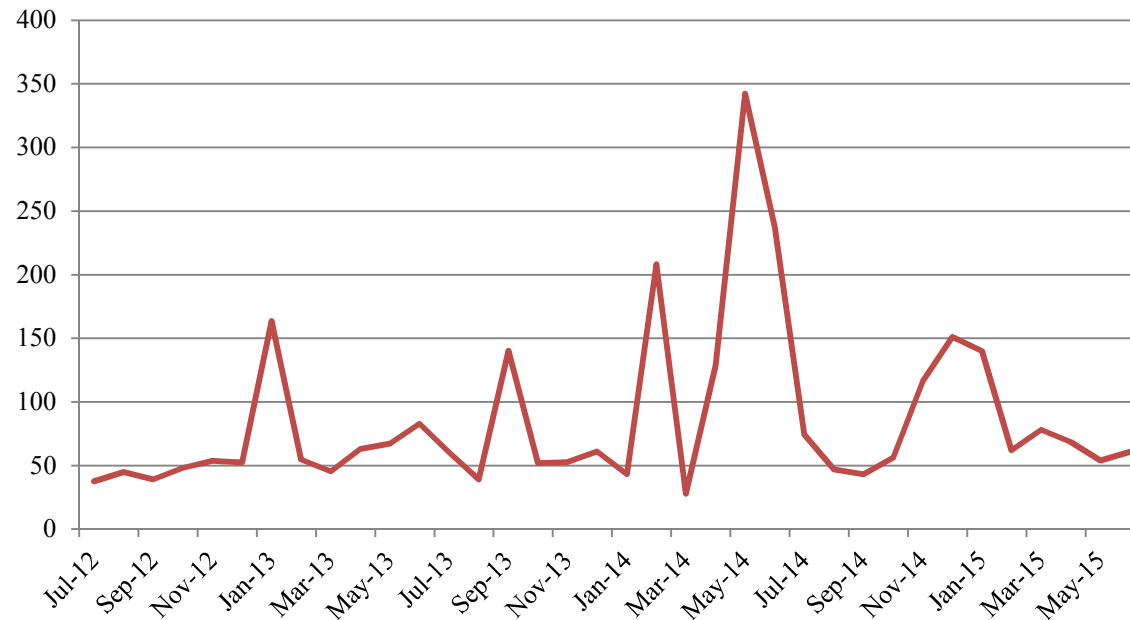
- **Transfers received and remote payments have become increasingly important over time, at the expense of airtime purchase.**

## Average Number of Mobile Money Transactions



- **Well functioning agent network and customer support seem crucial to promote consistent usage.**

## Average Value of Mobile Money Transactions



- **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**

dependent variable ----->		probability to receive transfers 2013		probability to receive transfers 2014		probability to send transfers 2013		probability to send transfers 2014	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
treatment	coefficient	0.081***	0.082***	0.060	0.063*	0.038	0.040	0.033	0.030
	standard error	(0.031)	(0.030)	(-0.037)	(-0.037)	(0.024)	(0.024)	(-0.033)	(-0.032)
mean dep. variable (CI group)		0.205	0.205	0.497	0.497	0.094	0.094	0.303	0.303
r-squared adjusted		0.008	0.015	0.003	0.005	0.003	0.002	0.000	0.016
number of observations		1,221	1,221	1,330	1,330	1,221	1,221	1,330	1,330
controls		no	yes	no	yes	no	yes	no	yes

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: Savings**

dependent variable ----->		value of total savings	
		(1)	(2)
<b>treatment</b>	<b>coefficient</b>	<b>985.877</b>	<b>974.659</b>
	<b>standard error</b>	<b>(966.519)</b>	<b>(907.781)</b>
<b>mean dep. variable (CI group)</b>		3,917.307	3,917.307
<b>r-squared adjusted</b>		0.000	0.006
<b>number of observations</b>		1,245	1,245
<b>controls</b>		<b>no</b>	<b>yes</b>

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: Consumption and Risk Sharing

**Table: Consumption and Vulnerability in 2013**

dependent variable ----->	value of total consumption		no lack of food		no lack of drinkable water		no lack of medical care	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>treatment coefficient</b>	<b>1,521.256</b>	<b>1,268.096</b>	<b>0.047</b>	<b>0.040</b>	<b>0.091*</b>	<b>0.082*</b>	<b>0.012</b>	<b>0.003</b>
<b>standard error</b>	<b>(1,803.400)</b>	<b>(1,682.565)</b>	<b>(0.051)</b>	<b>(0.047)</b>	<b>(0.049)</b>	<b>(0.047)</b>	<b>(0.072)</b>	<b>(0.068)</b>
<b>mean dep. variable (CI group)</b>	23,321.111	23,321.111	2.755	2.755	2.622	2.622	2.436	2.436
<b>r-squared adjusted</b>	0.000	0.014	0.000	0.020	0.002	0.007	-0.001	0.013
<b>number of observations</b>	1,221	1,221	1,199	1,199	1,199	1,199	1,189	1,189
<b>controls</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>

Note: All regressions are OLS. Dependent variables are based on survey questions asked in the follow-up survey; controls are province fixed effects. Vulnerability variables are defined on a 0-3 scale, where maximum vulnerability is defined as zero. Standard errors reported in parenthesis - these are clustered at the location level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

- 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

**Table: Consumption and Vulnerability in 2014**

dependent variable ----->	value of total consumption		no lack of food		no lack of drinkable water		no lack of medical care	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>treatment coefficient</b>	<b>-667.734</b>	<b>-979.534</b>	<b>0.057</b>	<b>0.055</b>	<b>0.117*</b>	<b>0.124*</b>	<b>0.104</b>	<b>0.095</b>
<b>standard error</b>	<b>(6,460.946)</b>	<b>(6,085.241)</b>	<b>(-0.049)</b>	<b>(-0.047)</b>	<b>(-0.068)</b>	<b>(-0.067)</b>	<b>(-0.071)</b>	<b>(-0.069)</b>
<b>mean dep. variable (CI group)</b>	40,454.857	40,454.857	2.736	2.736	2.497	2.497	2.236	2.236
<b>r-squared adjusted</b>	-0.001	0.012	0.001	0.003	0.000	0.016	0.000	0.016
<b>number of observations</b>	1,330	1,330	1,319	1,319	1,330	1,330	1,330	1,330
<b>controls</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>	<b>no</b>	<b>yes</b>

Note: All regressions are OLS. Dependent variables are based on survey questions asked in the follow-up survey; controls are province fixed effects. Vulnerability variables are defined on a 0-3 scale, where maximum vulnerability is defined as zero. Standard errors reported in parenthesis - these are clustered at the location level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

- 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**.