Agricultural Savings and Network Pressure:
Experimental Evidence Using Mobile Money in Mozambique

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Motivation

- **African farmers have a hard time saving**
  - They are poverty-ridden smallholder farmers
  - They are unbanked
    - Without access to financial products, namely those entailing some degree of commitment, they are easy prey to the pressures of their families and neighbors, and to their own temptations
- **Saving seems crucial to break the cycle of low investment and low agricultural productivity**
  - Improved agricultural technologies have yet to arrive in Africa
    - E.g., fertilizer use is the lowest in the world

- **The mobile money revolution is making its way in the African continent**
  - The first mobile money service, M-PESA, was launched in 2007 in Kenya
  - It was quickly adopted by a majority of the population in that country (Jack and Suri, 2011, Mbiti and Weil, 2011)
- **The way to tailor mobile money services to help farmers to save is not obvious**
  - It is possible that mobile money by itself de-incentivizes savings by easing transfers to other people
  - Commitment savings are yet to be introduced in many mobile money platforms

Research questions

- **Does access to a custom-made savings account offered through mobile money increase savings by farmers?**
    - Namely through adopting mobile money?
    - Does fertilizer adoption increase?
- **Is social pressure to share resources a force at work against savings by farmers?**
    - Does the savings account counteract social pressure by friends to share resources, i.e., does it shield farmers against this pressure?

Main results

- **Clear effects of access to the savings account on:**
  - Increasing mobile money adoption: likelihood of adoption of mobile money, number of mobile money transactions, total cash-ins
  - Increasing non-frequent expenditures but decreasing the likelihood that individuals lent money to their closest farming friends
  - Increasing fertilizer adoption: by 27-36 pp.
- **Symmetric treatment of closest farming friends**
  - Seems to be lowering social pressure
- **Interaction of the savings account with symmetric treatment**
  - Hints that the savings account counteracted social pressure

Outline

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Literature

- **Risk-sharing with social networks in rural settings**
  - Townsend (Econometrica, 1994), Udry (RESTUD, 1994)
    - Importance of informal risk-sharing for idiosyncratic risk
- **Commitment savings**
  - Ashraf et al. (QJE, 2006), Dupas and Robinson (AEJ/AE, 2013)
    - Access to commitment savings increases savings/investment
- **Input investment by smallholder farmers**
  - Duflo et al. (AER, 2011), Carter et al. (AJAE, 2013; 2014; 2015)
    - Small discounts and matched savings increase investment
- **Mobile money**
  - Jack et al. (AER/PP, 2012), Jack and Suri (AER, 2013)
    - Mobile money increases risk-sharing possibilities

Mozambican context

- **Low agricultural productivity**
  - Cereal agricultural productivity for 2011 was 10.4 th. htg/he, well below the world average, 36.6, and even below the African average, 14.4 (FAO, 2011)
  - Two factors may explain this:
    - Only 0.58% of farmers cultivate more than 10he (TIA, 2008)
    - Investment in improved inputs very limited: fertilizer use was 6.4kg/he (World: 73.3; Africa: 13.3) (FAO, 2011)
- **Low access to financial services**
  - 24 bank accounts per 100 Mozambican adults (Africa: 55), 3.9 bank branches per 100,000 adults (Africa: 7.7)
- **Introduction of mobile money in 2011 with great potential**
  - First operator was Carteira Móvel, with mKesh
  - Vodacom launched M-PESA in late 2013

Experimental design - Treatments

- **Two treatments, interacted in a 2x2 design, submitted at the individual level**
  - 196 maize farmers as primary experimental subjects
- **All experimental subjects were given two modules:**
  1. Module on introduction to mKesh, the existing mobile money service at the time of the experiment; it included:
     - A simple mobile phone
     - A leaflet explaining how to use mKesh
     - Self-registration
     - Trial cash-in (55 Meticais) including meeting the local agent
     - Checking balance

2. **Module on fertilizer use**; it included:

- The distribution of an information leaflet targeted at maize producers focusing on the use of urea fertilizer
- Possibility of selling maize (from previous season) through to a local buyer (DECA), mediated by the survey team; one of the possible payment methods made available was mobile money
- Possibility of purchasing urea fertilizer for the next season, through the survey team
- These possibilities were made available to all primary subjects, during visits performed until planting season

O QUE O SENHOR SABE E FAZ BEM...
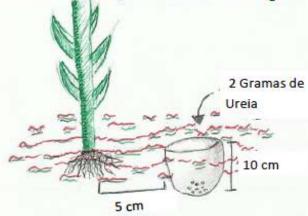
1	PREPARAR O SOLO.	-Remoção da vegetação existente. -Deixar o capim acumular no terreno (até 30 cm de altura).
2	SEMENTEIRA	-Esperar as primeiras chuvas e fazer sementeira 4 dias depois destas. Não deixe passar esta altura! -Fazer sementeira directa, ou seja, mexer na coberta da terra apenas no local de semeio. Isto evita que o seu terreno fique exposto. -Mesmo em solos férteis, é benéfico o uso de adubos orgânicos como por exemplo o estrume de boi.
3	SACHA	-Retire as ervas daninhas da machamba para que não prejudiquem a qualidade do solo e dessa forma a quantidade de milho aumente.
4	ADUBAÇÃO/ FERTILIZANTE	-Use fertilizante de topo, UREIA, porque apesar da elevada fertilidade dos solos de Moçambique, existem processos da natureza que ao longo do tempo vão prejudicando a machamba. -Mantenha as características naturais do solo enquanto aumenta os níveis de produção!

O QUE PODE FAZER MELHOR...

Use um fertilizante de topo: UREIA.

Esta é importante mesmo que o solo seja fértil. A Ureia é rica em nitrogénio que é um componente vital para a vida da planta e que é escasso nos solos de Moçambique.

Assim sendo, 2 a 3 semanas após a germinação espere pela chuva. Quando esta cessar, aplique ureia no seu milho, conforme indicado na figura.

2 Gramas de Ureia

10 cm

5 cm

Este fará o seu Milho crescer forte, com cores vivas e sem manchas!

EXPERIMENTE ESTA CAMPANHA EM 0,25HECTARES E VEJA A DIFERENÇA!

- **The treatments were:**
  1. Savings treatment
     - Information leaflet distributed
     - Offer of a bonus of 20% interest for the average mKesh balance held by an individual, over the period from the end of the survey team visits before the planting season to the follow-up survey (when urea should be applied)
     - Bonus was paid in urea fertilizer
     - Strong incentive to save as interest rates by banks in Mozambique approached but did not reach 10% in 2013 (commitment savings)

2. Network treatment

- It gave the two closest friends of each treated primary experimental subject the modules on mobile money and fertilizer use

- When interacted with the savings treatment, the network treatment also enabled access of closest friends to the savings mKesh bonus

  - Closest friends were identified by asking about farming friends in the same community, and farming friends with whom individuals had given or received a loan to/from

Experimental design - Hypotheses

	Individual Treatment - I	Network Treatment - N
Control – C	CI	CN
Savings Treatment – S	SI	SN

Hypothesis 1a:

The savings treatment increases adoption of mobile money services, savings, and investment on fertilizer, when taking the group of experimental subjects that is approached individually, i.e.,

$$Y(SI) - Y(CI) > 0$$

Hypothesis 1b:

The savings treatment increases adoption of mobile money services, savings, and investment on fertilizer, when taking the group that is approached together with closest connections, i.e.,

$$Y(SN) - Y(CN) > 0$$

Hypothesis 2a:

The network treatment increases mobile money services adoption (and possibly the other outcomes as well), when taking the group of experimental subjects that is not given the savings treatment, i.e.,

$$Y(CN) - Y(CI) > 0$$

Hypothesis 2b:

The network treatment weakly increases mobile money services adoption, when taking the group that is given the savings treatment, i.e., no change (social pressure) or positive change (network information/imitation),

$$Y(SN) - Y(SI) \geq 0$$

Hypothesis 3:

The savings and network treatment interaction decreases the adoption of mobile money services, savings, and investment in fertilizer, when the savings treatment is taken as a shield against social pressure to share resources, i.e.,

$$[Y(SN) - Y(CN)] - [Y(SI) - Y(CI)] < 0$$

Experimental design – Sampling and assignment to treatment

- **Implemented in districts of Manica, Mossurize, and Sussundenga, in the Mozambican province of Manica**
  - 15 localities identified as having farmer associations
- **We asked for lists of farmers in each of the localities and surveyed these farmers in a pre-project survey**
  - 240 farmers operating in non-irrigated plots who also provided information about their connections were surveyed at that point in June-July 2013
- **Within these, we were able to identify a set of 196 farmers in the same 15 localities with two connections each**
  - These 196 farmers were interviewed during our baseline survey (July-August 2013), and form our list of primary experimental subjects

- **Each triplet at the baseline was assigned to one of the four comparison groups**
  - We first composed blocks of four triplets within the same locality and using observable characteristics of primary farmers collected in the pre-project survey
  - We then randomly assigned each member of each block to a different comparison group
- **The post-intervention survey was implemented in January-February 2014, after the planting season was over, and after the urea fertilizer could be applied in that season**
  - Of the 196 primary farmers, we were able to survey 186 individuals, which entails an attrition rate of 5%

Surveying in Manica province

Experimental design – Measurement

- **Three different types of data:**
    1. Administrative data from mKesh, including balance and transaction data for all experimental subjects
    2. Sale records of maize and purchase records of urea fertilizer from enumerators
    3. Survey data from pre-project, baseline, and post-intervention surveys

Experimental design – Estimation strategy

- **We then have the following core specification:**

$$Y_{l,i,post} = \alpha + \theta X_{l,i} + \beta T_{l,i} + \varepsilon_{l,i,post}$$

where:

$Y_{l,i,post}$ is an outcome of interest

$X_{l,i}$ is a vector of location and individual controls

$\beta = \begin{bmatrix} \beta_S & \beta_N & \beta_{SN} \end{bmatrix}$ is the vector of effects of interest

$T_{l,i} = \begin{bmatrix} S_{l,i} & N_{l,i} & S_{l,i} \times N_{l,i} \end{bmatrix}$ is the vector of treatments

- **We also run difference in difference specifications, with controls or individual fixed effects**
- **OLS regressions throughout**
  - Clustered standard error at the level of the location
- **Hypotheses:**

$$H1a : Y(SI) - Y(CI) > 0 \Leftrightarrow \beta_S > 0$$

$$H1b : Y(SN) - Y(CN) > 0 \Leftrightarrow \beta_S + \beta_{SN} > 0$$

$$H2a : Y(CN) - Y(CI) > 0 \Leftrightarrow \beta_N > 0$$

$$H2b : Y(SN) - Y(SI) = 0 \Leftrightarrow \beta_N + \beta_{SN} = 0$$

$$H3 : [Y(SN) - Y(CN)] - Y(SI) - Y(CI) < 0 \Leftrightarrow \beta_{SN} < 0$$

Econometric results – Balance

Table 1a: Primary farmers' individual characteristics - differences across treatment and control groups; for both baseline and follow-up samples

		baseline sample					follow-up sample				
		CI	savings	network	savings * network	joint F-stat p-value	CI	savings	network	savings* network	joint F-stat p-value
basic demographics	female	0.100	0.124 (0.085)	0.057 (0.072)	0.052 (0.064)	0.499	0.045	0.167** (0.082)	0.111* (0.067)	0.091 (0.067)	0.132
	age	43.388	3.910 (2.410)	4.436* (2.646)	-0.127 (2.673)	0.165	44.568	2.810 (2.506)	3.255 (2.757)	-0.318 (2.814)	0.379
	born in Manica province	0.920	-0.048 (0.060)	-0.038 (0.060)	-0.007 (0.051)	0.845	0.909	-0.020 (0.064)	-0.027 (0.064)	-0.000 (0.056)	0.966
	complete primary school	0.280	0.047 (0.100)	-0.005 (0.092)	0.003 (0.091)	0.946	0.273	0.046 (0.101)	0.002 (0.092)	0.000 (0.095)	0.949
	number of household members	6.820	0.343 (0.786)	1.317 (0.825)	-0.711 (0.666)	0.054	6.864	0.434 (0.820)	1.274 (0.881)	-0.614 (0.658)	0.065
	number of children	4.340	0.742 (0.667)	1.738** (0.732)	-0.557 (0.624)	0.013	4.568	0.602 (0.736)	1.510* (0.776)	-0.636 (0.649)	0.026
agriculture	time cultivating plot (months)	116.851	34.924 (22.854)	16.443 (21.462)	29.460 (25.010)	0.462	122.595	27.469 (24.143)	10.699 (22.559)	28.847 (26.912)	0.618
	number of plots	2.220	-0.077 (0.282)	-0.220 (0.216)	-0.437* (0.259)	0.340	2.114	0.057 (0.275)	-0.114 (0.290)	-0.295 (0.222)	0.551
	size of main plot (hectares)	4.293	-0.508 (0.670)	0.763 (0.996)	-0.091 (0.765)	0.527	4.329	-0.504 (0.727)	0.728 (1.031)	-0.073 (0.826)	0.564
	number of crops last year	2.520	0.092 (0.267)	-0.108 (0.267)	0.176 (0.283)	0.701	2.386	0.273 (0.329)	0.025 (0.261)	0.295 (0.280)	0.637
	land fertility (1-4)	2.900	-0.063 (0.127)	-0.057 (0.128)	-0.117 (0.160)	0.905	2.909	-0.079 (0.137)	-0.066 (0.138)	-0.136 (0.171)	0.878
	used improved seeds for maize last year	0.220	0.127 (0.095)	0.172 (0.112)	0.193* (0.111)	0.292	0.250	0.112 (0.099)	0.142 (0.116)	0.182 (0.118)	0.443
	used organic fertilizer for maize last year	0.200	0.147 (0.094)	0.035 (0.090)	0.104 (0.098)	0.330	0.205	0.136 (0.098)	0.031 (0.095)	0.114 (0.105)	0.362
	used fertilizer for maize last year	0.160	-0.058 (0.067)	0.016 (0.075)	0.014 (0.068)	0.475	0.182	-0.075 (0.071)	-0.005 (0.078)	-0.000 (0.072)	0.502
	maize production last year (Kgs)	2,555.789	287.589 (559.173)	178.655 (566.536)	27.446 (577.998)	0.965	2,662.222	237.921 (584.756)	72.222 (576.931)	-73.434 (598.421)	0.978
	maize production value last year (MZN)	21,050.357	2,466.071 (7,920.370)	2,365.310 (6,615.428)	10,570.512 (11,176.000)	0.818	21,780.400	2,295.896 (8,447.872)	1,635.267 (7,083.919)	9,840.470 (11,358.225)	0.859
	% maize for sale last year	0.760	0.036 (0.074)	0.044 (0.074)	0.044 (0.084)	0.918	0.750	0.059 (0.072)	0.054 (0.077)	0.045 (0.089)	0.856

Note: Standard errors of the differences reported in parenthesis; standard errors are corrected by clustering at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 1b: Primary farmers' individual characteristics - differences across treatment and control groups; for both baseline and follow-up samples

		baseline sample					follow-up sample				
		CI	savings	network	savings * network	joint F-stat p-value	CI	savings	network	saving s* network	joint F-stat p-value
savings	has bank account	0.260	0.128 (0.094)	0.054 (0.071)	0.066 (0.077)	0.586	0.273	0.132 (0.104)	0.041 (0.077)	0.068 (0.085)	0.637
	time having a bank account (months)	79.154	-28.321 (29.651)	-10.621 (39.861)	-14.354 (34.955)	0.752	82.750	-31.917 (31.547)	-14.217 (41.830)	-17.950 (36.878)	0.720
	contributes to a saving group	0.140	0.044 (0.064)	0.036 (0.077)	0.012 (0.054)	0.921	0.136	0.034 (0.065)	0.040 (0.078)	0.023 (0.053)	0.947
	number of saving groups	2.143	-0.921 (0.998)	-1.032 (1.005)	-1.000 (0.869)	0.375	2.333	-1.083 (1.157)	-1.222 (1.157)	-1.190 (1.023)	0.294
	time contributing to saving groups (months)	48.857	-18.302 (19.522)	-17.857 (18.080)	-21.143 (18.092)	0.560	50.500	-16.875 (22.558)	-19.500 (21.041)	-22.786 (21.216)	0.428
	saving at home	0.820	-0.106 (0.087)	-0.140 (0.085)	0.024 (0.066)	0.167	0.864	-0.119 (0.087)	**-0.184**** (0.086)	-0.003 (0.068)	0.104
	savings with family and friends	0.460	-0.052 (0.096)	**-0.185*** (0.103)	-0.003 (0.095)	0.232	0.455	-0.072 (0.102)	**-0.180*** (0.106)	-0.023 (0.100)	0.324
expenditure and assets	total expenditure (MZN/month)	1,407.204	261.097 (479.768)	589.231 (411.227)	-109.973 (290.928)	0.396	1,373.589	329.716 (507.955)	622.845 (422.624)	-47.557 (316.114)	0.403
	owns barn	0.880	0.059 (0.049)	0.061 (0.055)	0.077 (0.051)	0.417	0.864	0.073 (0.054)	0.078 (0.059)	0.091 (0.056)	0.373
	owns fridge	0.040	0.062 (0.050)	-0.020 (0.034)	0.003 (0.040)	0.372	0.045	0.040 (0.051)	-0.025 (0.038)	0.000 (0.044)	0.522
	owns sewing machine	0.200	-0.016 (0.086)	-0.020 (0.096)	-0.004 (0.086)	0.994	0.159	0.011 (0.067)	0.021 (0.086)	0.045 (0.087)	0.959
	owns radio	0.820	-0.004 (0.069)	0.060 (0.073)	0.071 (0.081)	0.695	0.841	-0.032 (0.075)	0.039 (0.075)	0.045 (0.083)	0.726
	owns tv	0.429	0.020 (0.104)	-0.109 (0.098)	-0.016 (0.106)	0.581	0.364	0.083 (0.099)	-0.044 (0.094)	0.023 (0.106)	0.675
	owns bike	0.700	-0.027 (0.099)	-0.140 (0.093)	0.061 (0.079)	0.183	0.682	-0.001 (0.102)	-0.122 (0.096)	0.068 (0.086)	0.233
	owns motorcycle	0.100	-0.018 (0.066)	0.080 (0.077)	0.030 (0.055)	0.361	0.068	0.017 (0.059)	0.112 (0.069)	0.045 (0.063)	0.337
	owns generator	0.060	0.062 (0.060)	0.020 (0.051)	0.070 (0.045)	0.226	0.045	0.082 (0.061)	0.035 (0.049)	0.068 (0.046)	0.256
	owns animals	0.900	0.018 (0.060)	0.000 (0.062)	-0.030 (0.065)	0.862	0.886	0.029 (0.064)	0.014 (0.065)	0.000 (0.066)	0.954
	owns pump	0.020	-0.020 (0.020)	-0.020 (0.020)	0.023 (0.036)	0.209	0.023	-0.023 (0.023)	-0.023 (0.023)	0.023 (0.039)	0.207
	owns improved latrine	0.245	0.020 (0.098)	-0.025 (0.098)	0.038 (0.102)	0.929	0.273	0.004 (0.106)	-0.053 (0.102)	0.023 (0.110)	0.876
	has access to electricity	0.280	0.026 (0.089)	0.020 (0.090)	0.003 (0.080)	0.991	0.250	0.048 (0.090)	0.050 (0.096)	0.045 (0.081)	0.925
	has access to piped water or protected spring	0.500	0.031 (0.105)	0.040 (0.100)	0.043 (0.101)	0.969	0.523	0.009 (0.108)	0.017 (0.097)	0.045 (0.096)	0.973

Note: Standard errors of the differences reported in parenthesis; standard errors are corrected by clustering at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Few differences between comparison groups as expected**

Econometric results – Treatment effects

Table 2a: mKesh use - administrative data

dependent variable ------>		one transaction			number of transactions			total cash-in		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
savings - β_S (H1a)	coefficient	0.131	0.131	0.169**	0.766**	0.727**	0.949**	61.402*	62.900*	80.233*
	standard error	(0.085)	(0.085)	(0.075)	(0.353)	(0.351)	(0.393)	(36.509)	(37.053)	(43.354)
network - β_N (H2a)	coefficient	0.049	0.094	0.148**	0.374	0.451	0.755**	8.586	0.508	12.302
	standard error	(0.057)	(0.069)	(0.066)	(0.245)	(0.314)	(0.369)	(11.738)	(9.664)	(14.211)
savings*network - β_{SN} (H3)	coefficient	-0.082	-0.092	-0.193*	-0.495	-0.783	-1.309**	-52.140	-62.022	-91.389*
	standard error	(0.099)	(0.124)	(0.114)	(0.422)	(0.485)	(0.594)	(37.280)	(39.142)	(50.152)
mean dep. variable (CI group)		0.106	0.106	0.109	0.277	0.277	0.283	10.638	10.638	10.870
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.281	0.626	0.774	0.331	0.887	0.420	0.271	0.944	0.486
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.654	0.986	0.570	0.776	0.358	0.140	0.227	0.101	0.064
r-squared adjusted		0.020	0.023	0.045	0.035	0.019	0.072	0.006	0.020	0.026
number of observations		340	191	186	340	191	186	340	191	186
treated network included in sample		yes	no	no	yes	no	no	yes	no	no
controls		no	no	yes	no	no	yes	no	no	yes

Note: All regressions are OLS. All dependent variables are based on transaction data made available by the mKesh operator for the period between the end of the survey team visits before planting season to the follow-up survey. All regressions include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Savings treatment increases mobile money adoption; same for network treatment; interaction is negative**

Table 2b: mKesh use - administrative data

dependent variable ------>		total top-ups			total cash-out		
		(1)	(2)	(3)	(4)	(5)	(6)
savings - β_S (H1a)	coefficient	6.949	5.488	8.445	37.202	38.921	51.462
	standard error	(5.091)	(4.832)	(5.501)	(62.136)	(61.958)	(65.698)
network - β_N (H2a)	coefficient	6.453	6.318	9.035	-52.823	-43.930	-32.203
	standard error	(5.088)	(5.204)	(5.631)	(47.137)	(47.307)	(49.588)
savings*network - β_{SN} (H3)	coefficient	4.374	-8.997	-14.490*	30.899	72.682	46.750
	standard error	(10.783)	(6.559)	(7.729)	(64.028)	(76.384)	(84.722)
mean dep. variable (CI group)		2.766	2.766	2.826	62.404	62.404	63.761
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.309	0.581	0.378	0.014	0.057	0.134
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.386	0.495	0.201	0.628	0.650	0.827
r-squared adjusted		0.022	0.037	0.051	0.023	0.023	-0.000
number of observations		340	191	186	340	191	186
treated network included in sample		yes	no	no	yes	no	no
controls		no	no	yes	no	no	yes

Note: All regressions are OLS. All dependent variables are based on transaction data made available by the mKesh operator for the period between the end of the survey team visits before planting season to the follow-up survey. All regressions include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Not much happening for top-ups and cash-outs – main methods to take money out of mobile money accounts**

Table 3: Maize sold and fertilizer received through the survey team

dependent variable ------>		whether maize was sold through the survey team			% maize value sold through the survey team using mKesh			whether fertilizer was purchased through the survey team		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
savings - β_S (H1a)	coefficient	0.019	0.019	0.041	0.771***	0.771***	0.917***	0.041	0.044	0.054
	standard error	(0.056)	(0.057)	(0.061)	(0.151)	(0.157)	(0.136)	(0.044)	(0.045)	(0.047)
network - β_N (H2a)	coefficient	0.115*	0.144*	0.152*	0.021	0.003	0.055	0.003	0.007	0.010
	standard error	(0.063)	(0.077)	(0.080)	(0.017)	(0.002)	(0.070)	(0.034)	(0.040)	(0.035)
savings* network - β_{SN} (H3)	coefficient	-0.090	-0.103	-0.126	-0.073	0.059	-0.105	-0.038	-0.009	-0.021
	standard error	(0.067)	(0.088)	(0.098)	(0.188)	(0.114)	(0.189)	(0.048)	(0.060)	(0.057)
mean dep. variable (CI group)		0.119	0.119	0.119	0.000	0.000	0.000	0.026	0.026	0.026
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.018	0.150	0.154	0.000	0.000	0.000	0.868	0.422	0.453
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.547	0.385	0.587	0.793	0.598	0.730	0.356	0.972	0.827
r-squared adjusted		0.428	0.439	0.442	0.711	0.815	0.776	0.003	-0.001	-0.030
number of observations		305	176	173	53	27	27	309	174	170
treated network included in sample		yes	no	no	yes	no	no	yes	no	no
controls		no	no	yes	no	no	yes	no	no	yes

Note: All regressions are OLS. All dependent variables are based on transaction data registered by the survey team during all visits before planting season. All regressions include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Sale of maize through mKesh increased for the savings treatment; no effects on purchase of fertilizer**

Table 4: Saving methods beyond mKesh

dependent variable ------>		saving at home				saving with family and friends				saving in bank account			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
savings - β_S (H1a)	coefficient	0.054	0.123	0.161	0.136	0.091	0.128	0.121	0.147	0.118	-0.020	-0.030	-0.021
	standard error	(0.080)	(0.117)	(0.101)	(0.111)	(0.120)	(0.152)	(0.159)	(0.156)	(0.097)	(0.069)	(0.058)	(0.067)
network - β_N (H2a)	coefficient	-0.022	0.117	0.135	0.156	0.116	0.257*	0.266*	0.252*	0.082	0.046	0.064	0.059
	standard error	(0.089)	(0.133)	(0.132)	(0.134)	(0.098)	(0.146)	(0.148)	(0.148)	(0.104)	(0.071)	(0.073)	(0.072)
savings* network - β_{SN} (H3)	coefficient	-0.066	-0.311*	-0.351**	-0.342**	-0.165	-0.359*	-0.351*	-0.354	-0.048	0.003	0.008	-0.015
	standard error	(0.118)	(0.170)	(0.166)	(0.167)	(0.144)	(0.209)	(0.213)	(0.215)	(0.148)	(0.104)	(0.098)	(0.106)
mean dep. variable (CI group)		0.727	0.777	0.785	0.777	0.477	0.468	0.473	0.468	0.250	0.245	0.247	0.245
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.898	0.168	0.166	0.131	0.415	0.082	0.086	0.119	0.431	0.828	0.789	0.659
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.378	0.071	0.030	0.090	0.615	0.460	0.553	0.460	0.758	0.569	0.388	0.602
r-squared adjusted		0.043	0.006	0.034	0.028	-0.005	0.006	0.015	0.048	0.018	0.033	0.053	0.000
number of observations		182	380	371	380	182	382	373	382	182	382	373	382
controls		yes	no	yes	no	yes	no	yes	no	yes	no	yes	no
difference-in-differences		no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
fixed effects		no	no	no	yes	no	no	no	yes	no	no	no	yes

Note: All regressions are OLS. All dependent variables are based on survey questions asked in the follow-up survey or both the follow-up and baseline surveys. All regressions without fixed effects include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Network treatment increased savings with family and friends, consistently with social pressure story**

Table 5: Household expenditures

dependent variable ------>		day-to-day expenditures				non-frequent expenditures			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
savings - β_S (H1a)	coefficient	808.940	344.757	358.539	411.732	1,418.529**	1,513.348**	1,558.645**	1,286.109**
	standard error	(521.878)	(805.440)	(853.130)	(964.875)	(662.273)	(687.958)	(743.204)	(634.691)
network - β_N (H2a)	coefficient	-451.802	-590.820*	-558.877	-547.782	66.810	-145.832	-164.670	-119.249
	standard error	(279.878)	(356.762)	(369.361)	(348.712)	(217.678)	(348.810)	(352.889)	(374.045)
savings*network - β_{SN} (H3)	coefficient	119.735	833.751	778.642	755.272	-507.258	-495.469	-540.644	-287.801
	standard error	(687.357)	(977.028)	(1,012.928)	(1,166.771)	(564.056)	(894.804)	(936.336)	(867.586)
mean dep. variable (CI group)		1,733.904	1,570.358	1,586.645	1,570.358	514.153	446.147	450.126	446.147
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.022	0.031	0.042	0.055	0.012	0.060	0.063	0.070
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.575	0.779	0.804	0.844	0.489	0.394	0.387	0.559
r-squared adjusted		0.045	0.022	0.027	0.027	0.064	0.054	0.067	0.103
number of observations		181	315	308	315	182	347	340	347
controls		yes	no	yes	no	yes	no	yes	no
difference-in-differences		no	yes	yes	yes	no	yes	yes	yes
fixed effects		no	no	no	yes	no	no	no	yes

Note: All regressions are OLS. All dependent variables are based on survey questions asked in the follow-up survey or both the follow-up and baseline surveys. All regressions without fixed effects include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Non-frequent expenditures in particular increase for the savings treatment**

Table 6: Fertlizer use

dependent variable ------>		fertilizer use				urea use		npk use	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
savings - β_S (H1a)	coefficient	0.265***	0.341***	0.311***	0.359***	0.236**	0.196**	0.012	0.025
	standard error	(0.093)	(0.094)	(0.095)	(0.096)	(0.096)	(0.096)	(0.073)	(0.079)
network - β_N (H2a)	coefficient	-0.122	-0.143	-0.143	-0.124	-0.175**	-0.187**	-0.062	-0.059
	standard error	(0.079)	(0.091)	(0.092)	(0.091)	(0.073)	(0.078)	(0.066)	(0.070)
savings* network - β_{SN} (H3)	coefficient	0.120	0.062	0.095	0.038	0.087	0.124	0.187	0.174
	standard error	(0.137)	(0.133)	(0.137)	(0.136)	(0.143)	(0.152)	(0.114)	(0.116)
mean dep. variable (CI group)		0.227	0.191	0.194	0.191	0.233	0.233	0.136	0.136
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.000	0.000	0.000	0.000	0.001	0.003	0.015	0.018
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.983	0.457	0.666	0.436	0.456	0.609	0.128	0.153
r-squared adjusted		0.139	0.171	0.167	0.238	0.120	0.116	0.024	0.029
number of observations		182	382	373	382	180	176	185	181
controls		yes	no	yes	no	no	yes	no	yes
difference-in-differences		no	yes	yes	yes	no	no	no	no
fixed effects		no	no	no	yes	no	no	no	no

Note: All regressions are OLS. All dependent variables are based on survey questions asked in the follow-up survey or both the follow-up and baseline surveys. All regressions without fixed effects include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Fertilizer use increased for the savings treatment by 27-36 pp, significant at the 1 percent level**

Table 7: Transfers from/to other people

dependent variable ------>		closest farming friends lent to individual		closest farming friends borrowed from individual	
		(9)	(10)	(11)	(12)
savings - β_S (H1a)	coefficient	-0.032	-0.012	-0.104**	-0.087*
	standard error	(0.067)	(0.071)	(0.051)	(0.048)
network - β_N (H2a)	coefficient	-0.093	-0.083	-0.092*	-0.063
	standard error	(0.060)	(0.059)	(0.053)	(0.050)
savings*network - β_{SN} (H3)	coefficient	0.163*	0.129	0.286***	0.246***
	standard error	(0.086)	(0.088)	(0.085)	(0.086)
mean dep. variable (CI group)		0.193	0.193	0.170	0.170
$\beta_S + \beta_{SN} = 0$ (H1b)	F-stat p-value	0.016	0.040	0.006	0.015
$\beta_N + \beta_{SN} = 0$ (H2b)	F-stat p-value	0.298	0.507	0.004	0.009
r-squared adjusted		0.013	0.010	0.061	0.087
number of observations		186	182	186	182
controls		no	yes	no	yes

Note: All regressions are OLS. Both dependent variables are based on survey questions asked in the follow-up survey; they take value 1 if both friends lent to or were borrowed from by the individual; they take value 0.5 if just one friend lent or was borrowed from; they take value 0 if no friend lent or was borrowed from. All regressions include district dummies. Controls are gender, age, whether the individual was born in Manica province, whether the individual has completed primary school, number of household members, and number of children. Standard errors reported in parenthesis - these are clustered at the location level. * significant at 10%; ** significant at 5%; *** significant at 1%.

- **Loans to closest friends decreased for the savings treatment, also for the network treatment; interaction positive**

- **All consistent with savings account counteracting social pressure**

(Tentative) Policy implications

- **Communication of mobile money services is key**
  - There is a sense that the existence of the technology/services is enough for adoption
  - Incentivized agents are key for communication and adoption
- **More can be done to extend access to interest-bearing accounts, namely to mobile-money users**
  - There is potential to embed services from banks in the mobile money platforms (like in the case of Kenya)
  - Complementary measures can allow banks to have agents like the mobile-money agents

- **Remittances are the obvious channel of impact of mobile money, namely through enlarging networks for insuring idiosyncratic risk**
  - However, communication/incentivizing this service has been limited in Mozambique
- **Mobile money to incentivize savings should not be disregarded (for farmers or for urban vendors)**
  - To counteract social pressure to share resources
  - Complementarities with financial literacy are likely