

Cheap talk and coordination in the lab and in the field: Collective commercialization in Senegal

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SEEDEC 2019

Motivation

- Many decisions require coordination
- Multiple equilibria, strategic uncertainty : coordination failure
- Coordination failure as development trap
- Solutions
 - reduce group size (Van Huyck et al, 1990)
 - cheap talk/communication (Farrell (1987), Cooper et al (1992), Farrell and Rabin (1996))
- Issues
 - Evidence is mainly in labs
 - Interplay between sample size and cheap talk not yet explored
- Our paper:
 - impact of cheap talk on coordination
 - heterogeneous impact by group size

Coordination failure in farmer organizations

- Farmer organizations for smallholders' access to market (Barrett, 2008)
- Idea: aggregation of output will lead to access to better markets
- Organizations exist, but little or no collective commercialization: Fafchamps and Hill (2005), Aldana et al. (2007), Hellin et al. (2007), Ragasa and Golan (2014)
- Bernard et al (2014) on farmer organization:
 - Farmers believe collective commercialization could be a solution
 - Uncertainty regarding others' behavior seems to be a deterrent
- We frame this as a coordination failure issue
- Test predictions for cheap talk and group size

This paper

- Context: peanut farmer organizations in Senegal
 - Peanut historically backbone of Senegalese economy
 - Previously state-controlled cooperatives with prices fixed by the state
 - Now, privately operated farmer organizations
 - Private actors buying from farmers or farmer groups
 - Largely unsuccessful in collective commercialization
- Methodology: combine lab-in-the-field experiments and RCTs
 - LFEs : variation in group size and cheap talk
 - RCTs : variation in intentions revealed before commercialization

Findings and contribution

Findings:

- Revealing intended actions enhanced coordination, especially in larger groups
- The effect is not through changes in preferences, but likely expectations of success
- Suggestive evidence of higher incomes for small scale farmers
- Participation in LFEs affect subsequent behavior in RCTs

Our contribution

- Cheap talk can solve coordination failure in the field
- We show that the impact of cheap talk depends on the size of the group
- Transfers are possible from the lab to the field

Conceptual framework

- $N \in \mathbf{N}$ players, each with endowment V_j
- Decision: send $A_j \in [0, 1, \dots, V_j]$ to group
- Aggregate $A = \sum_j A_j$
- if $A \geq T$, each of A_j yields H
- if $A < T$, each of A_j yields L
- each $V_j - A_j$ kept yields M
- $L < M < H$
- Expected payoff: $p = P[A \geq T]$

$$\Pi = pu(A_j H + (V_j - A_j)M) + (1 - p)u(A_j L + (V_j - A_j)M)$$

if risk neutral

$$\Pi = pA_j H + (1 - p)A_j L + (V_j - A_j)M$$

Conceptual framework

Hypotheses

H_1 : as N increases, j decreases A_j , since coordination will likely fail

H_2 : if intentions are revealed and $A \geq T$, j will set $p = 1$

H_3 : The effect of cheap talk will increase with group size N

Overview of the design

May-June 2013: Lab-in-the-field experiments

- 1 Coordination games: 28 groups, 56 sessions, 839 members
- 2 Variations in intentions revelation and size of sessions

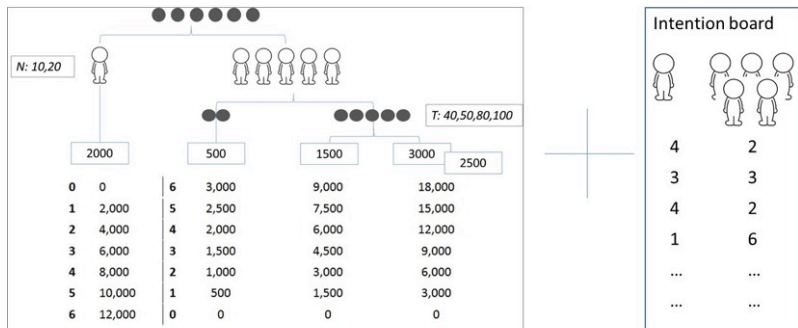
Nov 2013-Feb 2014: RCTs

- 1 Intentions: 79 groups (incl. 28 above), $N_i = 898$
- 2 Between: Control & 3 treatments (varying intentions' revelation)

May-June 2014

- 1 Post-surveys
- 2 Administrative data on collective commercialization

LFE/Games



Variations:

- (1) baseline (28 sessions, $N=429$) vs intentions (28 sessions, $N=410$)
- (2) EG size (10, 20), (3) threshold ($\in \{40, 50, 80, 100\}$),
- (4) premium (2500 or 3000), (5) risk (50% *premium* = 1500).

RCT protocol

- ① Nov-Dec 2013: Two leaders per FG/PO trained
- ② Dec13-Jan14: Leaders held feedback meeting
- ③ Jan-Feb 2014: intentions on sales/use of peanut produced in 2013
 - *Based on the quantity that you expect to harvest, what quantity do you intend to sell to the FG/PO; consume; stock; other?*
- ④ Subsequent meeting with enumerators for all groups

Treatment	In common	What is revealed?		
$A(N_{FG} = 17)$	Training + Intentions elicited + S	-	-	-
$B(N_{FG} = 21)$	Training + Intentions elicited + S	Aggregate intentions	-	-
$C(N_{FG} = 20)$	Training + Intentions elicited + S	Aggregate intentions	Distribution	-
$D(N_{FG} = 21)$	Training + Intentions elicited + S	Aggregate intentions	Distribution	Leader vs. Member

Total number of individuals across all treatments: $N_i = 898$.

S=Survey; $N = 898$ farmers surveyed

- ⑤ Mar 2014: Start of commercialization season

Empirical framework

Specification 1:

$$A_{ig} = \alpha + \beta I_g + X'_{ig}\rho + \varepsilon_{ig}$$

I_g : dummy for intentions revealed

Clustered standard errors: session for LFE, and group for RCT

Specification 2:

$$A_{ig} = \alpha + \beta I_g + \gamma S_g + \delta I_g \times S_g + X'_{ig}\rho + \varepsilon_{ig}$$

S_g : size of groups

Outcomes

- LFE: chips sent to group
- RCT: collective commercialization, total sales

Results 1: Impact of revealing intentions on coordination

Dependent variable Source	# Chips contributed LFE		Contribution intentions (kg) RCT - survey data		Quantity contributed (kg) RCT - survey data		Quantity contributed (kg) RCT - admin. data	
	1	2	3	4	5	6	7	8
Treatment	0.40 (0.19)**	-0.03 (0.31)	239.66 (159.16)	307.57 (426.91)	121.07 (35.51)***	-78.93 (63.31)	129.47 (70.70)*	-153.42 (148.10)
Size of Group	0.03 (0.24)	-0.31 (0.27)	-5.90 (5.57)	-3.72 (10.15)	7.18 (1.85)***	0.75 (1.28)	-1.15 (2.18)	-9.30 (3.53)**
Treatment X Size		0.65 (0.38)*		-2.44 (11.62)		7.19 (2.23)***		8.83 (3.57)**
Control group mean	3.03	3.03	830.39	830.39	39.58	39.58	123.79	123.79
N	3,316	3,316	873	873	873	873	2,752	2,752

Results 2: Impact by RCT treatment arms

Dependent variable Source	Contribution intentions (kg) RCT - survey data		Quantity contributed (kg) RCT - survey data		Quantity contributed (kg) RCT - admin. data	
	1	2	3	4	5	6
B	224.66 (158.64)	384.10 (391.49)	76.54 (38.01)**	-154.33 (92.63)*	94.56 (83.92)	-349.51 (178.26)*
C	186.43 (207.98)	391.81 (530.65)	169.47 (57.39)***	-141.87 (61.45)**	117.05 (88.38)	-124.39 (175.38)
D	207.89 (168.65)	72.79 (422.89)	121.45 (47.96)**	46.96 (71.45)	177.40 (84.32)**	-4.59 (156.30)
Size of Group	-6.20 (5.46)	-4.60 (9.78)	7.39 (1.81)***	1.26 (1.29)	-1.17 (2.19)	-8.74 (3.43)**
B X Size		-5.41 (10.52)		8.14 (3.48)**		12.89 (4.18)***
C X Size		-7.69 (14.01)		11.40 (2.28)***		7.70 (3.60)**
D X Size		4.30 (12.43)		3.01 (2.06)		6.28 (3.73)*
Control group mean	830.39	830.39	39.58	39.58	123.79	123.79
R^2	0.44	0.44	0.18	0.21	0.09	0.10
N	873	873	873	873	2,752	2,752

Results 3: mechanisms - aggregate intentions

	1	2	3	4
Treatment	91.90 (37.79)**	-16.87 (36.80)	121.66 (34.92)***	50.55 (35.13)
Aggregate intentions (tonnes)	3.41 (1.08)***	-0.49 (0.51)	0.58 (1.46)	-1.83 (1.29)
Treatment X Aggregate intentions		4.59 (1.42)***		2.96 (1.44)**
R^2	0.08	0.10	0.17	0.18
N	873	873	873	873
Controls?	No	No	Yes	Yes

Results 4: welfare impact (revenue from total sales)

	1	2	3	4
PO received some info (1= yes, 0 = no)	15.57 (73.25)	185.11 (56.22)***	7.91 (51.46)	61.05 (39.07)
Size of land (ha)	3.48 (3.55)	45.62 (20.68)**	0.85 (1.16)	14.28 (16.38)
Info * Land size (ha)		-43.33 (20.83)**		-13.70 (16.47)
Mean control group		233.66		
R^2	0.01	0.06	0.34	0.34
N	868	868	868	868
Controls	No	No	Yes	Yes

Results 5: impact of LFEs (games) on RCTs ('real life')

Dependent variable	Contribution intentions (kg)		Quantity contributed (kg)		Quantity contributed (kg)		
Sample	All Cooperatives				Game Cooperatives		Control Cooperatives
Farmer was in LFEs	-136.32 (367.59)	-181.08 (174.88)	68.60 (63.71)	95.83 (43.26)**	73.27 (66.81)	92.20 (43.83)**	74.17 (33.96)**
Group was in LFEs	15.19 (412.55)	151.03 (162.18)	110.59 (68.91)	49.44 (53.55)			-3.93 (17.96)
Treatment	151.17 (264.67)	204.15 (152.32)	130.40 (38.22)***	122.53 (36.01)***	204.01 (87.41)**	140.04 (66.63)**	
LFEs non participants mean	996.49	996.49	88.40	88.40	181.46	181.46	10.75
R ²	0.01	0.44	0.05	0.18	0.04	0.25	0.23
N	873	873	882	873	279	279	194
Controls	No	Yes	No	Yes	No	Yes	Yes

Summary

In this paper,

- Model collective commercialization as a coordination problem
- Test if cheap talk can solve coordination failure

We use lab-in-the field experiments and RCTs

We find

- Revealing intended actions enhanced coordination, especially in larger groups
- Suggestive evidence of higher incomes for small scale farmers
- Participation in LFEs affect subsequent behavior in RCTs

End

Thanks! ... Jairruhjef

More on experimental protocol

Key aspects:

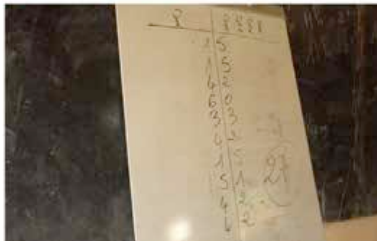
- Neutral framing
- Classroom-style with boxes as dividers
- Pencil & paper
- Instructions + Visual aids + Scenette/role play
- Within-subjects treatments across 4 rounds (no feedback)

Pre- & post-questionnaire

Duration: 2.5 – 3 hours

Average earnings: 9500 West African francs (CFA) \sim 20 USD compared to daily wage “equivalent” of 3000 CFA.

LFE / Game sessions



Game internal validity

Table: Average sample characteristics

Variables	Overall	Baseline	Intentions	Difference
Gender (1=female)	0.53 (0.50)	0.57 (0.02)	0.48 (0.03)	0.10** (0.03)
Land size (hectares)	4.81 (5.42)	4.52 (0.26)	5.11 (0.27)	-0.60 (0.37)
Koranic school (1=yes)	0.61 (0.49)	0.61 (0.03)	0.60 (0.03)	0.01 (0.05)
Groundnut harvest (kg)	1487.48 (2425.96)	1400.39 (129.70)	1576.32 (111.87)	-175.93 (171.54)
Trust	2.69 (1.44)	2.66 (0.07)	2.72 (0.07)	-0.07 (0.10)
Generosity	1.40 (0.61)	1.42 (0.03)	1.37 (0.03)	0.05 (0.04)
Risk aversion	3.10 (1.45)	3.14 (0.07)	3.07 (0.07)	0.07 (0.10)
Patience	1.53 (1.75)	1.58 (0.09)	1.47 (0.09)	0.11 (0.12)
<i>N</i>	839	429	410	839

** Significantly different from zero at 5 % level based on two-sided t-test.

Trust is a survey-based measure asking about trust towards a random group member.

Generosity is based on a hypothetical dictator game.

Risk aversion is based on a hypothetical Binswanger-style (1980) lottery choice.

Patience is based on a hypothetical, typical multiple price list.

RCT internal validity, individual

Table: Balance tests across treatments, individual level

	N_i	All	A	B	C	D	p-val diff
Age	898	46.24	45.70	46.93	48.04	44.38	0.02**
Sex (1=male; 0=female)	889	0.67	0.70	0.64	0.70	0.65	0.36
Leader (1=yes, 0=no)	889	0.19	0.22	0.19	0.18	0.18	0.70
Size of land (ha)	889	4.29	4.01	5.54	3.70	3.76	0.45
Risk (1 to 5)	889	2.80	2.80	2.71	2.85	2.84	0.74
Generosity (1 to 7)	889	2.91	3.18	2.88	2.65	2.99	0.00***
Patience (1 to 5)	889	2.52	2.54	2.52	2.72	2.31	0.12
Federation (1=CCPA, 0=FEGPAB)	889	0.53	0.48	0.54	0.56	0.54	0.50
PO exposed to lablike exp.: 1=yes; 0=no	898	0.33	0.42	0.29	0.28	0.33	0.01**
2013 harvest (kg)	889	1719.05	1967.40	1433.07	1864.13	1665.89	0.25
Expected 2014 harvest (kg)	889	1697.33	1773.30	1808.53	1704.92	1498.28	0.73
Intended to coll. com. : 1=yes, 0=no	889	0.84	0.81	0.87	0.84	0.85	0.36
Intentions coll. com. (kg)	889	1014.91	956.04	992.51	1111.32	994.33	0.85
Intentions indiv. com. (kg)	889	154.94	222.15	213.92	120.28	64.65	0.17
Farmed other crops : 1=yes, 0=no	889	0.58	0.60	0.62	0.56	0.53	0.26
Attended int. revelation meeting: 1=yes; 0=no	898	0.59	0.57	0.57	0.61	0.61	0.71

The last column is obtained by running a one-way ANOVA test, with standard errors clustered at the FG/PO level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Similar results hold if we compare A against $B \cup C \cup D$.

RCT internal validity, FG/PO

Table: Balance tests across treatments, FG/PO level

	N_{FG}	All	A	B	C	D	p-val diff
Group size	78	28.18	27.00	30.71	27.26	28.35	0.91
# with no intent to coll. com.	77	24.23	22.06	25.95	23.53	24.95	0.92
Aggregated intentions	77	27170.46	23384.62	26627.14	29425.85	28816.28	0.94
Mean of intentions	77	981.63	823.33	825.32	1,404.22	878.86	0.43
Mode of intentions	77	977.92	558.82	671.43	1,700.00	970.00	0.35
Median intentions	77	645.10	490.44	523.57	997.50	569.38	0.45
Leader's mean int.	76	1204.32	1162.75	821.88	1707.37	1161.18	0.29
Leader's modal int.	76	1834.14	1629.41	1297.62	2613.68	1830.79	0.42
Leader's median int.	76	1060.36	916.97	705.14	1533.47	1108.16	0.30
Simple member's mean int.	77	943.29	761.84	819.57	1354.16	837.09	0.47
Simple member's modal int.	77	929.22	476.47	752.38	1597.37	865.00	0.43
Simple member's median int.	77	618.12	443.09	525.83	977.37	522.50	0.46
% that attended revelation meeting	77	0.59	0.57	0.57	0.60	0.61	0.86

The last column is obtained by running a one-way ANOVA test.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Similar results hold if we compare A against $B \cup C \cup D$.

Behavioral measures impacted by intervention?

Impact of treatment on behavior

	Patience	Patience	Generosity	Generosity	Risk	Risk
<i>Binary treatment</i>						
Treatment	-0.15 (0.11)	-0.14 (0.28)	0.08 (0.10)	0.09 (0.20)	0.17 (0.11)	0.40 (0.33)
Size of Group	-0.00 (0.00)	-0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	-0.00 (0.00)	0.00 (0.01)
Treatment X Size		-0.00 (0.01)		-0.00 (0.01)		-0.01 (0.01)
R^2	0.07	0.07	0.08	0.08	0.04	0.04
N	873	873	873	873	873	873
<i>Treatment arms</i>						
B	-0.12 (0.13)	-0.04 (0.32)	0.11 (0.12)	0.16 (0.26)	0.18 (0.13)	0.44 (0.35)
C	-0.29 (0.14)**	-0.22 (0.32)	0.04 (0.12)	-0.03 (0.25)	0.08 (0.16)	0.30 (0.37)
D	-0.04 (0.14)	-0.15 (0.32)	0.08 (0.13)	0.16 (0.24)	0.23 (0.14)*	0.48 (0.38)
Size of Group	-0.00 (0.00)	-0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	-0.01 (0.00)	0.00 (0.01)
B X Size		-0.00 (0.01)		-0.00 (0.01)		-0.01 (0.01)
C X Size		-0.00 (0.01)		0.00 (0.01)		-0.01 (0.01)
D X Size		0.00 (0.01)		-0.00 (0.01)		-0.01 (0.01)
Control group mean	1.84	1.84	3.10	3.10	2.15	2.15
R^2	0.07	0.07	0.08	0.08	0.04	0.04
N	873	873	873	873	873	873