

Land Reform in Africa: No-Intervention Agreements

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In brief

- Land reforms are often expensive;
- Framed field experiment to test choice between voluntary agreement and "conflict", with and w/o mediator (gov't) intervention.
- Finding: Mediator option increases likelihood of voluntary agreement.
- Potential for cheap institutional reform to reduce conflict

Context

- Large scale interventions, eg in Ethiopia, to increase tenure security.
- Range of institutions, technologies and costs to achieve higher levels of investment and productivity.
- Two dimensions:
 - Voluntary vs mandatory
 - Informal vs formal
- This paper focuses on the “lower-end”, ie factors affecting the probability for voluntary, informal agreements over land.

Ethiopian context

- Traditional tenure system
- Revolutionary land reform with repeated land redistributions
- Certification scheme to increase tenure security
- Variation in approaches, but basically mandatory, low cost certification.
- What is the potential for voluntary agreements?
- With and without a mediator institution?

The game

- There are two farmers/players, called 1 and 2.
- Each farmer's strategy set equals $\{0, 1, \dots, D\}$, where D is the distance in furrows between the houses; a player's strategy indicates how many furrows of land (measured from the edge of his house) to which he lays claim.
- If a farmer chooses x while his neighbor chooses y then the farmer gets land value $v \cdot (x - z) + v \cdot z / 4$, where v is the value of uncontested land per furrows and z is the number of furrows of contested land: $z = \max\{x + y - D, 0\}$.

Social preferences

- Other objectives than material gain:
 - Inequity aversion;
 - Concerns of least well-off individual
 - Reciprocity;
 - Guilt aversion;
- All these models have as an equilibrium the cooperative outcome where each claim $D/2$.

Example in paper:

- *Distance (D)=4,*
- *Cost of enforcing a split (C)=10,*
- Value of uncontested land (v)=8
- Fehr – Schmidt preferences
$$s_i - a_i \cdot \max\{s_j - s_i, 0\} - b_i \cdot \max\{s_i - s_j, 0\}$$
where $0 \leq b_i \leq a_i$ and $b_i < 1$.
- Mediator option, splits equal: $(8 \cdot 4 - 10) / 2 = 11$

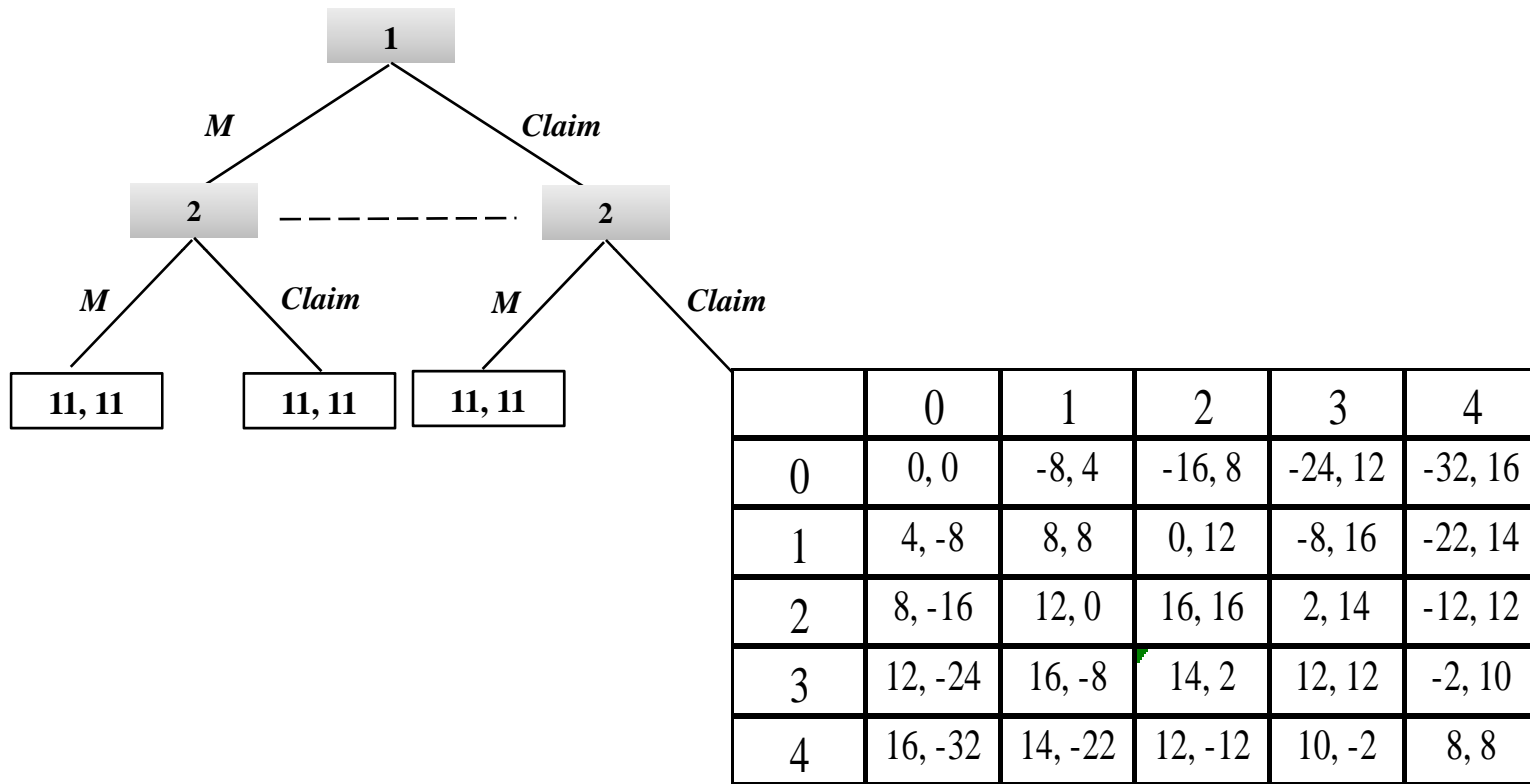
Without Mediator – ‘nominal’ payoffs

		Player 2				
		0	1	2	3	4
Player 1	0	0, 0	0, 8	0, 16	0, 24	0, 32
	1	8, 0	8, 8	8, 16	8, 24	2, 26
	2	16, 0	16, 8	16, 16	10, 18	4, 20
	3	24, 0	24, 8	24, 8	12, 12	6, 14
	4	32, 0	26, 2	20, 4	14, 6	8, 8

Without Mediator – payoffs adjusted for F&S social preferences

		Player 2				
		0	1	2	3	4
Player 1	0	0, 0	-8, 4	-16, 8	-24, 12	-32, 16
	1	4, -8	8, 8	0, 12	-8, 16	-22, 14
	2	8, -16	12, 0	16, 16	2, 14	-12, 12
	3	12, -24	18, -8	14, 2	12, 12	-2, 10
	4	16, -32	14, -22	12, -12	10, -2	8, 8

With Mediator - the extensive form game



Forward induction

- i. No rational player rejects M with the intention of following up with 0 or 1; by choosing 0 or 1 a player could at most get 8 in the proper subgame (where both players have rejected M) so he would have been better off choosing M .
- ii. Therefore, in the proper subgame, each player must expect the co-player to choose 2, 3, or 4.
- iii. However, in the proper subgame each player should figure out (ii), so it does not make sense to choose 4 since 4 is a best response only if the opponent chooses 0 or 1 (which (ii) ruled out).
- iv. But then it does not make sense to choose M since each player should figure out (iii) and so realize that by rejecting M and then choosing 3 he could get at least 12 (since by (iii) the co-player will not choose 4) and 12 is more than the 11 he would get from M .
- v. The prediction, then, is that players will choose 2 or 3.

Iterated elimination of weakly dominated strategies => (2,2) and (3,3)

1. It does not make sense to go for 0 or 1 while there is M.

2. It does not make sense to go for 4 since 4 is only a best response to 0 and 1.

		Player 2					
		M	0	1	2	3	4
Player 1	M	11, 11	11, 11	11, 11	11, 11	11, 11	11, 11
	0	11, 11	0, 0	-8, 4	-16, 8	-24, 12	-32, 16
	1	11, 11	4, 8	8, 8	0, 12	8, 16	22, 14
	2	11, 11	8, -16	12, 0	16, 16	2, 14	-12, 12
	3	11, 11	12, -24	16, -8	14, 2	12, 12	-2, 10
	4	11, 11	16, -32	14, -22	12, -12	10, -2	8, 8

3. Now that each player knows 4 is dropped out, it does not make sense to go for M.

4. We therefore end up with 2 equilibria, (2,2) and (3,3).

In sum

1. $(4,4)$ is not an equilibrium
2. (M, M) is not an equilibrium
3. $(2, 2)$ and $(3,3)$ better than mediated government intervention
4. While the mediated government intervention is not used, the fact that it *could have been used* shaped the analysis.
5. Analysis requires forward induction and presence of social preferences.

Experimental design

- Rural Ethiopian farmers (Amhara region)
- Mimic ag land conflict
- Contested land 4 tilms (1/10 ha)
- Two treatments, with and w/o mediator.
- 8 villages, 60 farmers per village
- Drawn from EEHS panel sample (with socio-economics from 4th round, 2007 – EfD/WB)

Table 1: Land claim with and w/o mediator option

	Land claim - Without mediator option (%)	Land claim - With mediator option (%)	Land claim - conditional on not choosing mediator (%)
M (Choose mediator)	n.a.	30.7	n.a.
0	0.0	0.0	0.0
1	0.8	0.0	0.0
2	43.1	38.7	55.8
3	22.6	12.2	17.6
4	33.5	18.5	26.7
Observations	239	238	165

Table 2: Explanatory Variables

Variable	Description	Variable	Description
<i>Male</i>	Dummy variable for gender (1=Male)	<i>Age</i>	Age in years
<i>Literate</i>	Dummy variable for literacy	<i>HH_size</i>	Total number of household members
<i>East Gojam</i>	Dummy for Zone (1= East Gojam, 0=South Wollo)	<i>Parcels owned</i>	Number of parcels of land owned by the household.
<i>Asset index</i>	Principal component index of major assets owned by the hh	<i>Trust general</i>	1=completely untrustworthy and 5= completely trustworthy)
<i>Trust trade</i>	Trust to trade transaction partners 1=completely untrustworthy 5= completely trustworthy	<i>Trust Woreda</i>	Trust to the Woreda administ'n 1=completely untrustworthy 5= completely trustworthy
<i>Certificate</i>	1= if the subject believes land certificate reduces land conflicts,	<i>Conflict concern</i>	1=if the subject is concerned about land related conflicts, 0 otherwise
<i>Belief Mediator</i>	1= if guess of partner's choice is <i>Mediator</i> , 0 otherwise)	<i>Belief Conflict</i>	1= if guess of partner's choice is a claim greater than 2, 0 otherwise
<i>Belief cooperation</i>	1= if guess of partner's choice is a claim of 2, 0 otherwise		

Table 3: Regression results

Explanatory Variable	Dependent Variable		
	Claim when there is no <i>Mediator</i> option	Claim when there is <i>Mediator</i> option	<i>Mediator</i>
<i>Male</i>	-0.262	-0.414	0.073
<i>Age</i>	0.003	0.015	0.020**
<i>Literate</i>	0.379**	-0.304	-0.474*
<i>HH size</i>	-0.0003	0.076	-0.047
<i>East Gojam</i>	0.470***	-0.068	-0.310
<i>Parcels owned</i>	-0.064	0.021	0.003
<i>Asset index</i>	-0.0007	0.0002	-0.005**
<i>Trust general</i>	-0.046	-0.108	-0.066
<i>Trust trade</i>	0.042	0.096	-0.318***
<i>Trust Woreda</i>	0.082	0.029	0.142
<i>Conflict concern</i>	-0.044	0.043	-0.441
<i>Certificate</i>	0.269	0.099	-0.225
<i>Belief of Mediator</i>	-	0.657	1.867***
<i>Belief of conflict</i>	0.593***	0.873***	0.725***
<i>Constant</i>	-	-	-0.670

Conclusion

- Land reforms are important, large scale and often expensive;
- Framed field experiment to test inclination for voluntary agreement (and "conflict"), with and without mediator (gov't) intervention.
- Finding: Mediator option increases likelihood of voluntary agreement.
- Potential for cheap institutional reform to reduce conflict as a precursor to more expensive (and far-reaching) land reforms.