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Transformation of the Family under Rising Land Pressure: A Theoretical Essay

C. Guirkinger   J.P. Platteau

Center of Research in the Economics of Development
University of Namur, Belgium

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Introduction

▶ What we understand well: the process and motives behind the individualisation of land tenure rules at community level.

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Introduction

- ▶ What we understand well: the process and motives behind the individualisation of land tenure rules at community level.
- ▶ What we do not know well: the process and motives behind the individualisation of the farm-cum-family structure at the farm unit level.

Introduction

- ▶ What we understand well: the process and motives behind the individualisation of land tenure rules at community level.

- ▶ What we do not know well: the process and motives behind the individualisation of the farm-cum-family structure at the farm unit level.

- ▶ Punchline of the paper: The same force that drives the former process of evolution also drives the latter, and this is growing land scarcity.

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Introduction

▶ Two circumstances under which individualisation occurs at farm unit level:

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▶ Two circumstances under which individualisation occurs at farm unit level:

(i) Head of collective farm grants individual plots to members of the household who keep for themselves the entire proceeds therefrom while they are required to work on the collective, family fields;

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Introduction

- ▶ Two circumstances under which individualisation occurs at farm unit level:

  (i) Head of collective farm grants individual plots to members of the household who keep for themselves the entire proceeds therefrom while they are required to work on the collective, family fields;

  (ii) Head agrees to the split of the stem family farm, implying that some (male) members leave with some portion of its land in order to form separate, autonomous branch households.

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Introduction

▶ Form (ii) appears to be a further stage of individualisation of the farm-cum-family structure than (i);

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▶ Form (ii) appears to be a further stage of individualisation of the farm-cum-family structure than (i);

▶ But it is not clear what is the underlying logic of the transformation, and in which order (i) and (ii) should succeed each other, especially so because split of the farm-cum-family may be partial (only some sons leave)

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- ▶ Form (ii) appears to be a further stage of individualisation of the farm-cum-family structure than (i);

- ▶ But it is not clear what is the underlying logic of the transformation, and in which order (i) and (ii) should succeed each other, especially so because split of the farm-cum-family may be partial (only some sons leave)

- ▶ To address this issue, and to understand how land scarcity exerts its effects on the farm-cum-family structure, we need a theory.

Literature

Few economic theories on the subject

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Literature

Few economic theories on the subject

▶ Explain either the shift from the collective farm to the mixed form in which individual and collective fields coexist, or the breakup of the collective farms into individual units.

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Few economic theories on the subject

▶ Explain either the shift from the collective farm to the mixed form in which individual and collective fields coexist, or the breakup of the collective farms into individual units.

▶ Fafchamps (2001): Why does a hhold head allocate individual plots to members? Basic idea: commitment problem in rewarding members for their work on the collective field.

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▶ Fafchamps (2001): Why does a hhold head allocate individual plots to members? Basic idea: commitment problem in rewarding members for their work on the collective field.

▶ Foster and Rosenzweig (2002): Why are there family-cum-farm splits? Basic idea: tradeoff between a public good produced by hhold and decreasing returns to scale in production.

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▶ Boserup (1965): Theory based on economic incentives that change with ecological conditions and resource endowments. Basic idea: Growing land scarcity leads to small family farms so as to facilitate adoption of care-intensive forms of land use that increase land yields.

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The puzzle

▶ In central Mali, individualization of farm-cum-family
   structures:

   (i) individual plots coexisting with collective fields, or,

   (ii) branch households formed on portions of the family land;

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The puzzle

- In central Mali, individualization of farm-cum-family structures:

  (i) individual plots coexisting with collective fields, or,

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- Although no evidence of technological change.

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The puzzle

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  (i) individual plots coexisting with collective fields, or,

  (ii) branch households formed on portions of the family land;

- ▶ Although no evidence of technological change.

  ⇒ Hence the need for a theoretical framework that does not rely on such change in order to account for the gradual demise of collective farms.

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Empirical Evidence from Central Mali

▶ The three regimes the pure collective regime, the mixed
   regime (with individual fields), and the stem households
   regime- coexist with each other in all villages.

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Empirical Evidence from Central Mali

▶ The three regimes the pure collective regime, the mixed regime (with individual fields), and the stem households regime- coexist with each other in all villages.

▶ Mixed system in about 25% of sample households.

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Empirical Evidence from Central Mali

- ▶ The three regimes the pure collective regime, the mixed regime (with individual fields), and the stem households regime- coexist with each other in all villages.
- ▶ Mixed system in about 25% of sample households.
  - ▶ Mixed farms on the rise: in the case of most of these farms, there were no individual plots under former head.

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Empirical Evidence from Central Mali

▶ The three regimes the pure collective regime, the mixed regime (with individual fields), and the stem households regime- coexist with each other in all villages.

▶ Mixed system in about 25% of sample households.
  ▶ Mixed farms on the rise: in the case of most of these farms, there were no individual plots under former head.
  ▶ Most common motive for such a shift: growing land scarcity. Other motive: Growing consumption needs of the young generation.

Empirical Evidence from Central Mali

▶ The hypothesis of the role of land scarcity is strongly
  confirmed by quantitative data:

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Empirical Evidence from Central Mali

▶ The hypothesis of the role of land scarcity is strongly confirmed by quantitative data:

Land per male member is 3.67 ha for pure collective farms, but only 3.01 ha for mixed farms (difference statistically significant).

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Highly significant negative coefficient of land endowment variable in regression analyses in which existence of individual plots is the dependent variable.

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Highly significant negative coefficient of land endowment variable in regression analyses in which existence of individual plots is the dependent variable.

▶ Most important problem in the mixed regime: competition between collective field and individual plots.

Empirical Evidence from Central Mali

- ▶ Sample heads reached that position through three different methods:

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Empirical Evidence from Central Mali

- ▶ Sample heads reached that position through three different methods:
  - ▶ The way of custom (59%): at the death of father, eldest brother or son takes over;
  - ▶ Split while father still alive (24.3%) → SPLIT;
  - ▶ Separation at the death of father (17%).

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Empirical Evidence from Central Mali

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    - ▶ The way of custom (59%): at the death of father, eldest brother or son takes over;
    - ▶ Split while father still alive (24.3%) → SPLIT;
    - ▶ Separation at the death of father (17%).
- ▶ Main reasons given for family breakups: land pressure (34%) and intra-family conflicts (34%).

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Empirical Evidence from Central Mali

▶ Family is essentially patriarchal:

Empirical Evidence from Central Mali

▶ Family is essentially patriarchal:
  ▶ Members may not take loans without heads approval;
  ▶ Members may not seek individual plots without the same.

Model setup

▶ Principal-agent model with head (father) as principal and N (male) members as agents;

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Model setup

▶ Principal-agent model with head (father) as principal and N (male) members as agents;

▶ Head obtains his income from collective field only;

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Model setup

- ▶ Principal-agent model with head (father) as principal and N (male) members as agents;

- ▶ Head obtains his income from collective field only;

- ▶ Workers on collective field equally treated in the distribution of collective produce, hence the existence of a moral-hazard-in-team problem on collective field that compounds the disincentive effect of the share system of labor remuneration;

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- ▶ Efficient levels of effort on individual plots, of size A^I;

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- ▶ Efficient levels of effort on individual plots, of size A^I;

- ▶ Members have outside options that provide $\underline{u}$, hence the existence of participation constraints.

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Model setup

- ▶ Utility is separable in consumption and effort:
  $u(c, l) = c - v(l)$.
- ▶ A member's consumption is the sum of his share of collective production and the production of his individual field.
- ▶ A member's labor is the sum of the labor he applies to the collective field, l^C, and the labor on his individual field, l^I.

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- ▶ The head does not work and consumes his rent R, i.e. a share α of the production on the collective field.

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- ► A member's labor is the sum of the labor he applies to the collective field, l^C, and the labor on his individual field, l^I.

- ► The head does not work and consumes his rent R, i.e. a share α of the production on the collective field.

- ► If one member splits, he leaves with $\frac{1}{N}$ if family land. The number of members on the farm is: $n \leq N$.

Model setup

▶ Two-stage game:

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Model setup

- ▶ Two-stage game:
  - ▶ The head chooses n, A^l and α;

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Model setup

▶ Two-stage game:
  ▶ The head chooses n, A^I and α;
  ▶ Given this, the sons choose how much labor to apply to the collective and their individual fields.

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Model setup

- ▶ Two-stage game:
  - ▶ The head chooses n, A^I and α;
  - ▶ Given this, the sons choose how much labor to apply to the collective and their individual fields.

- ▶ We solve for a symmetric Nash equilibrium in the second stage. The father anticipates his sons' behavior in the first stage.

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Head's problem

$$
\begin{aligned}
\text{Max}_{\alpha, A^I, l^C, l^I}\, R &= \alpha f\left(A - nA^I,\, nl^C\right) \\
\text{s.t.: } \{l^C, l^I\} &= \text{Argmax}_{l_j^C, l_j^I}\, \frac{1-\alpha}{n} f\left(A - nA^I,\, l_j^C + (n-1)l^C\right) + f\left(A^I,\, l_j^I\right) - v(l_j^C + l_j^I) \\
l^C &\geq 0 \text{ and } l^I \geq 0 \\
\underline{u} &\leq \frac{1-\alpha}{n} f\left(A - nA^I,\, nl^C\right) + f\left(A^I,\, l^I\right) - v(l^C + l^I) \\
0 &\leq \alpha \leq 1 \\
0 &\leq nA^I \leq A \\
A &= \frac{n\overline{A}}{N}
\end{aligned}
$$

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Giving out individual fields?

An increase in A^I has opposite effects on the head's rent:

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Giving out individual fields?

An increase in A^I has opposite effects on the head's rent:

▶ Decrease incentive to work on collective field

⇒ Decrease the base from which head obtains his income;

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Giving out individual fields?

An increase in A^I has opposite effects on the head's rent:

- ▶ Decrease incentive to work on collective field

  ⇒ Decrease the base from which head obtains his income;

- ▶ Relaxes the participation constraint of all members, since they farm more efficiently on individual plots

  ⇒ The head may keep a greater share of collective production.

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Splitting the family?
Ambiguous impact of a unit decrease in family size on the father's rent:

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▶ Farm size decreases;

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Splitting the family?

Ambiguous impact of a unit decrease in family size on the father's rent:

- ▶ Farm size decreases;
- ▶ Total labour available decreases:

  ⇒ Decrease maximum attainable production on collective field.

  ⇒ Decrease moral-hazard-in-team.

  ⇒ Decrease number of members to be sustained on farm.

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The role of $\overline{A}$ and $\underline{u}$ on the choice between the pure collective regime and the mixed regime

PROPOSITION 1

Assume that the production function is Cobb-Douglas and the cost of effort is $v(l) = \omega l^2$. Suppose that the head of an extended family is just indifferent between the pure collective regime and the mixed regime (with individual plots).

A marginal increase in the members' reservation utility, or a marginal decrease in land endowment induces him to strictly prefer the mixed regime over the collective regime. Conversely, a marginal increase in land endowment induces him to strictly prefer the pure collective regime. Furthermore, when $\underline{u}$ tends to 0, the head again prefers the pure collective regime.

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The role of $\overline{A}$ and $\underline{u}$ on the choice to split the family

PROPOSITION 2
Assume that the production function is Cobb-Douglas and the cost of
effort is $v(l) = \omega l^2$. If the male member's reservation utility is very large,
the family head of a pure collective or a mixed farm will choose to split
the family and let some male members leave with $\frac{1}{N}$ of total land
endowment. Conversely, if the reservation utility is very small, the family
head prefers to keep the family whole.

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The role of land pressure and outside options: analytical results

If we assume a Cobb-Douglas production function, and a polynomial cost of effort, we know that:

- For large $\overline{A}$, the pure collective regime dominates the mixed regime.

- If the mixed regime exists, it is for relatively large values of $\underline{u}$ or small values of $\overline{A}$.

- For small $\underline{u}$, the pure collective regime dominates all other regimes.

- For large $\underline{u}$, the head will split the family.

$\Rightarrow$ Not a complete set of predictions (What happens for small $\overline{A}$? Does the mixed regime ever dominate the others?)

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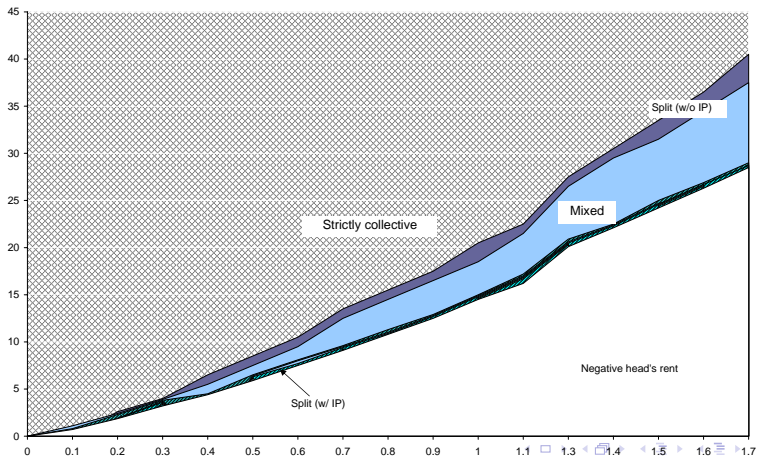## The role of land pressure and outside options: analytical results

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The role of $\overline{A}$ and $\underline{u}$: Simulation

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▶ Our model explains the coexistence of the three farm-cum-family structures under conditions of heterogeneous land endowments at farm level and static technology.

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▶ Land scarcity drives the individualization of the farm-cum-family.

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Conclusion

▶ Our model explains the coexistence of the three farm-cum-family structures under conditions of heterogeneous land endowments at farm level and static technology.

▶ Land scarcity drives the individualization of the farm-cum-family.

▶ As land pressure rises, household splits occur before individual plots emerge within the framework of an integrated farm, which may appear as rather counter-intuitive. But this is no paradox since splitting is partial rather than complete.