Formalizing rural land rights in West Africa: Evidence from a randomized impact evaluation in Benin

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Outline

- Motivation
- Program overview
- Impact evaluation approach
- Overall results
- Gender-disaggregated results
- Initial conclusions
Motivation (I)

- Throughout much of rural sub-Saharan Africa, customary land tenure systems continue to hold sway
- Often characterized by high tenure insecurity & low investment levels
- Evidence on the primary policy response, land titling, is mixed in Africa (Fenske 2011)
- Need for more flexible policy tools to embed customary rights & stimulate investment
Motivation (II)

- Growing body of evidence on relationship between women’s tenure security & increased agricultural investment & productivity (Goldstein & Udry 2008) & land market participation (Holden et al 2011) in SSA

Policy questions

- What is the Benin PFR’s impact on tenure security, land market activity, agricultural investment, intra-hh decision-making, & income diversification?

- How do these effects differ by sex? Do customary land formalization programs like the PFR expand or reduce women’s access to & control over land, relative to men?
PROGRAM OVERVIEW
Land in rural Benin

- Customary arrangements
- Tenure insecurity
- Low investment in land
- Conflicts over & unequal access to land
- Thin rural credit markets
- Land markets expanding in the south
- Women typically obtain secondary rights to land via husband
Benin’s Plan Foncier Rural (PFR)

- Hybrid approach to documentation & formalization of rural customary rights
- Offers community surveying, land adjudication, & land use certificates
- MCC-funded program aims to improve tenure security & stimulate agricultural investment in 40 of Benin’s 77 communes
The PFR process in Benin

- **Main steps in each village:**
  - Information campaign
  - Parcel surveying & identification of rights-holders
  - Preparation of village land use plans
  - Public review of village land use plan (60 days)
  - Review & approval of land use plan
  - **Certificate (CFR) delivery**
Marking of boundary corner

Topographic surveying

Signature of right-holder & neighbors
IMPACT EVALUATION APPROACH
Measuring program impact

- Exogenous treatment: *Randomized selection* of villages that submit a proposal & meet eligibility criteria (via commune-level lotteries) allows for rigorous analysis of impact
- Pre-program balance on observables
- Single-difference intent-to-treat estimates of program impact
Model specification for impact estimates

• OLS with village-level intent-to-treat variable:
  \[ y_{ijk} = \beta_0 + \beta_1 \cdot t_{jk} + \beta_2 \cdot x_{ijk} + \gamma_k \cdot c_k + \lambda \cdot \text{emicov}_j + \varepsilon_{ijk} \]

• OLS with added gender-treatment interaction term:
  \[ y_{ijk} = \beta_0 + \beta_1 \cdot t_{jk} + \beta_2 \cdot \text{fem}_{ijk} \cdot t_{jk} + \beta_3 \cdot \text{fem}_{ijk} + \beta_4 \cdot x_{ijk} + \gamma_k \cdot c_k + \lambda \cdot \text{emicov}_j \]
  \[ + \varepsilon_{ijk} \]

• For parcel (or plot) \( i \), village \( j \), and commune/municipality \( k \):
  \( t_{jk} = \text{Village was randomly assigned to PFR treatment (intent-to-treat)} \)
  \( \text{fem}_{ijk} = \text{Indicator variable for female manager (parcel or plot)} \)
  \( \text{fem}_{ijk} \cdot t_{jk} = \text{Gender interaction term} \)
  \( x_{ijk} = \text{Vector of household & parcel (or plot) controls} \)
  \( C_k = \text{commune dummy} \)
  \( \text{emicov}_j = \text{lottery dummy (villages covered by EMICoV 2006 vs. other villages)} \)
  \( \varepsilon_{ijk} = \text{error term} \)
Benin PFR impact evaluation & implementation timeline

**EMICoV I national survey begins (with follow-up waves in 2007)**

2006: Selection of PFR villages through public commune lotteries begins

2007: PFR land surveying begins in 78 treated villages in the sample

2008: PFR land surveys begin in 105 more villages in the sample

2009: 8 additional villages in sample undergo PFR land surveys

2010: Issuance of PFR certificates begins

2011: World Bank survey conducted on EMICoV II sub-sample

2012: EMICoV II survey conducted

2013/14: Planned follow-up survey

**IMPACT EVALUATION**

**PFR IMPLEMENTATION**

2007: Benin PFR impact evaluation & implementation timeline
MCA Benin PFR communes & Villages
2011 World Bank PFR survey

Commune
- non-PFR commune
- PFR commune

Village
- control village
- treatment village
Data

- 3,500 HH + community survey (2011)
- Rich set of data:
  - Communities
  - Households
  - Parcels/landholdings
  - Farm plots
  - Individual spouses
- 291 villages (193 treatment & 98 comparison)
OVERALL RESULTS
Tenure security

- Initial spike in perceived insecurity, which drops back for earlier PFR waves
- Increase in perennial & tree planting
- No overall effect on land conflicts
  - But increase in reported farmer/pastoralist conflicts among early-wave villages

### OLS regressions with household / parcel / geographical / lottery controls

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Fear of parcel re-allocation</th>
<th>Fear of parcel being occupied</th>
<th>No fear of losing parcel</th>
<th>Conflict occurred on parcel (last 3 years)</th>
<th>Planted trees on parcel (last 12 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>-0.01</td>
<td><strong>0.04</strong></td>
<td>-0.02</td>
<td>-0.01</td>
<td><strong>0.01</strong></td>
</tr>
<tr>
<td></td>
<td>(-0.67)</td>
<td>(2.42)</td>
<td>(-0.91)</td>
<td>(-0.99)</td>
<td>(1.75)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.206</td>
<td>0.145</td>
<td>0.267</td>
<td>0.0683</td>
<td>0.0583</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses. Standard errors clustered at village level. *** p<0.01, ** p<0.05, * p<0.1
## Land markets

- Initial freeze in PFR land markets before CFR issuance: drop in out transactions (sales, renting & sharecropping out) for recently-treated villages

### OLS regressions with household / parcel / geographical / lottery controls

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Parcel currently on loan/rented out</th>
<th>HH sold land in last 5 years</th>
<th>Currently easy to rent out plots in this village?</th>
<th>Currently easy to find a buyer for plots in this village?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>-0.01** (-2.33)</td>
<td>-0.01** (-2.02)</td>
<td>-0.04 (-1.30)</td>
<td>-0.04 (-1.32)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,473</td>
<td>2,753</td>
<td>2,600</td>
<td>2,516</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.0115</td>
<td>0.0269</td>
<td>0.500</td>
<td>0.456</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses. Standard errors clustered at village level. *** p<0.01, ** p<0.05, * p<0.1
Investments

- No observed increase in land investment (aside from tree planting)
- But a shift away from rain-fed to riverside land

### OLS regressions with household / parcel / geographical / lottery controls

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Parcel has at least 1 irrigation/ soil/ tree investment</th>
<th>Parcel water source: rain-fed</th>
<th>Parcel water source: dug well</th>
<th>Parcel water source: river</th>
<th>Plans to leave parcel fallow in next 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>0.02</td>
<td>-0.03*</td>
<td>0.01</td>
<td>0.02*</td>
<td>0.01</td>
</tr>
<tr>
<td>Observations</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.121</td>
<td>0.854</td>
<td>0.0382</td>
<td>0.0437</td>
<td>0.0559</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses. Standard errors clustered at village level. *** p<0.01, ** p<0.05, * p<0.1
Agricultural production

- No increase in average productivity

- Shift towards perennial cash crop (33% increase in oil palm production)
Off-farm activities

- Drop in paid wage employment for men (return to the farms?)
- No impact on off-farm enterprises
Institutions

- Initial increase in trust in institutions
- More engaged in village land mgmt

### OLS regressions with household / parcel / geographical / lottery controls

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>HH head has responsibilities for land management</th>
<th>Other HH members have responsibilities for land management</th>
<th>For problems with your land do you trust: Chef de terre</th>
<th>For problems with your land do you trust: Traditional/religious leader</th>
<th>For problems with your land do you trust: Village Land Cmte</th>
<th>For problems with your land do you trust: Mayor’s office</th>
<th>For problems with your land do you trust: Association/NGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>0.03***</td>
<td>0.01**</td>
<td>0.02</td>
<td>0.06**</td>
<td>0.29***</td>
<td>0.04</td>
<td>0.06*</td>
</tr>
<tr>
<td>Observations</td>
<td>2,909</td>
<td>2,909</td>
<td>2,570</td>
<td>2,591</td>
<td>1,921</td>
<td>2,706</td>
<td>1,940</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.0382</td>
<td>0.0103</td>
<td>0.814</td>
<td>0.721</td>
<td>0.531</td>
<td>0.822</td>
<td>0.446</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses. Standard errors clustered at village level. *** p<0.01, ** p<0.05, * p<0.1
GENDER-DISAGREGGATED RESULTS
Reduction in conflicts, despite drop in tenure security

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Parcel conflict in last 3 years</th>
<th># of conflicts on parcel</th>
<th>Fear of parcel re-allocation</th>
<th>Fear of parcel being occupied</th>
<th>Started falling parcel in last 3 years</th>
<th>Plans to leave parcel fallow in next 12 months</th>
<th>Planted trees on parcel (last 12 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>-0.01</td>
<td>0.19</td>
<td>-0.03</td>
<td>0.04**</td>
<td>-0.00</td>
<td>0.02*</td>
<td>0.01</td>
</tr>
<tr>
<td>Female-headed household * treatment</td>
<td>-0.02</td>
<td><strong>-0.67</strong></td>
<td><strong>0.13</strong></td>
<td>-0.03</td>
<td>0.00</td>
<td><strong>-0.07</strong>*</td>
<td>0.00</td>
</tr>
<tr>
<td>Female-headed household</td>
<td>0.01</td>
<td>0.31</td>
<td>-0.10**</td>
<td>0.05</td>
<td>0.01</td>
<td>0.05**</td>
<td>-0.02</td>
</tr>
<tr>
<td>Observations</td>
<td>5,473</td>
<td>5,460</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.0683</td>
<td>0.541</td>
<td>0.206</td>
<td>0.145</td>
<td>0.0329</td>
<td>0.0559</td>
<td>0.0583</td>
</tr>
</tbody>
</table>

Standard errors clustered at village level.

*** p<0.01, ** p<0.05, * p<0.1
Women taking part in land market

**OLS regressions with household / parcel / geographical / lottery controls**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Parcel obtained via inheritance - last 3 years</th>
<th>Parcel obtained via gift/donation - last 3 years</th>
<th>Parcel obtained via loan/ borrowed - last 3 years</th>
<th>Parcel obtained via métayage/ share-cropping (in) - last 3 years</th>
<th>Parcel obtained via purchase - last 3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>0.01**</td>
<td>-0.00</td>
<td>-0.01*</td>
<td>0.00</td>
<td>-0.01*</td>
</tr>
<tr>
<td>Female-headed household * treatment</td>
<td>-0.01</td>
<td><strong>0.02</strong>*</td>
<td>0.02</td>
<td><strong>0.01</strong></td>
<td><strong>0.03</strong></td>
</tr>
<tr>
<td>Female-headed household</td>
<td>0.01</td>
<td>-0.01</td>
<td>-0.00</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td>Observations</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
<td>5,473</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.0239</td>
<td>0.00804</td>
<td>0.0280</td>
<td>0.00621</td>
<td>0.0298</td>
</tr>
</tbody>
</table>

Standard errors clustered at village level.
*** p<0.01, ** p<0.05, * p<0.1
No evidence of increase in female PFR farmer yields
But women increased their farm input usage

- PFR women increased fertilizer usage by 9 pctg. points (43% increase compared to mean)
Women have a greater say in land but less in other assets?

- PFR women report having a greater say in HH land decisions (+6 pctg. points)
- But have less (-5 pctg. points) of a say in how to use money & assets
- No impact on women’s credit access
- Drop in intra-household conflict
PFR leads to changes within the household

OLS regressions with individual / household / geographical / lottery controls

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Female involved in HH’s land decisions</th>
<th>Female has money or assets that she uses as she wishes</th>
<th>Respondent receives at least some of the HH’s ag revenue</th>
<th>Female received a loan in last 12 months</th>
<th>No disputes or arguments with spouse (last 12 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment - PFR village</td>
<td>0.06**</td>
<td>-0.05**</td>
<td>0.04</td>
<td>-0.01</td>
<td>0.04*</td>
</tr>
<tr>
<td>Female-headed household</td>
<td>0.14**</td>
<td>0.10**</td>
<td>0.15***</td>
<td>0.01</td>
<td>0.09*</td>
</tr>
<tr>
<td>Observations</td>
<td>2,384</td>
<td>2,384</td>
<td>2,384</td>
<td>2,384</td>
<td>2,384</td>
</tr>
<tr>
<td>Outcome mean</td>
<td>0.372</td>
<td>0.680</td>
<td>0.225</td>
<td>0.195</td>
<td>0.409</td>
</tr>
</tbody>
</table>

Standard errors clustered at village level.
*** p<0.01, ** p<0.05, * p<0.1
Initial conclusions

- It gets worse before it gets better: initial spike in tenure insecurity drops for early-wave PFR villages
- Evidence of some long-term investments (perennials, trees)
- Dynamic institutional story: increased trust in the modern state apparatus
- Despite increased insecurity, women face less conflict & have greater say within the household
THANK YOU
ANNEX
## Pre-implementation balance test: Parcels, EMICoV 2006

<table>
<thead>
<tr>
<th>Variables</th>
<th>T-test</th>
<th>OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Treated</td>
</tr>
<tr>
<td>Title</td>
<td>3900</td>
<td>0.0103</td>
</tr>
<tr>
<td>Duration of tenure</td>
<td>3860</td>
<td>13.5358</td>
</tr>
<tr>
<td>Bought</td>
<td>3900</td>
<td>0.1414</td>
</tr>
<tr>
<td>Inherited</td>
<td>3900</td>
<td>0.6152</td>
</tr>
<tr>
<td>Sharecapped in</td>
<td>3900</td>
<td>0.0198</td>
</tr>
<tr>
<td>Rented in</td>
<td>3900</td>
<td>0.0831</td>
</tr>
<tr>
<td>Rented out</td>
<td>3900</td>
<td>0.0018</td>
</tr>
<tr>
<td>Fallow</td>
<td>3900</td>
<td>0.0256</td>
</tr>
<tr>
<td>Sharecapped out</td>
<td>3900</td>
<td>0.0022</td>
</tr>
<tr>
<td>Conflict</td>
<td>3900</td>
<td>0.0162</td>
</tr>
<tr>
<td>Conflict settled</td>
<td>3900</td>
<td>0.0157</td>
</tr>
<tr>
<td>Customary conflict settlement</td>
<td>3900</td>
<td>0.0036</td>
</tr>
</tbody>
</table>

OLS regressions properly account for the randomization at the stratum level. *** p<0.01, ** p<0.05, * p<0.1
References


