Collective Forest Tenure Reform in China: Outcomes and Analysis of Performance

集体林权改革：结果和绩效分析

Jintao Xu
Department of Environmental Management
Peking University
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Part I

GENERAL OVERVIEW
Forest Distribution in China
Main Forest Regions
Chinese forest sector characteristics

- High government intervention
- Forest sector remains highly regulated
- Controls in logging, shipping, land use, etc.
- Currently implementing the TAE program (禁伐和限伐)
- Logging ban and
- Large government investment forestry projects
- And…..
林权制度 Forest Tenure in China

* 两种所有制 Two ownership types
  * 国有 State
  * ~42% forest area and 68% volume;
  * Managed by state forest enterprises and farms
  * 集体 Collective
  * 58% area and 32% volume
  * Growing share of timber production
  * Diversified management schemes
History of Tenure Reform

* 第一次  First Round: 1981-1986
  * 政策反复  A fluctuating process
  * 地区间差异大  Different level of progresses among provinces
  * 长期争论不休  Tenure remains controversial Issue

* 第二次  Second Round: 2000-2008,
  * 截止2007年底，14个省参加
  * By 2007, 14 provinces announced new reform policy
  * 2008年6月，中共中央国务院文件出台
  * In July 2008, Central Government Reform Policy was declared, conclusion of the policy change process promoting collective forest tenure reform
本次改革特点 What’s New?

* 福建
* Fujian joining the mainstream of forest individualization
* 是国家近年来加强农民土地权益努力的一个组成部分
* Continuation of efforts to expand and strengthen forest tenure rights for farmers
* 村级民主决策
* Village representative committee as decision maker on land redistribution plan
* 合同期延长
* Longer term contracts (30, 50, 70)
* 权利内容增加
* New rights: transfer, inheritance, collateral, etc.
* 统一的林权证的发放
* Renewal of forest certificates (uniformed, GIS, etc.)
基本评价  So What?

* 是进步还是倒退？
* Is this socially optimal?
* 评判标准？
* What will be the impacts on
  * 森林资源经营管理的变化 forest resources
  * 林农收入 farmer income?
* 可持续性  Sustainability?
* 社会稳定 Social stability?
## The Survey commissioned by SFA

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<tr>
<th>Time</th>
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<th>Village</th>
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<td>Hunan</td>
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<td>2007.5-6</td>
<td>Shandong</td>
<td>5</td>
<td>15</td>
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<td>2007.8</td>
<td>Yunnan</td>
<td>6</td>
<td>12</td>
<td>30</td>
<td>600</td>
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<td><strong>Total</strong></td>
<td></td>
<td>49</td>
<td>141</td>
<td>288</td>
<td>3180</td>
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</table>
Recent Tenure Reform Participation by Village

- Fujian
- Jiangxi
- Zhejiang
- Anhui
- Hunan
- Liaoning
- Shandong
- Yunnan

Bar chart showing the percentage of villages that have undergone tenure reform and those that have not.
Categorizing Forest Tenure

1. Individual Household Management
   (Small Private Plots, Responsibility Hilly Land, Contracted, Rented, Planted and Occupied)
2. Partnership
3. Villager Cluster, Natural Village
4. Outsider Contract
5. Collective Management
6. Ecological Reserve
集体经营比例变化（各省村级数据）

家庭个体经营比例变化
合伙经营比例变化

村民小组经营比例变化

林地流转比例变化
各省变化总体情况

The Change of Area Share by Tenure Type, 2000-2005(6)
Forest Area by tenure type (ha. Household average)
Contract Length by Tenure Type

- Type 1: Individual HH
- Type 2: Villager cluster
- Type 3: Partner
- Type 4: Outsider contract
Knowledge of Tenure Rights by Household

1. Transfer Right within Village
2. Transfer Right Outside Village
3. Right to Mortgage Forest
4. Conversion to Other Forest Type (e.g. orchard)
5. Autonomy for Tree Species Selection
6. Right to Manage NTFP
7. Right to Harvest
8. Right to Abandon Forestland
9. Conversion to Ag land
Results 1: Timber Harvest Before and After by Village
Result 2: Afforestation Before and After by Village
Distribution of log forestation in each year

Figure 1: Distributions of log (Forestation)* in each year

Kernel Density

logforestation

year=2000  year=2003  year=2005/6
Econometric Estimation of Afforestation Effect

* Central finding is that the reform causes the villages to increase forestation by 262 mu, which is a 150% increase from no reform to reform.

* Plan to study long-run effect as more data become available.

* 对改革对造林结构的影响、以及长期影响有待进一步分析
结果三，林农家庭收入结构变化

Result 3: Change in Household Income Structure
Preliminary Observations

* Harvest increased a lot
* So was afforestation
* And farmer income from forests
* Signs of sustainability
* Social stability a concern due to equity in the reform process
对林业管理体制的影响

Induced Changes

* 采伐限额制度  Relaxation of Logging Quota Control
  * To be replaced by management plan
* 林地流转  Increase land transaction
  * If there is scale economy
  * Empirically testable
* 劳动力转移  Implication on labor reallocation
  * The safety net hypothesis under economic depression
  * Empirically testable
* 林业管理体制的适应性变化  Governance structure changes
  * Re-allocation of forest management staff
  * Service oriented agency
  * Increased role of eco-compensation scheme
* 国有林区改革  State Forest Reform
Thank You!
Part II
EMPIRICAL ANALYSIS I
VILLAGE TENURE CHOICE
林权模式形成的决定因素分析

Tenure Choice: Motivating Empirical Analysis

- 林权改革的方向仍存争议
- Strong disbelief still exists toward promises of forest tenure reform
- (foresters, social elites, etc.)

- 中国改革与世界其他发展中国家林权变化的异同
- In literature, “community forestry” seems to be the solution for developing countries
- 以墨西哥、印度和许多非洲国家为代表，社区林业是改革目标模式Outstanding examples: Mexico, India, Africa

- China is moving toward individualized tenure system in all land. (ag, forest, grassland, even sea shore). Can this be successful?
- 中国走向个体经营为主的经营体制的驱动因素是什么？And Why?
Some Explanations

* Historical Background
  * Private ownership 50 years ago
  * Similar to East European Countries
  * Human Capital: Farmer Individual entrepreneurship
  * While most developing countries are with history of colonial regime. State-ownership was dominant in natural resource sector and devolving down to community is already a big and difficult step

* Institutional Learning: success of agricultural reform
* Equity issue: agricultural land tenure
* Efficiency issue: failure of collective management
  * Ineffectiveness of Income generation and forest conservation
* Political-economic factors: declining share of forestry in regional economy
改革原因的思考
Speculating on Reform Rationale

* 集体土地所有制下，普通农民是名义所有人，集体经济组织的领导人行使实际所有者的权力

* In a collective system, land is so called “collective owned”. Ordinary farmers are de jure owner, but the leaders of the collective (administrative village) practice de facto decision making power.

* 集体经济组织的领导人受私利驱动，在经营集体林地过程中各种行为偏离集体利益最大化的目标，导致经营效率低下，林份质量下降，最终“两危”的局面

* The leaders are self interested. Without sufficient monitoring and sanctioning mechanism, the collective leaders will function in a way far from maximizing collective interests.
集体经营林地的问题
Failure of Collective Forest Management

* 经营规模偏大，在疏于管理的情形下，形同产生公地悲剧的制度框架
  * The size is too large, if no management, easily tragedy of commons problem
* 集体森林资源规模越大，普通林农的声音越小，其利益诉求越不容易得到反映
  * When managed by village leaders, the voice of individual farmers gets smaller once the scale of collective operations gets larger.
* 存在集体经济组织成员和领导阶层信息不对称
  * Information asymmetry between farmers and leaders, lack of accountability
* 腐败现象普遍发生
  * Widespread corruption
* 由于上级政府的影响，村集体领导阶层的权利缺乏监督而后制约
  * Lack of check and balance because village leaders are backed by upper level government
* 管理效率下降，收益下降
  * Management efficiency is low and declining, so is the rent
* 社会矛盾日增
  * Rising social conflict and farmer resentment
* 森林资源保护的成本增加
  * Rising cost of forest protection
改革的预期效果
Potential Benefit of Reform

* 克服公地悲剧问题
  * Hopefully, individualization solves the tragedy of commons problem (NTFP for example)
* 减少腐败空间
  * It reduces room for corruption
* 提高农民投资造林和再造林的积极性（效率改进1）
  * It provides incentives for individual farmers to invest in forest planting and re-planting—efficiency gain (1)
* 诱致林地市场形成和林地流转，产生规模效益（效率改进2）
  * It creates forestland market so that scale economy might be achieved—efficiency gain (2)
* 林农可以使用林权证抵押贷款，提高融资和投资能力（效率改进3）
  * Farmers can use forest certificate as collateral, therefore their ability to invest increases—efficiency gain (3)
* 也是公平性的改进
  * And it is more equitable a system than the previous one
  * (revenue distribution, bargaining power for farmers, safety net, etc.)
* 增强森林经营的可持续性
  * Better prospect of sustainable development
* 局部最优
  * Local Optimum
可能产生的问题

Points of Concern

* 林地细碎化，导致经营效率损失 (1)
* Forestland fragmentation, at least in near term—some efficiency loss (1)
* 缺乏金融系统支持，经营者融资能力降低 (2)
* Credit market not developed so well, therefore lack of funding for investment—delayed efficiency gain (2)
* 在改革过程中，有权势者获得大量林地（公平问题1）
* Social elites capture large area of forests—equity issue (1)
* 对弱势农民群体失地大担心（潜在的社会不稳定因素，公平问题2）
* Concerns about weak farmers losing land quickly—social stability and equity issues (2)
* 大量小农经营面对市场波动，会否产生大量毁林？（可持续性问题）
* Market volatility leading to deforestation, concerns about sustainability
理论框架
Theoretical Framework

* 两种理论 Two lines of literature
* 土地租佃理论 Land Tenancy Theory (Otsuka 等)
  * 假定村领导阶层是地主，村民或村民小集体是佃农，双方的能力差异决定合同的特征 Contract types reflect relative ability
  * 风险的影响，Nature of risk (political vs. natural)
* 激励理论 Incentive Theory (Lafont, Acemoglu, etc.)
  * 假定村集体领导层是政府，农民是私人部门，研究政府在什么情况下决定私有化，选择何种合同形式
  * In collectives, there is a government and a private sector
  * Government with private agenda
  * 寻租的动机和提高效率的动机的互相替代
  * Rent-seeking efficiency trade-off
The principle of reform (VRC, VA) allows testing the impacts of the following factors:

* 村级民主发育程度 Quality of Village Democracy
  * 有私利的政府 Non-Benevolent Village Government
    * 精英掠夺 Elite Capture (outsider contract)
    * 村级政府不独立
  * Non-Independent Village Government (government interference)
* 寻租与效率的替代 Rent Seeking-Efficiency Trade-off
  * Low efficiency of collective management leading to wide spread financial deficit
  * In Fujian, most of the village council improved their financial situation after reform, by collecting fees and charging prices on forest land
  * Opportunity cost of reform for village management important factor
其它因素 Empirical Analysis (cont’d)

* 体制风险 Institutional Risk (- household)
  * 产权稳定性 Tenure insecurity
  * 政府干预程度 Government Intervention
    * 采伐限额 Logging quota
    * 生态公益林 circle Eco-reserve

* 社会资本 Social Capital (+ community)

* 市场发育 Market Development (+ household)

* 替代收入 Alternative Income (- household demand)

* 一般村级特征 General Village Characteristics
计量模型 Econometric Model

• 产权选择的联立方程组
• 分析经营权类型的比例变化的驱动因素
• Estimation of a system of tenure share change
• Type(i, 2005)-Type (i, 2000)=f(6 categories of determinants, 2000)
• i=1,2, …, 5.
• The Sample:
  • Fujian and Jiangxi
  • 90 villages
# Tenure Change: Impacts of Driving Factors (2 Provs)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Individual</th>
<th>Partner</th>
<th>Villager Cluster</th>
<th>Outsider Contract</th>
<th>Collective</th>
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<td><strong>Village Characteristics</strong></td>
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<td>Share of Laborer</td>
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<td>0.092</td>
<td>-0.080</td>
<td>0.051</td>
<td>-0.329**</td>
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<td>Education Attainment</td>
<td>0.543*</td>
<td>-0.063</td>
<td>-0.089</td>
<td>0.269**</td>
<td>-0.075</td>
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<td>Slop of Forestland</td>
<td>0.001</td>
<td>-0.039**</td>
<td>0.051*</td>
<td>0.034*</td>
<td>-0.011</td>
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<td><strong>Market\ Alternative Income</strong></td>
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<td>Commercial Rate of Crop</td>
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<td>-0.031</td>
<td>0.097</td>
<td>-0.081*</td>
<td>0.043</td>
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<td>Informal Credit Attainability</td>
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<td>0.324**</td>
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<td>Cropland Adjustment</td>
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<td>Area of Eco-Reserve</td>
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<td>Forest Conflict</td>
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<td>Forestry Income Share</td>
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<td><strong>Land Rent</strong></td>
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<td>1=Yes; 0=No</td>
<td>0.095</td>
<td>0.114**</td>
<td>0.087</td>
<td>-0.043</td>
<td>-0.149*</td>
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</table>

* significant at 10%; ** significant at 5%; *** significant at 1%
**Conclusion**

- Higher alternative incomes reduce individual demand for forestland;
- Good social capital is conducive to community management (village cluster);
- Government interference, tenure insecurity, tend to induce increase in group management (risk sharing), but reduce demand for individual tenure;
- The quality of village government matters;
- Rent Seeking-Efficiency Trade-off Seems to Exist;
- Compensation for opportunity cost of collective leadership will reduce collective management and increase new tenure types.
Thank You!
Part III

EMPIRICAL ANALYSIS II
PERFORMANCE ANALYSIS
The Effect of the Collective Forest Tenure Reform in China on Forestation

Lunyu Xie (UC Berkeley)
Peter Berck (UC Berkeley)
Jintao Xu (Beijing University)
Collective Forest Tenure Reform
- Individualize collective-owned forests
- Policy delivery process: State, Province, County, Township and Village
- Village representative committees or village assemblies vote for or against the reform
- Goals
  - Stimulate investment in forests
  - Improve forest conservation
  - Increase forest income

Forestation
- Afforestation and reforestation
- Newly planted forest land in a year, in unit of mu (1 mu = 1/15 hectare)
Research Questions

What is the effect of the reform on forestation?

- Whether forestation is increased by the reform significantly?
- If so, what is the magnitude of the effect?
The data is from the surveys done by the Environmental Science and Engineering unit of Beijing University, China.

They surveyed 49 counties in 9 provinces. In each county, they conducted interviews randomly in 6 villages, and 10-20 households in each village.
Exposure to the policy and reform

The variations are due to the delivering process of the reform policy and the villages’ voting decisions.

<table>
<thead>
<tr>
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<th>Villages observed</th>
<th>Villages exposed to reform</th>
<th>Villages that have taken the reform</th>
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<tr>
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<td>Fujian</td>
<td>72</td>
<td>72</td>
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<tr>
<td>Jiangxi</td>
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<td>Anhui</td>
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<td>Yunnan</td>
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</tr>
<tr>
<td>Shandong</td>
<td>30</td>
<td>30</td>
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</tr>
</tbody>
</table>
Estimation

The estimating equation is

$$fa_{icpt} = \alpha + \beta reform_{it} + c_i + \eta_t + \chi_{pt} + \varepsilon_{icpt}$$

- $fa_{icpt}$: newly forested area in village $i$ in county $c$ of province $p$ at time $t$
- $reform_{it}$: binary variable. 1 if village $i$ takes the reform at time $t$; 0 if not taking the reform before or at time $t$.
- $c_i$: village fixed effects
- $\eta_t$: time effects
- $\chi_{pt}$: province-by-year fixed effects
- $\varepsilon_{icpt}$: least squared residual
Self selection problem: It is up to the villages to decide whether to take the reform or not.

IV: The exposure to the reform policy.

\[ \text{exposure}_{ict} = 1 \text{ if county } c \text{ where village } i \text{ is has been exposed to reform at time } t \text{ or before } = 0 \text{ otherwise} \]

* First stage regression shows significant coefficient of exposure.
* IV justification
Table 4: Determinants of the Timing of Exposure

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<th>In Levels</th>
<th>In Changes</th>
<th>In Percentages</th>
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<tr>
<td>Forest</td>
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<tr>
<td></td>
<td>(0.0953)</td>
<td>(0.0628)</td>
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<td>Private Forest</td>
<td>0.1003</td>
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<tr>
<td></td>
<td>(0.1286)</td>
<td>(0.1253)</td>
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<td>Distance to County</td>
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<td></td>
<td>(0.0071)</td>
<td>(0.0041)</td>
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<tr>
<td>Price</td>
<td>-0.0185</td>
<td>-0.0073</td>
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<tr>
<td></td>
<td>(0.0039)**</td>
<td>(0.0058)</td>
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<td>Income</td>
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<td></td>
<td>(0.0001)**</td>
<td>(0.0001)</td>
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<tr>
<td>Timber Volume</td>
<td>0.0071</td>
<td>-0.0138</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0112)</td>
<td>(0.0205)</td>
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</tr>
<tr>
<td>Change of Timber Volume</td>
<td></td>
<td>0.0377</td>
<td>-0.0914</td>
</tr>
<tr>
<td>(from 1995-2000)</td>
<td></td>
<td>(0.0611)</td>
<td>(0.0582)</td>
</tr>
<tr>
<td>Forest/Land</td>
<td></td>
<td></td>
<td>0.0262</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.2599)</td>
</tr>
<tr>
<td>Private Forest/Forest</td>
<td></td>
<td></td>
<td>0.4009</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.8225)</td>
</tr>
<tr>
<td>Volume/Forest</td>
<td></td>
<td></td>
<td>0.1561</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0364)**</td>
</tr>
<tr>
<td>Province Fixed Effect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
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<td>118</td>
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Table 7: OLS and Instrumental Variable Regressions

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<tr>
<th>Forestation in Level</th>
<th>OLS</th>
<th>IV</th>
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<tr>
<td></td>
<td>1</td>
<td>2</td>
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<tr>
<td>Reform</td>
<td>235.2406</td>
<td>259.6335</td>
</tr>
<tr>
<td></td>
<td>(103.0658)**</td>
<td>(149.4253)*</td>
</tr>
<tr>
<td>Land</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Price</td>
<td></td>
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<tr>
<td>Village Fixed Effect</td>
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<td>Y</td>
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<tr>
<td>Year Dummies</td>
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<td>Y</td>
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<tr>
<td>Province-by-year Fixed Effects</td>
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<td>Y</td>
</tr>
<tr>
<td>R-square</td>
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<td>0.1089</td>
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<tr>
<td>Number of Observations</td>
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</tbody>
</table>
Conclusion

* Central finding is that the reform causes the villages to increase forestation by 262 mu, which is a 150% increase from no reform to reform.

* Plan to study long-run effect as more data become available.
Ongoing and Future Efforts

- Impacts of Forest Tenure Reform on Labor Market
- On land market
- Forest investment
- On state forest reform
- Follow-up surveys and assessment needed to obtain understanding of full results of forest tenure reform
Thank You Again!