The Impact of Improved Chickpea Adoption
A Pathway for Rural Development in Ethiopia?

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Chickpea in Ethiopia

- Ethiopia is the world’s $7^{th}$ largest producer of chickpea, accounting for 90% of production in SSA.
  - Traditionally, smallholders cultivated Desi, a local variety with smaller brown seeds.
  - An improved variety of Kabuli, a cream colored larger seed legume was recently introduced.
- Yet adoption of improved Kabuli remained low: $< 1\%$ in 2001 & $\approx 18\%$ in 2003.
- TL-II was designed to accelerate adoption of improved varieties.
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From 2008-14 Kabuli adoption increased from 30% → 80%.

This was driven by adoption among both former Desi growers and those who had never previously grown chickpea.
Research Questions

1. What has been the impact of improved chickpea adoption on household income?
2. To what extent did adoption contribute to poverty reduction?
3. Did adoption affect households differently depending on their initial wealth status?
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Methodological Issues

- Access to improved seed is not universal.
  - Poorer households may not have access to seed and therefore are unable to adopt.
- Success in cultivating a new crop is not random.
  - Some households, depending on skill, risk preferences, etc., are likely to adopt a new technology while also having higher welfare measures \textit{ex ante}.
- Shocks might jointly influence a household’s decision to adopt as well as its welfare status.
  - A death in the family may keep households from adopting while also making them poorer.
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Study Area

- 3 districts selected in suitable agro-ecological areas.
- Results should be regarded as an upper bound of the potential welfare impact.
- 700 households randomly selected in 26 villages.
- Analysis uses a balanced panel of 606 households.
Improved Chickpea Adoption

Estimate via a Double Hurdle, instrumenting for access to improved seed and including Correlated Random Effects

\[ K_{it} = \max(0, \alpha + \beta X_{it} + T_{it}\theta + Z_i\zeta + D_t + v_j + \epsilon_{it}) \]

- \( K_{it} \) - area planted with Kabuli
- \( X_{it} \) - access to improved seed
- \( T_{it} \) - vector of household characteristics
- \( Z_i \) - vector of time-invariant agro-ecological characteristics
- \( D_t \) - year dummies
- \( v_j \) - village dummies
Impact of Adoption

Estimate via OLS, instrumenting for area planted with Kabuli and including Fixed Effects

\[ Y_{it} = \alpha_i + \phi K_{it} + T_{it}\theta + D_t + \epsilon_{it} \]

- \( Y_{it} \) - net income or poverty status
- \( \alpha_i \) - household fixed effect
- \( K_{it} \) - area planted with Kabuli
- \( D_t \) - year dummies
Impact of Adoption on Income and Poverty

![Coefficient plot showing the impact of improved chickpea adoption on income and poverty]

- \( \ln(\text{Income Per Capita}) \)
- \( \ln(\text{Total Income}) \)
- Poverty < $1.25
- Poverty < $2.00

Coefficient values:

- \( 0.539 \)
- \( 0.585 \)
- \( -0.208 \)
- \( -0.275 \)
Impact of Adoption by Initial Asset Ownership

![Graph showing coefficients for Income Per Capita and Total Income across different quartiles of improved chickpea area planted.](image-url)
Conclusions

1. What has been the impact of improved chickpea adoption on household income?
   - A 10% increase in the area planted with improved chickpea increases income by $\approx 6\%$.

2. To what extent did adoption contribute to poverty reduction?
   - A 10% increase in the area planted with improved chickpea reduced the probability of being in poverty by $\approx 2.5\%$.

3. Did adoption affect households differently depending on their initial wealth status?
   - Impact of adoption on welfare is strongly significant and positive for households in the upper three asset quartiles.
   - Adoption did not have a significant effect on welfare for households in the lowest asset quartile.
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Policy Implications

- Adoption of improved chickpea can contribute to household income and poverty reduction in rural Ethiopia.
- Seed replenishment rates remain low, so attention is needed to ensure that there is a sufficient supply of quality chickpea seed.
- Adoption favored all but the initially poorest households, so additional effort is required to ensure that the poorest can benefit.
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Appendix
# Impact of Adoption on Income and Poverty

<table>
<thead>
<tr>
<th>Ln improved chickpea area (ha)</th>
<th>Ln income per capita</th>
<th>Ln household income</th>
<th>Poor (&lt; $1.25)</th>
<th>Poor (&lt; $2.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.603***</td>
<td>0.579**</td>
<td>-0.219**</td>
<td>-0.294**</td>
</tr>
<tr>
<td></td>
<td>(0.228)</td>
<td>(0.244)</td>
<td>(0.105)</td>
<td>(0.117)</td>
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<tr>
<td>observations</td>
<td>1,818</td>
<td>1,818</td>
<td>1,818</td>
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<td>households</td>
<td>606</td>
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<tr>
<td>R²</td>
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<td>0.859*** (0.323)</td>
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<td><strong>Initial quartile 3</strong> * Ln improved chickpea area</td>
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<td><strong>Initial quartile 4</strong> * Ln improved chickpea area</td>
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