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.
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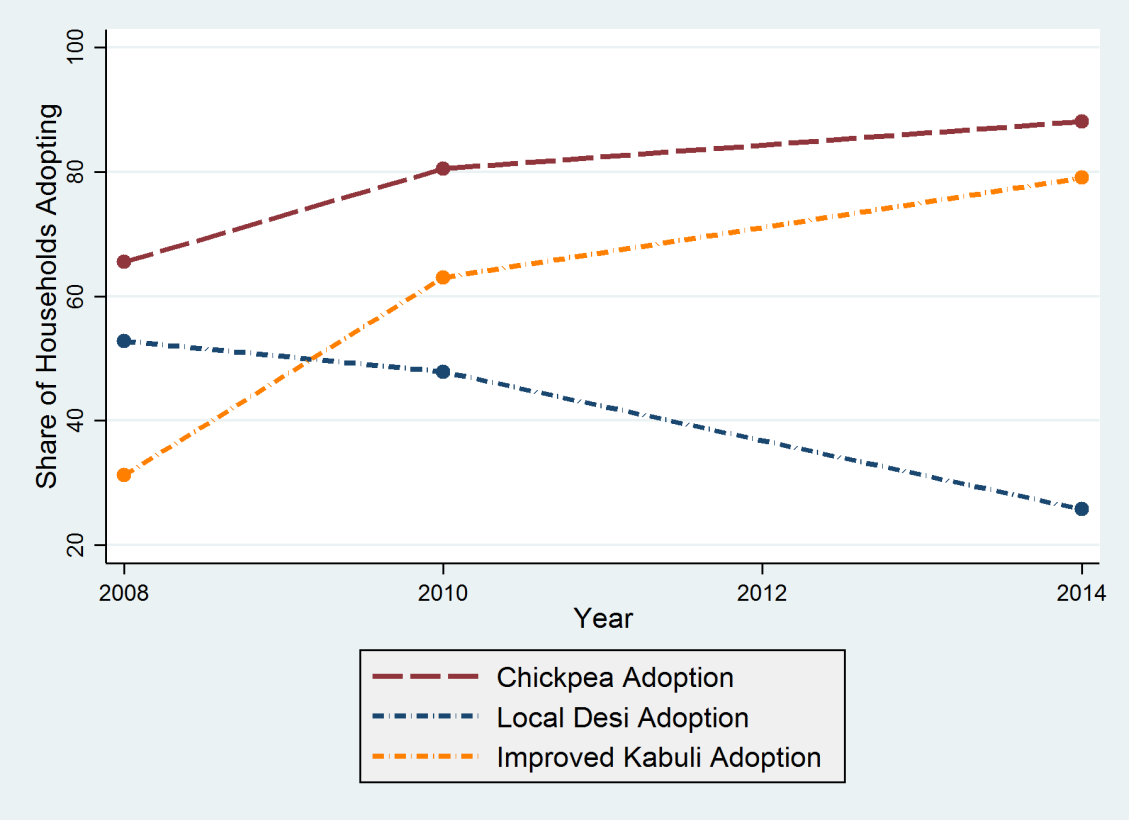
Adoption Trend



- 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

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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 *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.
- 3 rounds of data collection: 2006/07, 2009/10, 2013/14.
- 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

$$K_{it} = \max(0, \alpha + \beta X_{it} + \mathbf{T}_{it}\theta + \mathbf{Z}_i\zeta + D_t + v_j + \epsilon_{it})$$

- K_{it} - area planted with Kabuli
- X_{it} - access to improved seed
- $\mathbf{T}_{it}$ - vector of household characteristics
- $\mathbf{Z}_i$ - vector of time-invariant agro-ecological characteristics
- D_t - year dummies
- v_j - village dummies

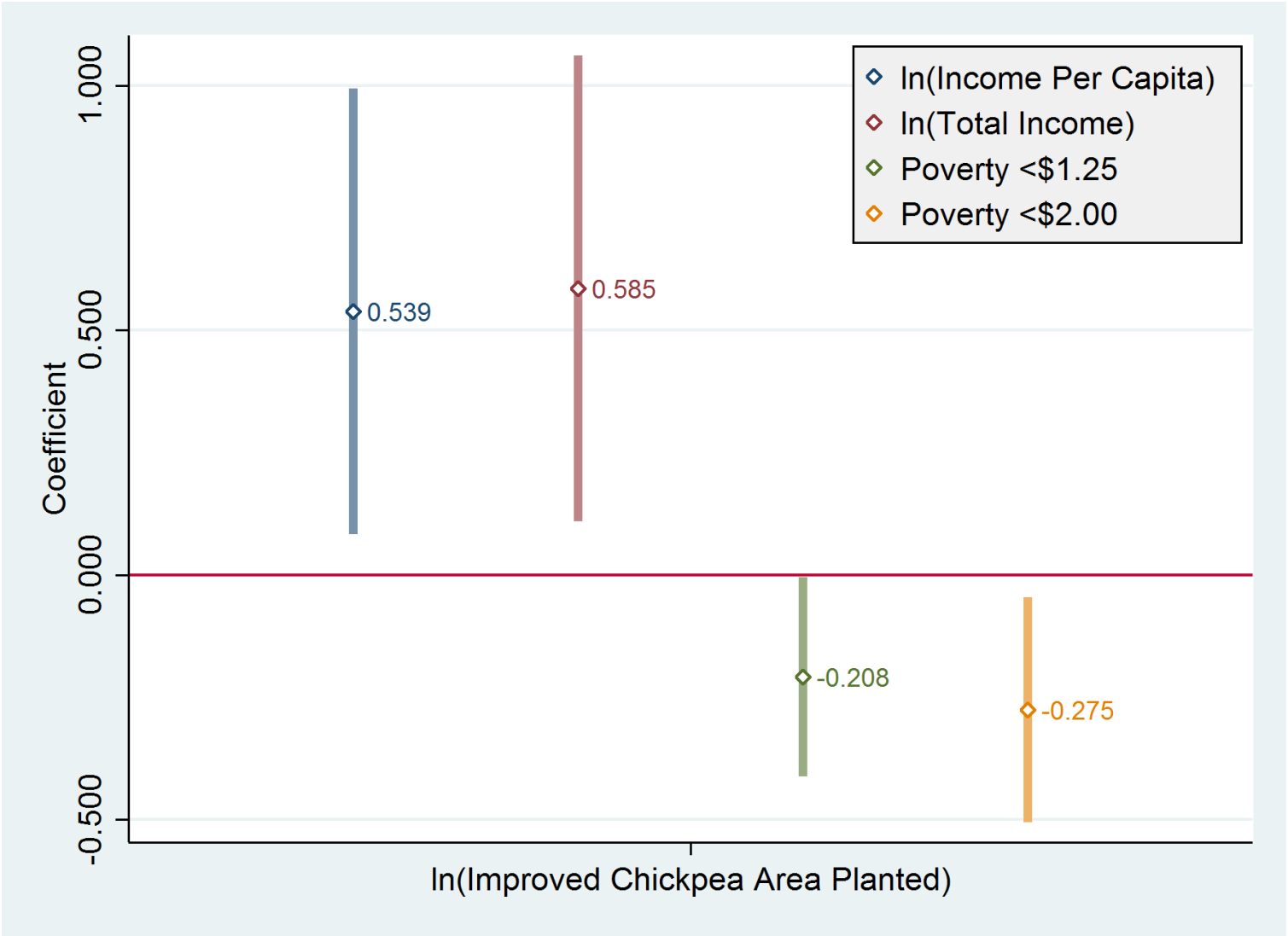
Impact of Adoption

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

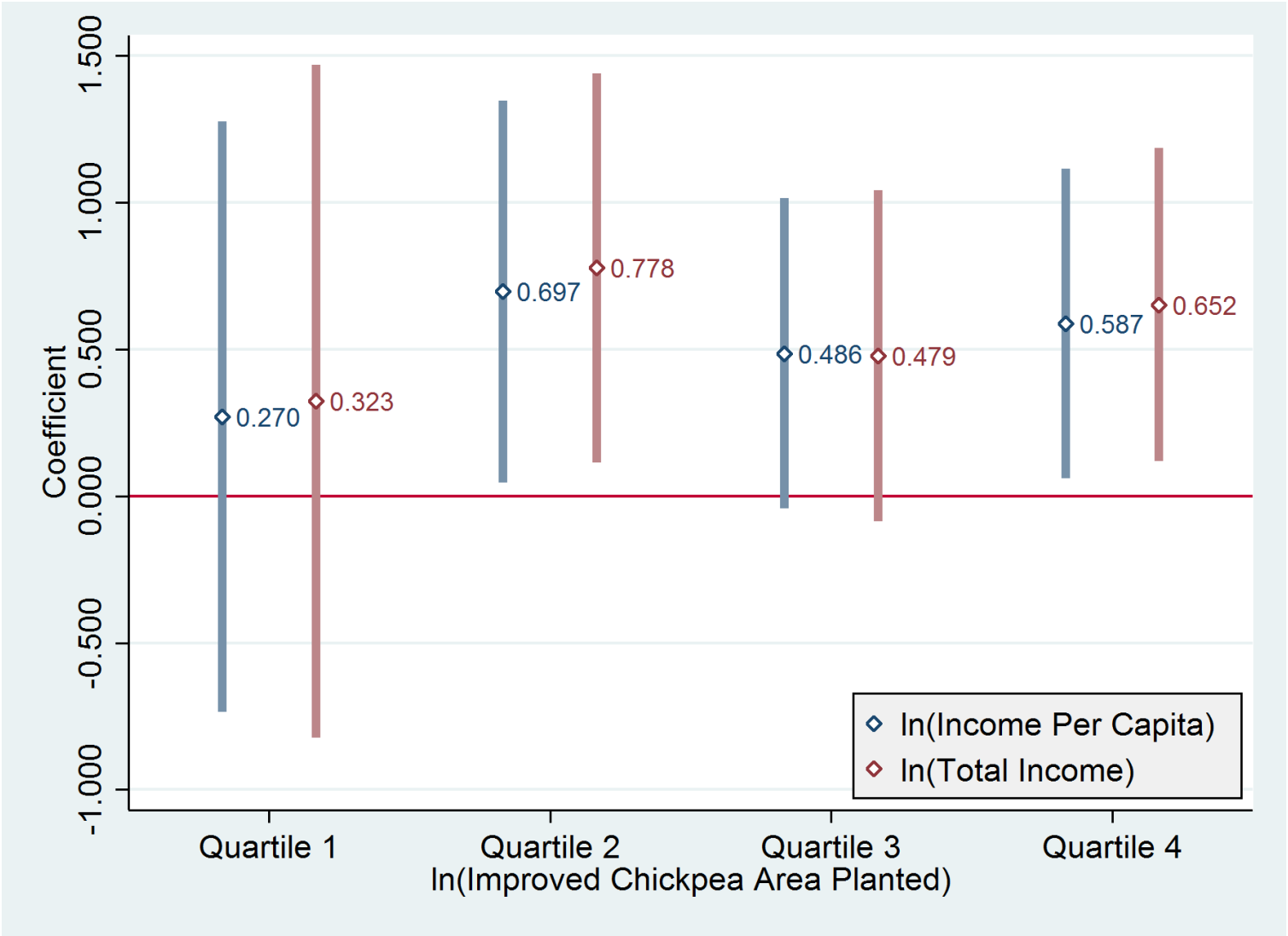
$$Y_{it} = \alpha_i + \phi K_{it} + \mathbf{T}_{it}\theta + D_t + \epsilon_{it}$$

- Y_{it} - net income or poverty status
- α_i - household fixed effect
- K_{it} - area planted with Kabuli
- D_t - year dummies

Impact of Adoption on Income and Poverty



Impact of Adoption by Initial Asset Ownership



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

	Ln income per capita	*Ln household income*	*Poor* (< $1.25)	*Poor* (< $2.00)
Ln improved chickpea area (ha)	0.603***	0.579**	-0.219**	-0.294**
	(0.228)	(0.244)	(0.105)	(0.117)
observations	1,818	1,818	1,818	1,818
households	606	606	606	606
R^2	0.061	0.070	0.081	0.099

Impact of Adoption by Initial Asset Ownership

	Ln income per capita	*Ln household income*
Initial quartile 1 * Ln improved chickpea area	0.388	0.254
	(0.530)	(0.608)
Initial quartile 2 * Ln improved chickpea area	0.859***	0.788***
	(0.323)	(0.340)
Initial quartile 3 * Ln improved chickpea area	0.463*	0.476*
	(0.267)	(0.287)
Initial quartile 4 * Ln improved chickpea area	0.646**	0.663**
	(0.265)	(0.276)
observations	1,818	1,818
households	606	606
R^2	0.060	0.069

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