Food Loss in Agricultural Value Chains (Daniel Ehrlich, 2025)

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Summary

- Motivation:
  - Food loss can lead to large welfare losses, especially among the poorest
  - Two key determinants of food loss: storage technology and seller-buyer matching
  - Optimal policy is not obvious given interactions between frictions
- Important contributions:
  - Survey of 1800 pepper farmers and 500 traders in Ghana
  - Structural model of agricultural trade with storage, directed search and limited commitment
  - Counterfactual analysis of policies improving storage and reducing matching frictions
- Key findings:
  - Due to interactions between frictions, improving storage technology can *increase* food loss
  - But this can increase welfare due to reduced uncertainty for risk-averse farmers in GE

Why I like this paper (a lot!)

- Globally extremely important and understudied policy concern
- Model is grounded in unusually detailed survey and deep knowledge of the local context
- Despite the richness of the model, the exposition is elegant and clear
- Model produces non-obvious insights – general equilibrium matters
- *The paper is very well crafted – comments are meant to inspire future research*

Inefficiency in Equilibrium

- Equilibrium is inefficient due to farmers' risk aversion (Lemma 5)
  - Farmers choose markets with lower prices to increase probability of matching
  - Higher prices with less matching, leading to *more* food loss, would increase surplus
- Key problem: farmers cannot smooth consumption due to incomplete asset markets
  - Model abstracts away from saving, insurance
- Questions:
  - How sensitive are counterfactuals and welfare implications to calibration of risk aversion?
  - How do different policies aimed at fixing asset markets impact welfare?
  - Implications on consumer welfare? Intuitively, consumer welfare should decrease due to higher prices when food loss is higher in the aggregate

Static Model

- Matched farmers 'die' after one period; convenient for tractability and exposition
- But static nature of the model shuts down possibly important features:
  - Intertemporal substitution, saving (see earlier)
  - Land markets
  - Learning (e.g., Conley and Udry, 2010)
  - Relational contracts between farmers and traders (e.g., Macchiavello and Morjaria, 2023)
- How would the predictions and model fit change in a dynamic model?
  Are these features important in this context?

Limited Commitment

- In the model, traders accept crops above a certain threshold quality and reject otherwise
- Given that traders pay fixed costs, why not negotiate over price instead?
- Unclear from text what is assumption and what is based on survey responses
- Could do more to validate this assumption: e.g., traders closer to markets should be less likely to reject (lower risk of spoilage)

Farmer and Crop Heterogeneity

- Farmers and crops are homogeneous in the model
- Heterogeneity in outcomes arises from stochastic perishability of crops and matching
- Unobserved heterogeneity could jointly determine perishability and matching:
  - Human capital: affects perishability, crop quality, ...
  - Farm location: affects weather, access to infrastructure, competition, ...
- E.g., farmers with higher human capital could produce less perishable crops and achieve higher prices on the market because of higher quality rather than longer search
- Could such unobserved heterogeneity affect the relationship between food loss and depreciation and match rates?

Empirics

- Distance to market used as IV for relative storage duration in test of Poisson process
- IV exclusion restriction is a strong assumption here
  - Distance correlated with other factors affecting food loss independent of matching?
  - E.g., farmer wealth and human capital, access to financial markets, climate
- Some ideas for alternative IVs for robustness (not necessarily better!)
  - Roll-out of mobile network coverage
  - Density of nearby traders
  - Weather shocks hindering transport
- In addition, can you use similar IV strategies to strengthen the motivating evidence?

Policy Counterfactuals

- Counterfactuals focus on improving storage technology
- I would find it interesting to examine specific policies aimed at reducing search frictions, given the comparatively larger potential welfare gains
  - subsidizing transportation infrastructure
  - centralizing markets and improving coordination mechanisms
- Cost-benefit analysis?

Policy Implications

- Highly heterogeneous returns to agricultural technology in Africa
- Hinders technology adoption and productivity growth (Suri and Udry, 2022)
- One-size-fits-all approach unlikely to be optimal
- How applicable are calibration and findings to other contexts?
- How to find, finance, and promote adoption of locally suitable storage technologies?

Minor Questions

- How realistic is free entry of traders in this context?
- Discount rate of 0.03 seems far too low for this context
  - Common to use annualized return of 10-year bonds in the country
  - Currently closer to 0.3 in Ghana, i.e., 10 times larger
- How to interpret $R^2 << 0$ in some of the models?

Concluding Thoughts

- Climate change is aggravating challenges from food loss
- Careful understanding of agricultural frictions is crucial for informing policy solutions
- This paper is really well done and highlights importance of general equilibrium effects

Thank you!

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