Abstract

For marketing maize producers, economic losses from storage pests cause both dry weight loss and price discounts for damaged grain. However, price discounts are absent from the East and Southern African maize literature. We use a choice experiment (CE) with physical samples of maize to estimate preferences for local vs. hybrid variety, insect damage, and mold damage among Malawian maize store traders. Results with mixed logit and latent class models demonstrate severe discounting for insect damage, and these discounts increase with traders’ intention to store for longer periods of time. The Equality Constrained Latent Class (ECLC) method is used to identify and correct for price non-attendance bias, a common problem in stated preference research. Results are compared with a smaller scale contingent valuation method which yields lower, yet still significant price discounts for insect damage. The value of preventing insect damage in long-term maize storage is found to be quite high in Malawi, signaling that effective storage technologies may provide significant benefits to marketing producers.

Motivation

• Maize is the most important staple crop in Malawi and is commonly used as a cash crop (Jayne et al., 2010).
• Significant price seasonality in many Malawian markets makes storage potentially very profitable (Jones, Alexander, Lowenberg-DeBoer, 2011).
• Even with insecticide treatment, preventing insect damage in medium to long term maize storage is difficult under traditional storage practices. Dry weight losses from maize weevil (Sitophilus zeamais) and the larger grain borer (LGB) (Prostephanus truncatus) after 6 months may range from 3-8%, which translates to 13.9-93.1% grains damaged (Boxall, 2002; Kimenju and DeGroot, 2010; Holst, Meikle, and Markham, 2000).
• Traders may penalize farmers for insect damage if not properly protected in storage, though these price discounts have only been measured in Ghana (Compton et al., 1998).
• Purdue Improved Crop Storage (PICS) bags showed initial promise for maize and LGB (Hell et al., 2010) and could be a profitable storage alternative, depending on relative efficacy and market valuation of insect damage.

Data and Methods

• 252 traders surveyed in Thyolo, Zomba, Lilongwe, Nkhotakota, and Mzimba districts in “in season” months of January/February 2012
• CE attributes examined were:
  • Insect Damage (0,10,20,30%)
  • Local vs. Hybrid (OKD8033) variety
  • Mold (0% and 5% of grains)
  • Price (mean and ±10,20% from district wholesale price)
• Secondary method employed through contingent valuation method
• Isolating insect damage (0-30%)
• CE analysis through Random Parameters Logit (RPL) and Latent Class (LC) Models (through ECLC, which accounts for attribute non-attendance).
• Accounts for individual level (RPL) and group level (ECLC) heterogeneity in trader preferences

Conclusions

• Possible to use physical samples with visually discerned attributes to conduct choice experiments.
• Storage length before re-sale significantly impacts maize trader discounts for insect damage.
• Trader preferences are clearly heterogeneous.
• Correcting for price non-attendance reduces WTP coefficients to more reasonable levels.
• Estimation through contingent valuation method produces lowest and most “conservative” price discounts for insect damage. Damage “thresholds” observed before discounts are applied.
• In this study, the most conservative price discounts found are double the severity compared with Compton et al. (1998) in Ghana in 1990s.
• Assuming PICS product efficacy from initial trials, PICS bags for maize in Malawi could be more profitable than previously estimated by Jones, Alexander, and Lowenberg-DeBoer (2011).

References

Jones, M., Alexander, C., and Lowenberg-DeBoer, J., 2011. An initial investigation of the potential for hermetic Purdue Improved Crop Storage (PICS) Bags to improve Income for Maize Producers in Sub-Saharan Africa. Purdue University Working Paper 11-3, Department of Agricultural Economics, Purdue University, September 2011.