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The Effect of U.S. International Food Assistance on U.S. Prices for Lentils and Peas

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U.S. Food Assistance Policy

- U.S. government spends approximately $2 billion per year to provide food assistance in developing countries.
- Legislative mandate (P.L. 480) has historically required the U.S. government to source most food aid domestically; U.S. farmers are suppliers and potential beneficiaries of demand shift caused by food aid purchases.
- Domestic price impact of food aid is thought to be insignificant in most markets:

> "Because food aid represents such a small share of the U.S. food market, it has proved too small to move markets in a way that generates any identifiable effect on farmgate prices in all but very exceptional circumstances."
>
> *Barrett and Maxwell, 2005, Food Aid After Fifty Years, p. 36.*

The Importance of Food Assistance for U.S. Lentil and Dry Pea Demand

- Are pulse crops, namely lentils and dry peas, one of these "very exceptional circumstances"?
  - Food aid procurement makes up a substantial share of U.S. pulse exports: 37% for lentils and 28% for peas over 2002-2012.

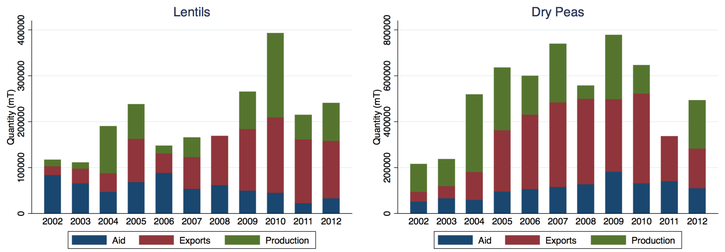

Figure : Exports and food aid exports as a share of U.S. pulse crop production, 2002-2012
Source: FAOSTAT, World Food Programme Food Aid Information System.

- Other countries, esp. Canada, the world's dominant exporter of lentils and peas, uses domestic procurement of pulse crops for food aid only sparingly.
- U.S. food aid is procured using short-run tenders which do not permit a production/quantity response, so prices may react to a tender announcement.
- U.S. production is delivery-eligible against tenders; Canadian supplies are not.

Acknowledgements

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Research Question

What is the magnitude and persistence of lentil and pea price shocks related to U.S. food aid purchase announcements?

Data

Price Data: USDA-AMS and Saskatchewan Ministry of Agriculture weekly grower bids for medium green lentils, green peas, and yellow peas.

- Midpoint of reported bid range for North Dakota/Montana (*ND/MT*) and Washington/Idaho (*WA/ID*) regions. ND/MT region prices only available 2006-2013. Reported bid for Saskatchewan (*SK*) region.
- Missing data points in ND/MT price data interpolated using one period-ahead forecasts generated from WA/ID data and linear interpolation.
- SK prices converted to US dollars per hundredweight ($US/cwt).

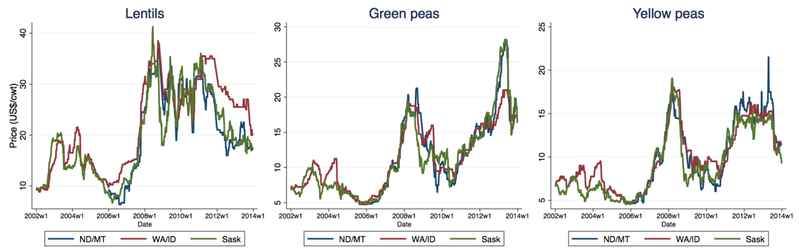


Figure : Weekly pulse crop prices at various locations, 2002-2013
Source: USDA-AMS, Saskatchewan Ministry of Agriculture.

Food Aid Procurement Data: Commodity Credit Corporation invitations to tender offers for sale of lentils, green and yellow peas reported by USDA-AMS. Reports contain:

- Date of announcement, quantity, quality, location, and shipping specifications to be met.

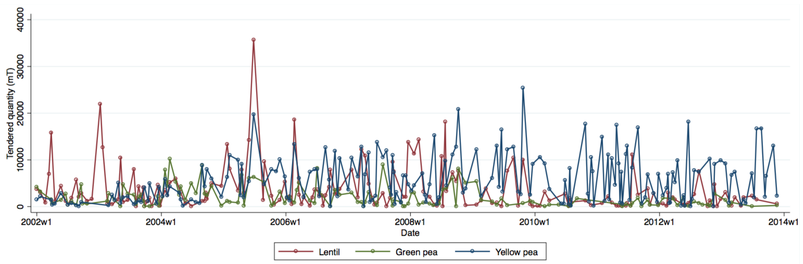


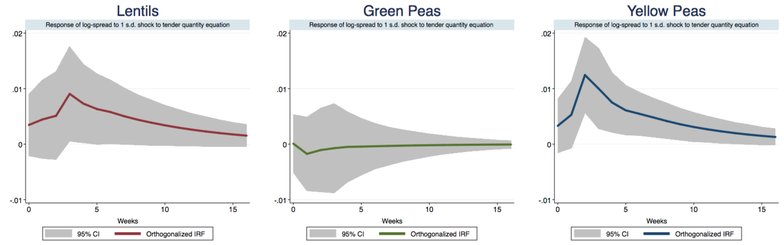
Figure : Weekly food aid tender amounts, 2002-2013
Source: USDA-AMS; Note weeks without tender announcements are omitted for clarity.

Empirical Model and Results

- Goal: Identify ND/MT pulse price variation associated with food aid tenders.
  - Use the log spread between *ND/MT* and *SK* prices: ($\ln spr_t = \ln(p_{ND/MT}) - \ln(p_{SK})$) to filter out price fluctuations related to non-food-aid supply and demand shifts.
  - Accommodate intermittency and censoring in tender data by replacing zero values with step-ahead forecasts using Croston's method of intermittent demand forecasting (Croston 1972, Boylan and Syntetos 2007). Asymmetric, censored nature of tender data causes known problems in VAR analysis (Kilian and Vigfusson 2009).
- Method: Estimate separate bivariate VARs for lentils, green peas, and yellow peas, including log-adjusted-tender quantity and the log-price spread as endogenous regressors (y_t).

$$y_t = \begin{pmatrix} \ln spr_t \\ \ln adj\text{-}tender_t \end{pmatrix} = (B_1 L - B_2 L^2 - \ldots - B_p L^p) y_t + D x_t + \varepsilon_t$$

  - Information criteria (AIC, HQIC, SBC) suggest including up to 3 lags ($p = 3$).
  - Exogenous regressors are marketing year indicator (x_t) and linear time trend.
- Results: VAR models yield orthogonalized impulse response functions representing U.S. farm gate price reaction (above reaction of Canadian prices) to unanticipated shocks in food aid quantities tendered.
  - Orthogonalization assumes spreads respond to contemporaneous tender shocks but tender quantities do not respond to contemporaneous spread shocks.



- **Impact of tenders is limited in magnitude, differs across commodities**:
  - Magnitude: food aid tenders associated with ND/MT price rising ~1% above SK price for lentils and yellow peas. Lentil and green pea price impact indistinguishable from zero.
  - Persistence: Maximum impact 1-3 weeks post-tender shock. After 2 months, only yellow pea price response is distinguishable from zero.

Implications for Food Assistance Policy

- Initial results suggest that proposed changes in food aid policy such as a switch to local and regional procurement would not affect production incentives for U.S. farmers since food aid price impacts are small and short-lived.
- Further empirical work will deal with intermittent and censored nature of procurement data, the potential for asymmetrical price response, and potential for structural breaks in data-generating process.

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