

The producer welfare effects of trade liberalization when goods are perishable and habit-forming: the case of asparagus

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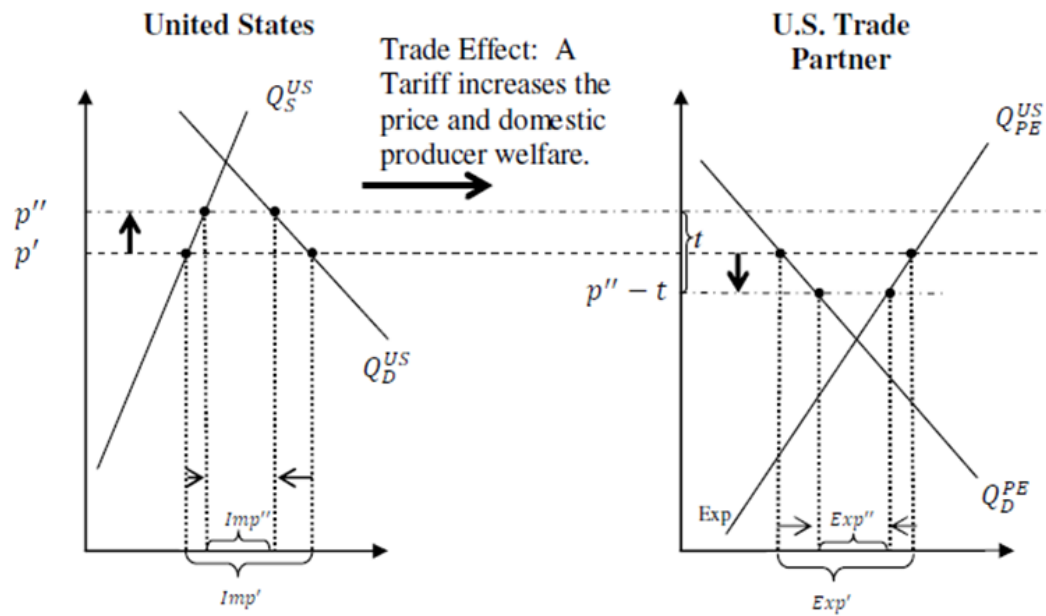
Some Ag Imports are perishable and seasonal

	<u>Perishable</u>	<u>Non-perishable</u>
<u>Seasonal</u>	Orchard Crops: grapes, berries, cherries, peaches	Apples, Oranges, Beans, Garlic
<u>Non-seasonal</u>	Greenhouse Crops: Mushrooms, Broccoli, Tomatoes, Cut Flowers	Meats, Some Grains

Key Issues For Trade:

- Out of season imports increase availability
- Out of season imports may not compete U.S. domestic supply
- Out of season imports may cause habit formation (Becker, 1977, “Consumption Capital”)
 - Strengthens/sustains demand for in season domestic products
 - Positive habits may offset some of the harm of import comp.





The Case of Asparagus

- Highly Seasonal Spring Crop
 - 10-13 year growth cycle
 - Hand picked daily for 2-3 months then allowed to “fern out”
 - Canned, frozen asparagus of lesser quality
- 95% of supply from US, Peru, and Mexico
 - U.S. supplies February to June
 - 21.3% MFN tariff reduced to 5% Sept to November
 - Peru: Andean Trade Pref. Act (1991), Peruvian FTA (2009,2011)
 - Mexico: NAFTA (1994)
- 2008 Farm Bill – MLA for Low Prices From Imports
 - \$15M for the 4 preceding years (2004 to 2007)
 - Split Between fresh and frozen suppliers.
 - \$1.75 M to Fresh Producers, \$1.75 M to Frozen



Asparagus Imports: Rising, Seasonal

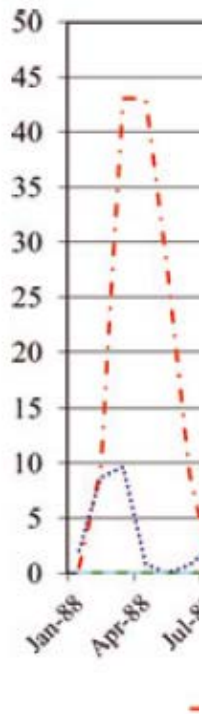


Fig. 1. 1

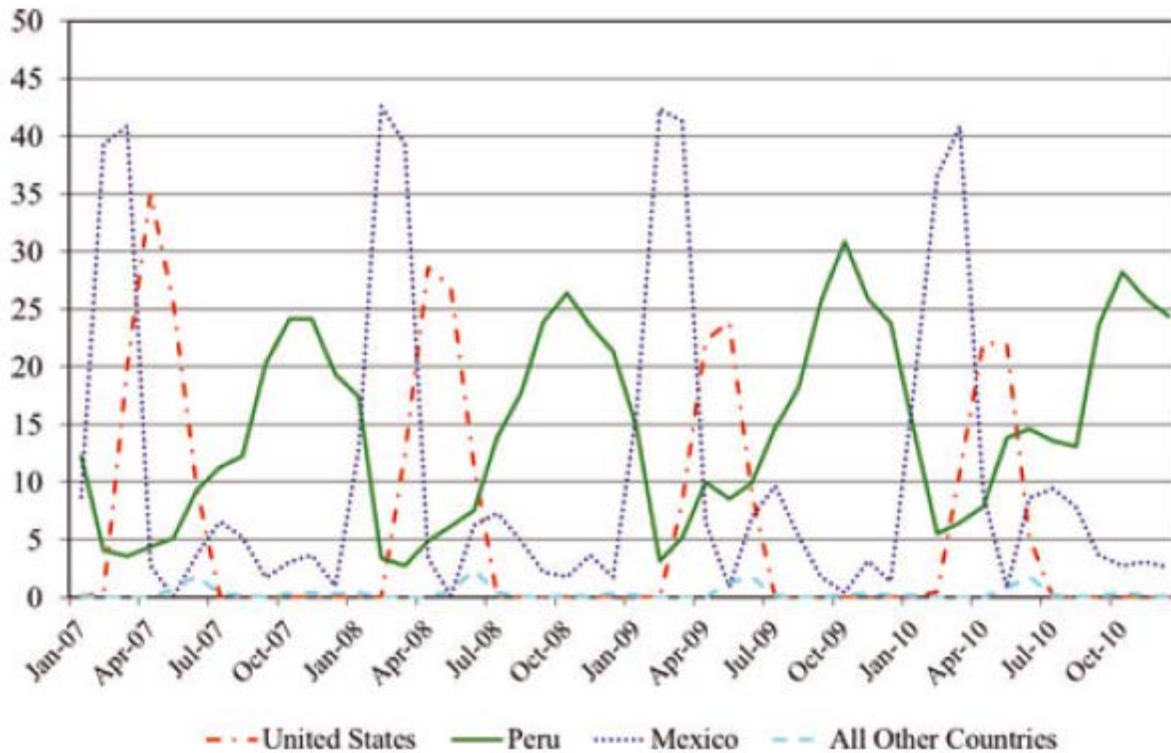


Fig. 2. U.S. fresh asparagus supply by source: 2007–2010 (millions of pounds).



Emp. Strat. to Measure the Offset of Habits

1. Estimate a demand elasticities for veg with habits
 - Assumed homogenous quality in asparagus
 - Supply elasticities pulled from available estimates
2. Create Equilibrium Displacement Model
 - A. Simulate the (positive) benefit of re-imposing MFN tariffs on U.S. producers (assuming no habits)
 - B. Simulate the (negative) effect of reduced habits on U.S. producers
3. Compare total net benefit of re-imposing MFN tariff and to MLA Provided in Farm Bill.



1. Demand System Estimation

- Data (Monthly, 1992-2008)
 - Quants: AMS Product Movement Data (nat. aggreg.)
 - Prices: ERS outlook prices augmented w import prices
- Trans Log Demand System
 - Flexible, Comparable to AIDS model
 - 4 goods (asparagus, broccoli, carrots, cauliflower)
 - LaFrance – Inclusion of numeraire good overcomes the problem of assuming income separability.
 - Lagged consumption is a demand shifter
 - Discounted “memory” of past consumption captures habits
 - Discount rate is estimated at .5589



Elasticities of demand with respect to price and income (averages and standard deviations)

	Asparagus	Broccoli	Carrot	Cauliflower	Numeraire
Elasticity of Demand with Respect to Lagged Consumption					
<i>Aspar</i>	Asp.	Bro.	Car.	Cau.	Num.
<i>Brocc</i>	0.64	0.08	0.03	-0.04	0
<i>Carro</i>	Lag Asp. (0.48)	(0.18)	(0.15)	(0.33)	(0)
<i>Cauli</i>	Lag Bro. (0.53)	(0.37)	(0.25)	(0.57)	(0)
<i>Nume</i>	Lag Car. (0.54)	(0.29)	(0.29)	(0.61)	(0)
<i>Incom</i>	Lag Cau. (0.38)	(0.2)	(0.16)	(0.46)	(0)
<i>Stand</i>	Lag Num. (0.96)	(0.57)	(0.52)	(1.02)	(0)



2. Create the Equilibrium Displacement Model

The Market Equilibrium Condition

$$Q^D(P, \text{lag } Q) - \sum_k Q^{S,k}((1 - t_k)P) = 0.$$

..... as Elasticities

$$A \hat{\alpha} \ln P + B \hat{\alpha} \ln \text{Lag } Q + C t_k = 0.$$

$$(E_P^D - (\varphi_k E_P^{S,k}) I),$$

Lag Dem.
Elast.

Monthly Shares
of Supply

$$E_{\text{Lag } Q}^D$$

Lag Dem.
Elast.

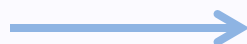
$$(\varphi_k E_P^{S,k})$$

Own Supply Elast.
ranges from 0.2 to 0.6,
cross elast. is zero



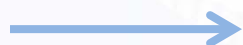
2. Create the Equilibrium Displacement Model: Welfare Effect

$$\Delta CS_i = \int_{P_i^{**}}^{P_i^*} Q_i^D(P_i) \partial P_i \approx -\partial P_i \left(\frac{1}{2} (2Q_i + \partial Q_i) \right)$$



$$\frac{\Delta CS_i}{(P \times Q)_i} = \partial \ln P_i (1 + 0.5 \partial \ln Q_i),$$

$$\begin{aligned} \Delta PS_i &= \sum_K \int_{((1-t)P_i^{**})}^{((1-t)P_i^*)} Q_{i,k}^S(t_{i,k} P_i) \partial(t_{i,k} P_i) \\ &\approx \sum_k (\partial P_i t_{i,k} - \partial t_{i,k} P_i) \frac{1}{2} (2Q_{i,k} + \partial Q_{i,k}). \end{aligned}$$



$$\frac{\Delta PS_i}{(P \times Q)_i} = \sum_{k=1}^K (\partial \ln P_i - \partial t_{i,k})' (1 + 0.5 \partial \ln Q_{i,k}).$$



Welfare Effects without Habits (Changes as Percent of Total Revenue)

\$451.3M
Tot. Rev.

	Consumer Surplus	Producer Surplus				U.S.	U.S.
	All	All	Mex.	Peru	U.S.		
NAFTA	0.32	6.12	18.7	-0.1	-0.28	→ (\$1.26M)	
ATPA	0.16	5.65	-0.13	13.0	-0.09	→ (\$0.41M)	
Both	0.48	11.77	18.6	12.85	-0.36	→ (\$1.62M)	

Welfare Effects With Habits (Changes as Percent of Total Revenue)

	Consumer Surplus	Producer Surplus			
	All	All	Mex.	Peru	U.S.
NAFTA	.55	6.36	18.85	0.27	-0.1
ATPA	.35	5.85	0.03	13.18	0.15
Both	.90	12.21	18.88	13.46	0.04



3. Total Welfare Effects

- We find that the estimated loss from the tariff reductions of NAFTA and the ATPA is less than the annualized farm bill support of \$1.75M (\$7.5 M over 4 four years) to fresh producers.
- The estimated loss is even smaller when habit effects are included.



Conclusions

- Seasonality and habit formation may offset the harm to producers from trade liberalization
 - Very specific to goods, trade patterns
 - Asparagus might be a prime example.
 - Chilean grapes, berries and stone fruit?
 - Some preference for out-of-season supply is already embedded in tariff code

