The Impact of Domestic and Import Prices on U.S. Lamb Imports: An Update

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The Impact of Domestic and Import Prices on U.S. Lamb Imports: An Update

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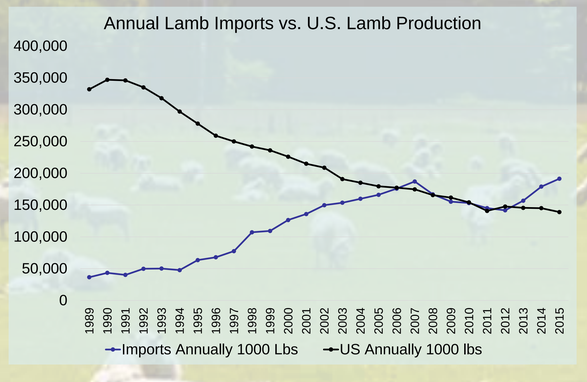
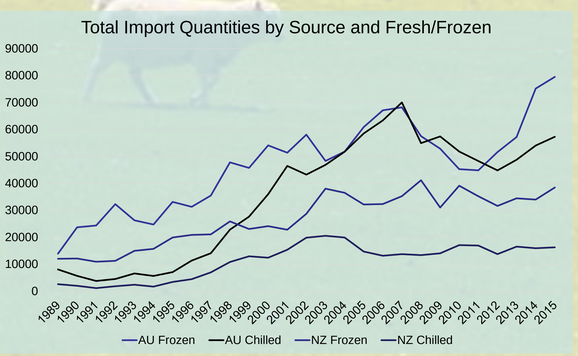
Background

- U.S. national flock in decline since World War II
- Lost subsidies and producer support
- Competition for production resources
- Historically shrinking consumer market
- Declining consumption from 'traditional American' demographic (now <1 lb/capita/year), but potential for recovery of national consumption through promotion and increasing ethnic populations
- How do we meet current and future demand?
- Long-term increasing trend in lamb imports from Australia and New Zealand (only substantial sources of lamb imports for the U.S.)
- Imports now surpass domestic production in quantity
- Muhammad, Jones and Hahn (2007) estimated lamb import elasticities, finding a mostly inelastic import market
- Despite having evaluated fresh/frozen distinctions in imports, there remains a deficit in the literature evaluating the role of product differentiation in import market





Objective:

To reexamine the state of the U.S. lamb import industry and further determine the importance, or lack thereof, of product differentiation in importer decision-making

Monthly Data (1989-2016):

- Quantities of U.S. Lamb Import and Wholesale Values (Australia and New Zealand only)
- U.S. Trade Laborer Wage Rate
- U.S. Domestic Wholesale Price of Lamb
- Quantity of U.S. Domestic Lamb Production

Empirical Models

- A Differential Production Model was applied to monthly import data disaggregated by source country and fresh/frozen product type.
- An absolute price version of the Rotterdam Model was applied to monthly import data disaggregated by source country, fresh/frozen and boneless/bone-in product differentiation.

Estimated Differential Production Model

Output Supply:

$$\Delta X_t = \varphi \Delta p_t + \sum_{j=1}^{N} \pi_j \Delta w_{jt} + \varepsilon_t$$

Import Demand System:

$$\bar{f}_{it} \Delta x_{it} = \theta_i^* \Delta X_t + \sum_{j=1}^{n} \pi_{ij}^* \Delta w_{jt} + u_{it}$$

Estimated Rotterdam AP Model

$$\bar{g}_{m_{i_r} t} \Delta q_{m_{i_r} t} = \theta_{m_{i_r}} \Delta Q_t + \sum_{n=1}^{2} \sum_{j=1}^{2} \sum_{s=1}^{2} \pi_{m_{i_r} n_{j_s}} \Delta p_{n_{j_s} t} + \varepsilon_{m_{i_r} t}$$

Results: Differential Production Model Elasticities

Unconditional Elasticities of the Derived Demand for Lamb Imports

Exporting Country/Good	E_D w.r.t. Output Price
New Zealand Frozen	0.1931 (0.1243)
New Zealand Chilled	0.1158 (0.0754)
Australia Frozen	0.1426 (0.0933)
Australia Chilled	0.1412 (0.0915)

Conditional Divisia and Price Elasticities

		Conditional Own- and Cross-Price			
Exporting Country/Good	**Divisia (Total Imports)**	**New Zealand Frozen**	**New Zealand Chilled**	**Australia Frozen**	**Australia Chilled**
New Zealand Frozen	1.2557*** (0.0721)	-0.1836*** (0.0576)	0.0567** (0.0253)	-0.0093 (0.0461)	0.1362*** (0.0490)
New Zealand Chilled	0.7568*** (0.0678)	0.1212** (0.0526)	-0.8476*** (00687.)	0.1804** (0.0713)	0.5461*** (0.0763)
Australia Frozen	0.9317*** (0.1055)	-0.0148 (0.0732)	0.1397** (0.0543)	-0.6572*** (0.1171)	0.5324*** (0.0980)
Australia Chilled	0.9252*** (0.0497)	0.1046** (0.0377)	0.1962*** (0.0282)	0.2579*** (0.0474)	-0.5587*** (0.0594)

Results: AP Rotterdam Model Elasticities

Boneless Compensated Own-/Cross-Price Elasticities

	COND. EXPEND.	NZ FRZN	NZ CHILL	AU FRZN	AU CHILL
NZ FRZN	1.9104*** (0.1384)	-0.6656*** (0.1259)	0.2532*** (0.0573)	0.0228 (0.0995)	0.3895*** (0.0971)
NZ CHILL	0.9046*** (0.0593)	0.2327*** (0.0527)	-1.0899*** (0.0903)	0.0549 (0.0959)	0.8022*** (0.0962)
AU FRZN	0.7213*** (0.0643)	0.0124 (0.0541)	0.0325 (0.0568)	-0.3941*** (0.1167)	0.3491*** (0.0910)
AU CHILL	0.8734*** (0.0466)	0.1675*** (0.0417)	0.3755*** (0.0450)	0.2759*** (0.0720)	-0.8188*** (0.0809)

Bone-In Compensated Own-/Cross-Price Elasticities

	COND. EXPEND.	NZ FRZN	NZ CHILL	AU FRZN	AU CHILL
NZ FRZN	1.0278*** (0.0648)	-0.2418*** (0.0880)	0.0552 (0.0336)	-0.0245 (0.0463)	0.2111*** (0.0753)
NZ CHILL	0.8503*** (0.0556)	0.1339* (0.0760)	-0.7491*** (0.0842)	0.0945 (0.0630)	0.5206*** (0.0896)
AU FRZN	0.8612*** (0.0848)	-0.0506 (0.0966)	0.0832 (0.0554)	-0.2707** (0.1076)	0.2381** (0.1127)
AU CHILL	1.0833*** (0.0470)	0.1700*** (0.1127)	0.1789*** (0.0308)	0.0930** (0.0440)	-0.4419*** (0.0729)

Conditional Expenditure Elasticities: %Δ product class demand / %Δ total (boneless/bone-in) import expenditures

Standard errors are in parenthesis, *** = Significant at p = 0.01; ** = Significant at p = 0.05; * = Significant at p = 0.10
Key: AU – Australia, NZ – New Zealand, FRZN – Frozen, CHILL – Chilled

Conclusions

- Lamb imports have continued to trend toward inelasticity
- Import quantity sensitivities to price changes have remained largely consistent over the last decade
  - One major deviation is the loss of response in the import market to changes in the domestic price of lamb, signaling the import market functions independent of the domestic product market
- Results* of the Differential Production Model indicate emerging quality preference patterns with preference for chilled product from Australia and frozen product from New Zealand
  - Finding corroborated in part by Rotterdam AP elasticities, given apparent insignificance of frozen Australian lamb quantity and price changes in the context of the lamb import market
- Evidence of boneless/bone-in product separability in Rotterdam AP Model shows that analyses of the U.S. lamb import market must treat boneless and bone-in lamb imports as separate products
- All significant cross-product elasticities indicate substitute relationships
- Overall, importer decision-making driven by more than price, given price inelastic market, with quality playing a significant role

*Estimation results omitted due to space constraint