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**Bovine Spongiform Encephalopathy (BSE) and Structural Changes in Beef Import Demand:  
Evidence from Japanese and South Korean Import Markets**

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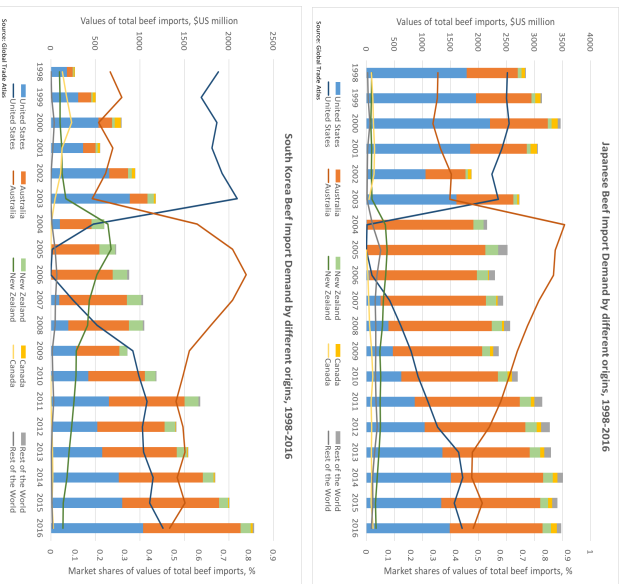
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# Bovine Spongiform Encephalopathy (BSE) and Structural Changes in Beef Import Demand: Evidence from Japanese and South Korean Import Markets

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## Introduction

- The 2003 BSE case in Washington State led to a significant impact on US beef exports to major destination markets in Asia.
- In 2002/03, Japan and South Korea were the largest importers of US beef and edible offal, accounting for nearly 50% or roughly \$2.1 billion worth of total US beef exports.
- As a result of BSE, Japan and Korea banned US beef exports and only recently have started re-opening their markets to beef aged 30 months or less.
- While the US has gradually regained its market share since the re-opening of markets, less is known about the degree to which import demand patterns have changed in the wake of BSE.
- In both markets, US export recovery has been slow suggesting that the BSE case may have fundamentally altered consumer preferences in these markets.



## Objectives

- Examine how BSE has affected Japanese and Korean beef imports by developing a source-differentiated beef import demand system.
- Estimate and compare the price and expenditure elasticities of beef imports in the post-BSE period (2008-2015) with those in the pre-BSE periods (1998-2003) using a time transition function.
- Test whether Japanese and Korean beef import demand elasticities have experienced structural changes in the wake of BSE.

## Data and Model

- Monthly import quantities and values of beef products from 1998 to 2015 are collected from the *Global Trade Atlas Database*.
- Two beef categories, Fresh/chill/frozen beef (*HS 201 & HS 202*) and edible beef offal (*HS 206*), and five importing origins (United States, Australia, New Zealand, Canada, Rest-Of-World) are included in the import demand model.
- The reduced-form source-differentiated Almost Ideal Demand System (RSDAIDS) model is implemented to allow for different demand responses to price and expenditure changes with respect to beef products from different origins.

$$w_{ist} = a_{is} + d_{is}B_t + \sum_k (Y_{isk} + \theta_{isk}B_k) \ln P_k + \sum_{j \neq i} (Y_{isj} + \theta_{isj}B_j) \ln P_j + (\beta_{is} + \sigma_{is}B_s) (\ln E_t - \ln P_t)$$

where  $B_t$  is a time transition function expressed as the following,

$$B_t = \begin{cases} 0 & \text{if } t = 1, \dots, t_1 \\ \frac{t-t_1}{t_2-t_1} & \text{if } t = t_1 + 1, \dots, t_2 \\ 1 & \text{if } t = t_2, \dots, T \end{cases}$$

$t_1$  is December 2003,  $t_2$  is December 2007,  $T$  is December 2015.

## Tests

- Structural change is defined as a test of the constancy of the estimated parameters with no identified structural changes due to the BSE case.
- $d_{is} = 0, \theta_{isk} = 0, \theta_{isj} = 0, \sigma_{is} = 0, \forall s, k \in i, j$
- Adding-up, homogeneity and symmetry are imposed when estimating.

## Results

- The striking differences between the pre-BSE elasticities and the post-BSE levels suggests the US case of BSE has caused a structural shift in consumer preferences to US beef imports versus other competing suppliers' imports.

Estimated elasticities in Japanese SDAIDS model at the sample average of pre-BSE and post-BSE periods					
	Price elasticities		Expenditure elasticities		
	United States	Australia	United States	Australia	
United States	-1.290***	-1.497***	0.136*	0.176	1.261***
Pre-BSE	-1.290***	-1.497***	0.136*	0.176	1.261***
Post-BSE	-1.290***	-1.497***	0.136*	0.176	1.261***
Australia	0.354***	0.230***	-1.219***	-1.121***	0.766***
New Zealand	0.078	0.121	1.002***	0.622***	0.687***
Canada	-0.850***	-1.775***	0.311	0.438	0.975***
Rest of the World					1.330***
Estimated elasticities in South Korean SDAIDS model at the sample average of pre-BSE and post-BSE periods					
	Price elasticities		Expenditure elasticities		
	United States	Australia	United States	Australia	
United States	-1.438***	-2.290***	0.383***	1.104***	0.866***
Pre-BSE	-1.438***	-2.290***	0.383***	1.104***	0.866***
Post-BSE	-1.438***	-2.290***	0.383***	1.104***	0.866***
Australia	0.888***	0.562***	-1.845***	-1.058***	1.231***
New Zealand	0.013	1.158***	1.048	-3.439***	1.021***
Canada	1.327***	-1.123	-2.057***	4.835*	1.475***
Rest of the World					0.449

Note: The major results (uncompensated price and expenditure elasticities) shown above are estimated from RSDAIDS model for Japan and South Korea, respectively. Pre-BSE period is 1998-2003; post-BSE period is 2008-2015.

## Conclusions

- Our results provide evidence of structural changes of Japanese and South Korean preferences for beef imports from different regions in the post-BSE periods.
- Both Japanese and Korean demand for US beef imports are more sensitive to US price changes while their demand for Australian beef imports are less sensitive to Australian price changes.
- Cross-price elasticities show that Japanese and Korean consumers are more willing to substitute US beef for Australian and New Zealand beef in the post-BSE period.
- The BSE case has led to both short-run and longer-run impacts on US beef exports, rendering a big challenge to US beef export industries in Asia-Pacific markets.

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