How Do U.S and Australian Beef Imports Impact on the Hanwoo Beef Market in South Korea?

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Introduction

❑ South Korea is one of the largest beef import countries in the world.

❑ Imported beef quantities in 2012 were 52.1% from Australia and 35.4% from U.S, and 11.0% from New Zealand respectively.

❑ A dairy cow in Washington State was discovered occurrence of BSE, and Korea banned beef import from U.S. on December 2003 (Giamalva, 2013 and Park, et al., 2008).

❑ Corn is one of the important feedstock to produce cattle, and proportion of amount of imported feed is more than 50% in total formula feed to domestic cattle in South Korea.

Objectives

❑ What is the relationship between Korean Natural Cattle and Corn Prices?

❑ What impact does corn price have on imported beef prices?

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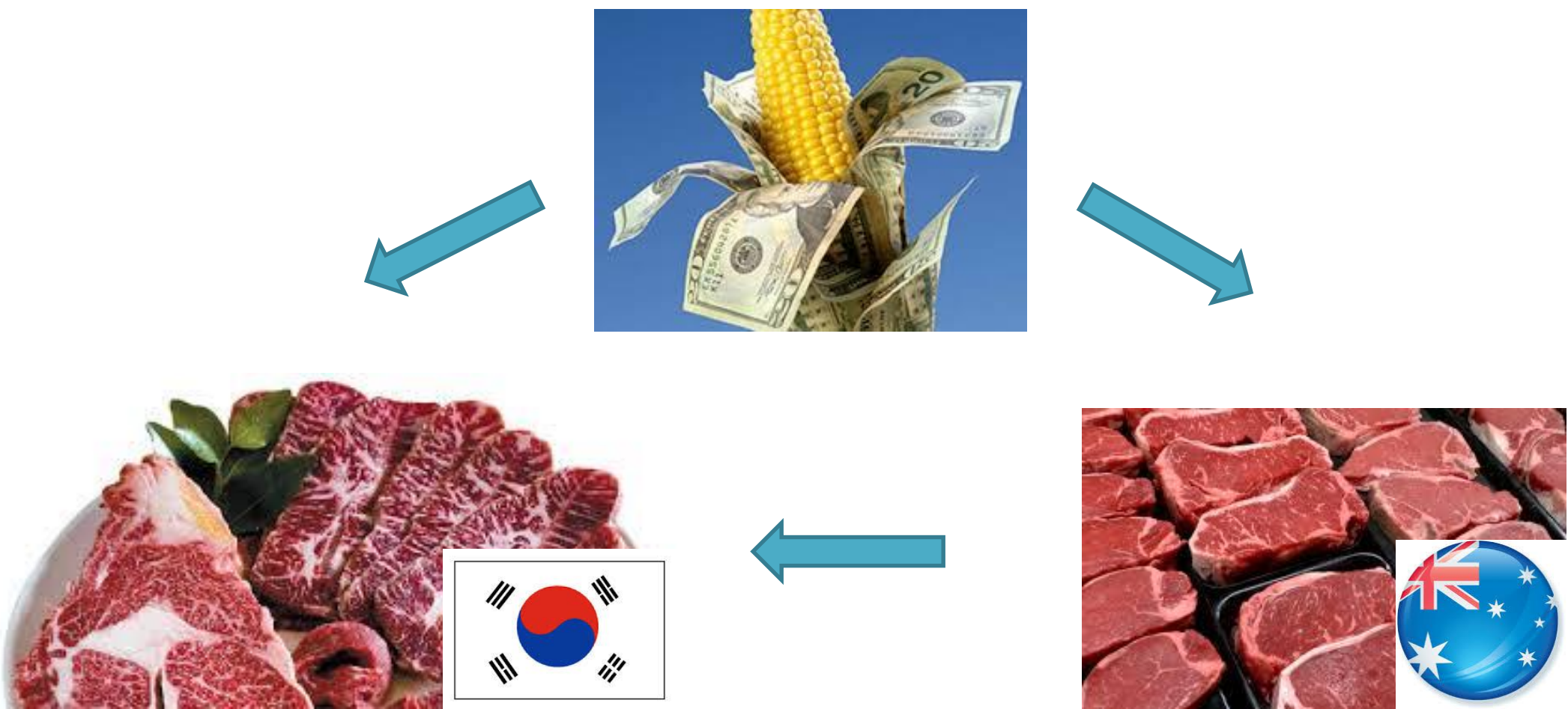
Data

❑ 2000-2015 Monthly time series data

❑ Korean beef prices from Korea Institute for Animal Products Quality Evaluation

❑ Imported beef prices from Korea Customs Service

❑ Corn price data from World Bank

❑ Real exchange rate from Bank of Korea

Summary Descriptions

Variable	Description	Obs	Mean	Std. Dev.
KORP	Price of Korean native cattle (won/kg)	178	13291.83	1905.46
CORNP	Imported Corn price (won/kg)	178	184.98	82.26
AUSP	Imported Australian beef price (won/kg)	178	4163.63	1147.44
DKORP	First differentiated KORP	177	17.75	1236.09
DCORNP	First differentiated CORNP	177	0.38	13.35
DAUSP	First differentiated AUSP	177	22.40	207.92

DF-GLS Unit Root Test

$$\Delta y_t = \alpha + \beta y_{t-1} + \delta t + \gamma_1 \Delta y_{t-1} + \cdots + \gamma_p \Delta y_{t-p} + \varepsilon_t$$

❑ The testing null hypothesis is $H_0: \beta = 0$. The null hypothesis explains that y_t is a random walk or it possibly has drift. The alternative hypothesis is that y_t is either stationary with linear trend or non-zero mean with no trend.

The results from the DF-GLS Unit Root Test

Variable	Level Constant w/o trend	Level Constant with trend	Decision	First Difference Constant w/o trend	First Difference Constant with trend	Decision
KORP	-1.8883	-2.9562**	I(1)/I(0)	-17.4795***	-18.5246***	I(0)
CORNP	-1.0074	-1.7368	I(1)	-10.7521***	-10.8671***	I(0)
AUSP	0.3254	-3.4392**	I(1)/I(0)	-12.3592***	-12.5411***	I(0)

Note: Estimates are statistically significant at *** 1%, ** 5%, and * 10%
   I(0) indicates no unit root and I(1) indicates unit root

Threshold Linearity Test

Threshold Hypothesis	DAUSP	DCORNP	DKORP
1 vs 2	35.295***	16.691	19.405
1 vs 3	62.303***	28.863	42.406
2 vs 3	27.008***	12.172	23.001

Significant at *** 1%, ** 5%, and * 10%
Note: D indicates first difference

❑ Lo and Zivot (2001) test is used to test threshold non-linearity.

❑ We find that only differentiated Australian beef price has 2 thresholds at 1% significant level, whereas other variables have no thresholds.

TVAR Model

$$y_t = \begin{cases} \delta_1 + \rho_{1,1}y_{t-1} + \cdots + \rho_{1,p}y_{1-p1} + u_t & if\ x_{t-d} \geq \theta_L \\ \delta_2 + \rho_{2,1}y_{t-1} + \cdots + \rho_{2,p}y_{1-p1} + u_t & if\ \theta_H \geq x_{t-d} \geq \theta_L \\ \delta_3 + \rho_{3,1}y_{t-1} + \cdots + \rho_{3,p}y_{1-p1} + u_t & if\ \theta_H \geq x_{t-d} \end{cases}$$

where y is price vector of Korean beef, corn, and Australian beef, $\delta_1, \delta_2, \delta_3$ refer the intercepts in each regime, $\rho_{j,1}, \ldots, \rho_{j,m-1}$ are the number of lags in regime, θ_L, θ_H are the thresholds, d is the delay of transition variable, and x_{t-d} is the transition variable from one of three variables.

Result from TVAR

	REGIME	INTERCEPT	DAUSP(-1)	DCORNP(-1)	DKORP(-1)
DAUSP	1	-157.46	-0.84	3.17	0.03
(11.40%)	2	10.88	-0.05	-0.36	0.01
	3	33.26	-0.16	-1.80	-0.02
DCORNP	1	-14.89	-0.04	0.09	-0.001
(69.30%)	2	0.18	-0.001	0.18****	-0.003*
	3	-5.04	0.02	0.15	-0.001
DKORP	1	1992.63****	5.04****	-39.99****	-0.60***
(19.30%)	2	130.93	1.49****	1.43	-0.30***
	3	-335.07	0.07	22.14****	-0.40*

Threshold value: -278.15 and 198.29

Significant levels: ****, ***, **, and * at 0%, 1%, 5%, and 10% respectively

Note: (-1) indicates first lag

Summary and Conclusions

❑ Current Korean beef price is positively affected by increasing in previous month of Australian beef price in first and second regimes.

❑ If corn price increased in previous month, there is incentive to increase current Korean beef price. However, the incentive might be canceled out (i.e., buffered) by low Australian beef price in first regime. The incentive may not be buffered in third regime where increasing in previous Australian beef price is high.

❑ Current Korean beef price is negatively affected by previous month of the Korean beef price regardless of different thresholds

❑ Finding from this study suggests that linearity assumption in time-series analysis will provide biased results

❑ The main contribution of this paper is to provide economic implications to domestic market structure and price competitive.