The Impact of TRQs on Korean Rice Market

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The Impact of TRQs on Korean Rice Market

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11-13 December, 2016
Market access remains important in trade negotiations.

Tariff-rate quota (TRQ) allows to improve market access.

- Quantity of the TRQ
- In-quota tariff on imports within the TRQ quantity
- Over-quota tariff on imports beyond the TRQ quantity

If the over-quota tariff is high enough that no additional imports occur, then the over-quota tariff is prohibitive.

Korean rice market has shifted to TRQ regime from import quota since 2015.
Korean Rice Market

Consumption
- In recent year, rice consumption decreased (faster than production).

Production
- Production decreased with yield growing steadily and decreasing rice harvest area.

Trade
- Implementing Tariffication was postponed until 2004, and then again until 2014.

  Minimum Market Access (MMA):
  2005 ~ 2014, CSQ + Most Favoured Nation (MFN)

  Tariff Rate Quota
  2015 ~: Implemented the TRQs
  (513% the over-quota tariff and 408 thousand ton for MMA).
Comparison of domestic price and price of imported rice.  
(with 513% over-quota tariff rate)

- Korean consumers primarily prefer Japonica rice (medium grain rice) and also consume Indica rice (long grain rice) in restaurants
Objective

Examine the possibility of importing medium and long grain rice under uncertainty in Korea.

Model

- Partial equilibrium model for Korean rice market.
- Represent a TRQ regime and a product differentiation.
- Stochastic approach to impose the uncertainty.
Model: TRQ Regime

The explicit TRQ regime

- **At the quota**
  \[ IM_t = MMA_t \]
  \[ P^D_t : IM_t + QP_t + BS_t = QC_t + EX_t + ES_t \]

- **Over-quota**
  \[ P^D_t = P^W_t \times XR_t \times (1 + T_{high,t}) \]
  \[ IM_t = QC_t + EX_t + ES_t - QP_t - BS_t > MMA_t \]

- **The Fischer-Burmeister Nonlinear Complementarity problem (NCP) function**
  \[ \sqrt{[IM_t - MMA_t]^2 + [P^I_{high,t} - P^D_t]^2} - \{[IM_t - MMA_t] + [P^I_{high,t} - P^D_t]\} = 0 \]

\[ U(q_m, q_l, z) = k \frac{1}{\varepsilon} \frac{\varepsilon}{\varepsilon-1} \left[ (q_m + \theta q_l)^\lambda z^{1-\lambda} \right]^{\frac{\varepsilon-1}{\varepsilon}} + y \]

Individual utility of the consumer depends on consumption of medium grain rice, \( q_m \), long grain rice, \( q_l \), wheat as substitute, \( z \), and numeraire, \( y \). The consumer is characterized by a theta, \( \theta \).

- \( k > 0 \): the size of the market
- \( \varepsilon > 0 \) (\( \varepsilon \neq 1 \)): the overall food demand elasticity
- \( 0 < \lambda < 1 \): consumer preference parameter equal to shares between rice and wheat as substitute good.
Model: Product Differentiation Model

Aggregation of individual demands

- Consumption of medium grain rice

\[ D_m = \left( \frac{p_l - \theta_L}{p_m - \theta_L} \right) \exp \left[ \ln \left( (1 - \lambda)^{-1}(1-\varepsilon) \lambda^{1-\lambda(1-\varepsilon)} k \right) + (\lambda(1-\varepsilon) - 1) \ln(p_m) + (1 - \lambda)(1 - \varepsilon) \ln(p_z) \right] \]

- Consumption of long grain rice

\[ D_l = \left( \frac{\theta_H - \theta_L}{\theta_H - \theta_L} p_{l-1}^{1-\lambda(1-\varepsilon)} \right) \exp \left[ \ln \left( (1 - \lambda)^{-1}(1-\varepsilon) \lambda^{1-\lambda(1-\varepsilon)} k \right) + (1 - \lambda(1-\varepsilon) - 1) \ln(p_l) + (1 - \lambda)(1 - \varepsilon) \ln(p_z) \right] \]

- The choice between medium and long grain rice

\[ \theta_L < \frac{p_l}{p_m} < \theta_H \quad \Rightarrow \quad D_m > 0 \quad D_l > 0 \]

\[ \theta_L < \theta_H < \frac{p_l}{p_m} \quad \Rightarrow \quad D_m > 0 \quad D_l = 0 \]
Hold-out case

- There are consumers who always consume medium grain rice.
- $\varphi$ represents a share of consumption for medium grain rice.

$$D_m = \left( \varphi + (1 - \varphi) \frac{p_l}{p_m} \right) \exp \left[ \ln \left( (1 - \lambda)^{-(1-\lambda)(1-\varepsilon)} \lambda^{1-\lambda(1-\varepsilon)} k \right) + (\lambda(1 - \varepsilon) - 1) \ln(p_m) + (1 - \lambda)(1 - \varepsilon) \ln(p_z) \right]$$

$$D_l = (1 - \varphi) \left( \frac{\theta_{H}^{1-\lambda(1-\varepsilon)} - \frac{p_l}{p_m}}{\theta_{H} - \theta_{L}} \right) \exp \left[ \ln \left( (1 - \lambda)^{-(1-\lambda)(1-\varepsilon)} \lambda^{1-\lambda(1-\varepsilon)} k \frac{1}{1 - \lambda(1 - \varepsilon)} \right) + (\lambda(1 - \varepsilon) - 1) \ln(p_l) + (1 - \lambda)(1 - \varepsilon) \ln(p_z) \right]$$

Model: Product Differentiation Model
Model: Stochastic Approach

- **Stochastic approach** (FAPRI stochastic approach, Westhoff et al. 2006)

  - Make 500 correlated random draws from empirical distributions of selected exogenous variables
    (e.g. error terms of Korean rice yields, world rice prices, and exchange rates).

  - Generate 500 alternative outcomes
    (e.g. prices of imported rice, domestic price, and import quantities).
Calibration & Scenario

- **Calibration**
  - Own price elasticity of demand is -0.65
  - Price elasticity of supply is 0.3
  - Assume that $\phi = 0.9$ and $\theta = [0, 0.5]$

- **Scenario**
  - Over-quota tariff rate is reduced by 200%, 300%, and 400%.
## Scenario Results

Rice import under scenarios with different over-quota tariff rate

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Over-Quota Tariff Rate</th>
<th>Long Grain Rice</th>
<th>Medium Grain Rice</th>
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1000 MT
Sensitivity Test

Rice import impacts of reducing the over-quota tariff with $\theta_H=0.5$ and different consumer hold out ($\varphi$), 5-year averages

- $\varphi = 0.9$: 513%
- $\varphi = 0.8$: 313%
- $\varphi = 0.7$: 213%
- $\varphi = 0.6$: 113%

Legend:
- Blue: Long grain rice
- Red: Medium grain rice
Sensitivity Test

Rice import impacts of reducing the over-quota tariff with $\theta_H=0.7$ and different consumer hold out ($\varphi$), 5-year averages

![Bar Chart]

- Long grain rice
- Medium grain rice
Rice import impacts of reducing the over-quota tariff with $\theta_H=0.9$ and different consumer hold out ($\varphi$), 5-year averages

Sensitivity Test

- $\varphi = 0.9$
- $\varphi = 0.8$
- $\varphi = 0.7$

513% 313% 213% 113%

Long grain rice  Medium grain rice

1000 MT
Conclusion

Based on these preliminary results...

- There probably will not be over-quota rice imports if the over-quota tariff stays at 513%.

- If the over-quota tariff rate is reduced, there could be possibility of importing rice.

- If a share of consumption switches to long grain rice and more consumers are willing to buy long grain rice, the possibility of importing long grain rice might increase, but the possibility of importing medium grain rice might decrease when the over-quota tariff rate is reduced.
Thank you!!
Appendix.1

513%

213%

313%

113%
Examine the possibility of importing rice under uncertainty in Korea.

Source: Adapted from Abbott and Paarlberg (1998)