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# Potential Trade Distortion Effects of State Trading Enterprises under the Tariff-Rate Quota Scheme

*Jung-Hyun Yoon and Song Soo Lim*

**Abstract**
The paper analyzes the potential trade distortion effects of state trading enterprises (STEs) on soybean imports to Korea. Traditionally, STEs have exercised exclusive rights to import the so-called strategic products, to ensure food security, domestic price stabilization, and import mark-ups. However, STE imports have been criticized on the grounds that industries using soybeans as a raw material are unable to obtain a diverse mix of quality material and cannot exercise the "right to choose" their own ingredients. Under a theoretical framework, a tariff equivalent of the STE is postulated to equate imports by private firms with imports by the STE. An empirical model is constructed and estimated using annual data spanning 1980-2009. The estimated results show that providing exclusive rights to imports has a negative effect on market access. When the STE pursues consumer welfare, the import-reducing effect turns out to be smaller than that in the producer welfare maximization case.

**JEL** F11 F13 Q17
**Keywords** State trading enterprises; tariff-rate quotas; tariff equivalents; soybeans; sensitive products

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## I. Introduction

State trading accounts for a significant part of agricultural imports to Korea. The so-called sensitive agricultural products, such as rice, red pepper, garlic, onions, ginger, sesame seeds, soybeans, certain other beans, and buckwheat, have been subject to state trading for a long time (Korea Agro-Fisheries Food Trade Corporation, 2012). The strong arguments in favor of state trading include, among other things, its ability to ensure stable consumption, protect local production, generate revenues for the government, and achieve self-sufficiency (OECD, 2001). Major state trading enterprises (STEs) in the country include the Ministry for Food, Agriculture, Forestry, and Fisheries (MIFAFF), which has an exclusive right to import rice, the country's staple crop, and the Korea Agro-Fisheries and Food Trade Corporation (aT), a public entity, which monopolistically administers the imports of sensitive products.

Many other countries besides Korea rely on STE trades (Abbott and Young, 1999; Linda, 2005). STEs account for a substantial proportion of world trade in grains, dairy products, and sugar (Ackerman and Dixit, 1999). Notably, the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO) both recognize STEs as legitimate participants in international trade subject to certain disciplines (Roberts, 2001; WTO, 2003).

However, trading practices by STEs are criticized owing to their anti-competitive effects on market access and fair trade (Hoekman, 1997; Lo, 2006). In this vein, the current round of world trade talks, the Doha Development Agenda (DDA), is negotiating over the trade distorting effect of STEs and looking for ways to remedy it.[1,2] However, the reform process

[1] Details of the WTO/DDA negotiations can be found at the WTO website: http://www.wto.org/english/tratop_e/dda_e/dda_e.htm.

[2] Several member countries have called for the development of additional and effective disciplines to regulate trade by STEs (Linda 2005). The United States and Japan proposed that STEs be eliminated, while the EU, MERCOSUR, Chile, and Columbia requested effective ways to control the trade distortive practices of STEs.

has been slow and ineffective (McCalla and Nash, 2007).

STE imports also deliver significant market effects as an import administration method for the tariff-rate quota (TRQ) system.[3] The TRQ scheme is a two-tiered, differentiated tariff scheme whereby a lower tariff is imposed on within-quota imports, and an increasingly higher tariff is charged on over-quota imports (Dupraz and Matthews, 2007; Skully, 2001). About 45 member countries of the WTO operate the TRQ mechanism, where STEs control 2% of the total 1,429 products (WTO, 2006).

This study is motivated by the fact that there is little literature on the trade effects of STEs under the TRQ regime (McCorriston and MacLaren, 2005). Earlier research by Lloyd (1982) proposed to measure the trade distorting effect of a monopoly STE in terms of the tariff equivalent to a competitive trade case. In much the same vein, Ackerman and Dixit (1998) derived the tariff equivalent of STEs.

McCorriston and MacLaren (2005) highlighted the factors that determine the trade distorting effect of importing STEs. A significant contribution made by this study is the characterization of various STEs by the nature of exclusive rights for domestic procurement and import purposes enjoyed by them. Specifying different pay-off or welfare functions for STEs, the paper suggested that the trade distorting effect of a consumer surplus maximizing single desk STE should result in the lowest tariff equivalent compared to producer surplus and profit maximizing cases. McCorriston and MacLaren (2007) developed a theoretical model for exporting STEs. Allowing differences in the STE's pay-off function, they concluded that STEs could create significant trade distortion effects.

In a review of the role of the STE China National Cereals, Oils, and Foodstuffs Import and Export Company (COFCO), McCorriston and MacLaren (2010) measured COFCO's

[3] TRQ administration methods include applied tariff; license on demand; first-come, first-served; historical importers; auction; state trading; producer groups; mixed methods; and others.

tariff equivalent for wheat imports. The styled model of the importing STE was similar to those used in previous studies, except that COFCO's objective function was specified to represent China's relative weights for producer or consumer surpluses. The simulated results demonstrated that STEs have significant effects on importing as well as exporting countries.

In line with the ideas presented in the literature, this paper aims to analyze the trade distorting effects of Korean STE imports. The exclusive rights of the Korean STE to import soybeans, which are contingent on the STE's objective functions, are converted to tariff equivalents, and are then compared against one another to gauge market impacts.

## II. STE Imports of Soybeans under the TRQ Scheme

As an STE, aT has the special right to import soybeans. The annual TRQ is set at 185,787 tons by the WTO, but the government has expanded it to satisfy domestic demand (Table 1). Within-the-quota or in-quota imports face a 5% ad valorem tariff, while the out-of-quota or over-quota imports are subject to a tariff rate of 487%.

**Table 1:** Estimation of Mark-ups and Economic Rents

| | | Unit | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| WTO quota | | ton | 185,787 | 185,787 | 185,787 | 185,787 | 185,787 |
| Quota expansion | | ton | 34,872 | 72,198 | 42,157 | 38,135 | 93,931 |
| In-quota import by: | | | | | | | |
| | STE | ton | 220,659 | 257,985 | 227,944 | 223,922 | 279,718 |
| | HI | ton | 24,700 | 15,950 | 6,500 | 4,800 | 6,200 |
| | End-user | ton | n/a | n/a | 29,932 | 29,905 | 27,462 |
| Over-quota import | | ton | 44,061 | 33,740 | 14,633 | 20,065 | 12,921 |

Note: "HI" and "End-user" refer to historical import and import by the small-scale manufacturers' association, respectively.
Source: The Korea Agro-Fisheries and Food Trade Corporation (2012).

The imported soybeans are then allocated to manufacturers according to their production capacity and needs. Since aT sells the soybeans at a predetermined release price, which is far lower than that of domestically produced soybeans, there is a huge opportunity for economic rent.[4] The lower release price has been fixed at 1,020 won per kg since 2009, which reflects industry requests for low sourcing costs and the government's desire to control inflation rates.[5]

A small portion of the quota is administered by soybean oil manufacturers according to their requirements. In addition, since 2009, the small-scale manufacturers' association ("end-user") has obtained the right to import their own soybeans, on the condition that it pays the import mark-ups. The mark-ups refer to a specified payment by importers on top of import prices, through which the government collects a part of the quota rents.

The justification given to the manufacturers' association for the quota import was that aT provided only a single standard of imported soybeans to the food industry. However, the manufacturers' association claimed that only one particular quality or standard of soybeans imported by the aT (i.e., US No. 1 standard) could not meet the market's diverse demands. The logic of "right to select ingredients" led to the political decision to share the import rights with the industry. The annual quota to the end-user amounts to 30,000 tons or 13% of the overall quota. Like the STE, the manufacturers' association imports this amount at a low in-quota rate of 5%.

However, these experimental efforts have led to mixed results. Some argue that the quality of imported soybeans has improved after the association obtained the right to import their own soybeans, while others claim the opposite is true. Moreover, the import right given

[4] Economic rents accrue to the wedge between domestic and import prices.

[5] Processed food manufactures use the imported soybeans as raw materials to produce a variety of final goods, such as tofu, soybean oils, fermented beans (*maeju*), and bean paste (*doenjang*).

to the quasi-STE may not be sustainable as long as the manufacturers' association keeps asking for cuts in mark-up payments owing to its financial difficulties (Lim et al., 2010).

## III. A Model for the Trade Distortion Effect by Importing STEs

### A Benchmark Case

Importing STEs can affect trade by controlling prices or quantities. A standard approach to measure the STE's trade effect is through tariff equivalents (McCorriston and MacLaren, 2005). An underlying assumption is that the STE's import will impact the domestic price in the same way as an import tariff. More specifically, the import level under the tariff equivalent (a non-STE case) would be same as that for the STE.

The standard approach also assumes that there are *n* private firms in the market. These *n* firms are under Cournot competition, and earn profits from domestic procurement and imports.

The trade distortion caused by the STE is measured as the tariff level that would generate the same level of imports by the *n* importing firms as the imports by the STE. This specification is given by the following relationship.

$$Q_m(t^e) = Q_m^{STE},$$

where, $Q_m$ is the import quantity by the *n* private firms in the benchmark case, $Q_m^{STE}$ is the volume imported by the STE, and $t^e$ is the specific tariff equivalent such that the import volume of the private firms equals that of the STE. The tariff equivalent can be positive or negative. The former case arises when the allocation of exclusive import rights to the STE reduces the import volume. The latter case corresponds to an import subsidy.

For the *n* firms benchmark case, the domestic inverse demand function can be set as follows.

$$P = a - b(Q^d + Q^m), \tag{1}$$

where, $Q^d = nq^d$ is the quantity sold in the domestic market and $Q^m = nq^m$ refers to the imports. The cost function for each firm can be specified as the purchase from upstream agricultural sectors and from imports. Their respective inverse supply functions are as seen below.

$$P_A = f + kQ^d \quad \text{and} \tag{2}$$

$$P_W = F + kQ^m. \tag{3}$$

Profit maximization by each firm depends on the net costs and the quantity sourced.

$$\pi_i = (P - P_A)q_i^d + (P - P_W - t^e)q_i^m, \tag{4}$$

where, $t^e$ is the implicit measure of tariff equivalent. Under the Cournot equilibrium, $q_i^d = q_j^d = q^d$ and $q_i^m = q_j^m = q^m$ *for* $i \neq j$, and equation (1) ~ equation (3), the first-order conditions for profit maximization with respect to $q_i^d$ and $q_i^m$ are as below.

$$\frac{\partial \pi}{\partial q_i^d} = (a - f) - (b + k)(n + 1)q^d - b(n + 1)q^m = 0 \quad \text{and} \tag{5}$$

$$\frac{\partial \pi}{\partial q_i^m} = (a - F - t^e) - b(n + 1)q^d - b(n + K)(n + 1)q^m = 0. \tag{6}$$

When the quantities sourced from domestic agricultural sectors and imports are solved and aggregated over *n* firms, $Q^d$ and $Q^m$ can be derived as follows.

$$Q^d = \frac{(a - f)(b + K)(n + 1) - b(n + 1)(a - F - t^e)}{(b + k)(n + 1)(b + K)(n + 1) - b^2(n + 1)^2} \quad \text{and} \tag{7}$$

$$Q^m = \frac{(b + k)(n + 1)(a - F - t^e) - b(n + 1)(a - f)}{(b + k)(n + 1)(b + K)(n + 1) - b^2(n + 1)^2}. \tag{8}$$

When compared to this benchmark case, the impact of the STEs on imports can be derived by estimating the implicit tariff level that corresponds to the above $Q^m$. For simplicity and to replicate, as far as possible, the actual soybean imports made by the STEs, it is assumed that the STEs seek differentiated objectives in relation to the exclusive rights to import.

Three cases are identified according to the objective functions of the STEs. Case 1, Case 2, and Case 3 refer to profit maximization, producer surplus maximization, and consumer surplus maximization, respectively. Two identical conditions apply to each case: exclusive rights to import and non-exclusive rights to domestic procurement.

**Case 1: Profit Maximization**

Case 1 refers to a situation where *m* out of *n* firms aim to maximize their profits. The *m* firms have exclusive rights to import from the world market and can procure from domestic producers, too. On the contrary, the remaining $n - m$ firms cannot import because of the lack of the rights, but can operate in the domestic market. Pay-off functions ($\pi$) for the *m* and $n - m$ firms are $\pi^d + \pi^m$ and $\pi^d$, respectively.

The domestic inverse demand function is shown as equation (9).

$$P = a - b(Q^{de} + Q^{me} + Q^d), \tag{9}$$

where, $Q^{de}$ is the quantity sold by the *m* firms with domestically procured products, $Q^{me}$ is the quantity sold by the *m* firms with imported products, and $Q^d$ is the quantity sold by the $n - m$ firms with products purchased from domestic suppliers. The corresponding inverse supply functions are as given below.

$$P_A = f + k(Q^{de} + Q^d) \quad \text{and} \tag{10}$$

$$P_W = F + KQ^{me}. \tag{11}$$

The first-order conditions for a representative firm having exclusive rights to import can be derived as follows.

$$\frac{\partial \pi_i}{\partial q_i^{de}} = (a - f) - (b+k)(m+1)q^{de} - b(n+k)(n-m)q^{d} - b(m+1)q^{me} = 0 \quad \text{and} \qquad (12)$$

$$\frac{\partial \pi_i}{\partial q_i^{me}} = (a - F) - b(m+1)q^{de} - b(n-m)q^{d} - (b+K)(m+1)q^{me} = 0\,. \qquad (13)$$

Likewise, a representative $n - m$ firm without import rights faces the following first-order condition for profit maximization.

$$\frac{\partial \pi_i}{\partial q_i^{d}} = (a - f) - m(b+k)q^{de} - (b+k)(n-m+1)q^{d} - bmq^{me} = 0\,. \qquad (14)$$

The simultaneous solutions, $q^{me}$, and their sum over the $m$ firms give the total imports, $m \cdot q^{me}$, which is denoted as $Q_{m,1}^{STE}$. Equating $Q_{m,1}^{STE}$ with the level of imports in the benchmark case, $Q_m(t^e) = Q_{m,1}^{STE}$, and then solving for the tariff equivalent gives equation (15).

$$t_1^e = \frac{1}{\phi_1}\left\{\left[\phi_1 - \frac{\Omega_1 m}{\Omega_2 n}(b+k)\right](a-F) - \left[b(n+1) - \frac{\Omega_1 m}{\Omega_2 n}b\right](a-f)\right\}, \qquad (15)$$

where,

$\phi_1 = (b+k)(n+1)$,
$\phi_2 = (b+K)(n+1)$,
$\Omega_1 = \phi_1\phi_2 - b^2(n+1)^2$ *and*
$\Omega_2 = (m+1)\left[(b+k)(b+K) - b^2\right]$

The allocation of exclusive rights to import is likely to shift the export supply curve upwards, which results in a lower level of imports. The decrease in imports, compared to the benchmark case, captures the trade distorting effect in terms of tariff equivalent, $t_1^e$. Equation (15) indicates that $t_1^e$ depends on the numbers of *m* and *n* firms. The smaller the

size of *m*, the larger the tariff equivalent. The existence of fewer STEs in the market appears to generate a relatively larger trade distorting effect compared to the benchmark case. The size of *n*, on the other hand, indicates the extent of relative competitiveness for the benchmark. If the size of *n* is relatively large, or the benchmark case is more competitive, the dependence of the tariff equivalent on the relative number of *m* firms increases.

**Case 2: Producer Welfare Maximization**

Case 2 considers a situation where the STEs having exclusive rights to import seek to maximize domestic producer surplus. This case closely resembles a typical objective of agricultural policies in many developed countries, whereby high policy weights are placed on the interests of domestic farm sectors. The relatively high border protection or minimization of imports tends to contribute to the maintenance of domestic farm prices above world prices.

The domestic inverse demand and supply functions are specified in the same manner as in Case 1. The objective function, *W*, consists of two components: one, to maximize producer welfare, and the other, to maximize the profit from imports, where

$$W = PQ^{de} - \int_0^{Q^{de}} P_A dQ^{de} + \pi^{me} = PQ^{de} - \int_0^{Q^{de}} P_A dQ^{de} + (P - P_W)Q^{me}. \quad (16)$$

To maximize the objective function, first-order conditions are derived with respect to $Q^{me}$ and $Q^{de}$ as seen below.

$$\frac{\partial W}{\partial q^{de}} = (a - f) - (2b + k)Q^{de} - (b + k)(n-1)q^{d} - 2bQ^{me} = 0 \quad \text{and} \quad (17)$$

$$\frac{\partial W}{\partial q^{me}} = (a - F) - 2bQ^{de} - b(n-1)q^{d} - 2(b + K)Q^{me} = 0. \quad (18)$$

For the representative $n - m$ firms that do not have exclusive rights to import from the world market, the first-order condition for profit maximization with respect to $Q^{d}$ is given as

follows.

$$\frac{\partial \pi_j}{\partial q_j^d} = (a - f) - (b + k)Q^{de} - n(b + k)q^d - bQ^{me} = 0. \quad (19)$$

The solution for the equilibrium quantity of imports provides the tariff equivalent, $t_2^e$, as seen below.

$$t_2^e = \frac{1}{\phi_1}\left\{\phi_1(a - F) - \left[\frac{\Omega_1}{n}\Phi_1 + b(n+1)(a - f)\right]\right\}, \quad (20)$$

where,

$$\Phi_1 = -\left[\frac{(n(F - f) + f)b^2 + (2k(F - f) + nk(F - a))b}{2nb^3 + (k(3n+1) + 2K(n-1))b^2 + 2k(2K + nK + k)b + 2k^2(1 + K)}\right].$$

Since the STEs reflect the welfare of import-competing domestic agricultural producers, the quantity of imports will be minimized. As such, a positive and relatively large tariff equivalent is expected. In fact, the trade distortion effect is likely to be higher than that in Case 1.

**Case 3: Consumer Welfare Maximization**

Case 3 is postulated to maximize consumer surplus with the exclusive rights to import. In contrast to Case 2, this type of agricultural policy is commonly observed in many developing countries. These countries are more or less interested in maintaining low domestic prices and being competitive in world markets with relatively low labor costs.

As such, the STEs are assumed to allocate all the weight to consumers. The objective function for the STEs is given by equation (21).

$$W = \int_0^Q PdQ - PQ + \pi^{de} + \pi^{me}, \quad (21)$$

where, $Q = Q^{de} + Q^{me}$.

To maximize the objective function, the first-order conditions with respect to $Q^{me}$ and $Q^{de}$ are derived as seen below.

$$\frac{\partial W}{\partial q^{de}} = (a - f) - (b + 2k)Q^{de} - k(n-1)q^{d} - bQ^{me} = 0 \quad \text{and} \tag{22}$$

$$\frac{\partial W}{\partial q^{me}} = (a - F) - 2bQ^{de} - b(n-1)q^{d} - (b + 2K)Q^{me} = 0. \tag{23}$$

As for the representative $n - m$ firms without import rights, the first-order condition to maximize profit with respect to $Q^{d}$ is given by equation (24).

$$\frac{\partial \pi_j}{\partial q_j^{d}} = (a - f) - (b + k)Q^{de} - n(b + k)q^{d} - bQ^{me} = 0. \tag{24}$$

Following the same procedure as the previous case, the tariff equivalent, $t_3^e$, is obtained as below.

$$t_3^e = \frac{1}{\phi_1}\left\{\phi_1(a - F) - \left[\frac{\Omega_1}{n}\Phi_2 + b(n+1)(a - f)\right]\right\}, \tag{25}$$

where,

$$\phi_1 = (b + k)(n + 1)$$
$$\phi_2 = (b + K)(n + 1)$$
$$\Omega_1 = \phi_1\phi_2 - b^2(n+1)^2$$
$$\Phi_2 = \frac{n(a + F - 2f)b^2 + [nk(2F - a - f) + k(F - f)]b + [a(1-n) + F(1+n)]k^2}{nb^3 - n(k - 2nK)b^2 - [nk(4K + k) + k(2K + k)]b - 2K(n-1)k^2}$$

Maximizing the consumer surplus indicates that the STEs do not exploit their monopoly power to import fully. In other words, the STEs set the prices along the demand curve instead of the marginal revenue curve. By forgoing the monopolistic profit, the STEs induce import expansion, which suggests a lower trade distortion effect than that in Cases 1 and 2.

## IV. Empirical Applications in Soybeans Import

### Estimation for Parameters

The empirical application of the above theoretical models towards the case of soybean import to Korea requires the parameter values for the inverse demand and supply equations. For the sake of simplicity, basic specifications for demand and price functions are adopted. First, domestic demand for soybeans, Q at time t is specified as a function of the retail price, $P_t^r$, and GDP per capital, $GDPPC_t$, in a log-linear form, such that

$$\ln(Q_t) = \beta_0 + \beta_1 \ln(P_t^r) + \beta_2 \ln(GDPPC_t) + e_t,$$

where, $e_t$ is a normal disturbance term.

Second, the inverse cost functions for domestic and world markets are specified as

$$\ln(P_t^p) = \chi_0 + \chi_1 \ln(S_t) + \nu_t, \text{ and}$$
$$\ln(P_t^w) = \delta_0 + \delta_1 \ln(M_t) + \xi_t$$

where, $P_t^p$ refers to the procurement price for domestic soybean, $S_t$ represents domestic soybean production, $P_t^w$ is the world price, and $M_t$ is the volume of soybean import. The corresponding normal disturbance terms are $\nu_t \; and \; \xi_t$.

Table 2 provides the summary of statistics for the dataset. The dataset accounts for food-use soybeans only. The sample period spans 1980-2009. The GDP deflator and exchange rates (won per US dollar) are sourced from the Bank of Korea and the other variables are sourced from MIFAFF. All price variables are valued at the 2005 constant price.

**Table 2**: Summary of Statistics, 1980-2009

| Variable | Unit | Mean | Standard | Minimum | Maximum |
|---|---|---|---|---|---|

| | | | Deviation | | |
|---|---|---|---|---|---|
| Domestic consumption | ton | 14.06 | 0.24 | 13.36 | 14.39 |
| Domestic production | ton | 12.03 | 0.28 | 11.56 | 12.46 |
| Import | ton | 13.89 | 0.34 | 12.94 | 14.30 |
| Retail price | won/kg | 8.19 | 0.52 | 7.53 | 9.02 |
| Procurement price | won/kg | 7.78 | 0.15 | 7.50 | 8.01 |
| World price | won/kg | 6.88 | 0.33 | 6.46 | 7.95 |
| GDP per capita | won/head | 11.53 | 0.53 | 10.54 | 12.22 |

Note: All variables are log-transformed.

Source: Ministry for Food, Agriculture, Forestry, and Fisheries (2011); The Bank of Korea (http://www.bok.or.kr)

The standard OLS estimation results for the demand and inverse cost functions are shown in Table 3 and 4, respectively. In the demand function, the statistically significant and negative parameter value for the retail price is consistent with economic theories. As a shifter variable, GDP per capita shows a positive relationship with demand. In addition, the relationships between domestic production and procurement prices, and import volume and world prices, turn out to be positive and statistically significant.

**Table 3**: Estimation Result for Demand Function of Soybean

| Variable | Parameter Estimate |
|---|---|
| Constant | 9.157 (0.649)*** |
| Retail price | −0.366 (0.112)*** |
| GDP per capita | 0.685 (0.113)*** |
| R-squared | 0.724 |

Note: 1. Robust standard errors are in parentheses.

2. *** indicates $p < 0.01$.

**Table 4:** Estimation Result for Inverse Cost Functions of Soybean

| Variable | Parameter Estimate for $P_t^p$ | Parameter Estimate for $P_t^w$ |
|---|---|---|
| Constant | 4.721 (1.337)*** | 1.192 (1.698) |
| Domestic production | 0.247 (0.109)** | - |
| Import volume | - | 0.409 (0.125)*** |
| R-squared | 0.569 | 0.175 |

Note: 1. Standard errors are in parentheses.

2. *** and ** indicate $p < 0.01$ and $p < 0.05$, respectively.

Finally, Table 5 shows the matches between the estimated parameter values and parameter symbols in the above-mentioned theoretical models of tariff equivalents for STEs.

**Table 5:** Matches between Estimated Parameter Values and Symbols in Tariff Equivalent Models

| a | b | f | k | F | K |
|---|---|---|---|---|---|
| 25.02 | 2.73 | 0.25 | 4.72 | 0.41 | 1.19 |

To calculate the tariff equivalents, the number of *n* and *m* firms in the market must be determined. The fact that *aT* is only STE with the exclusive right to import food-use soybeans from the world market implies that the number of *m* firms equals one. However, there is no such easy way to estimate the total number of private *n* firms in the market. For simplicity's sake, this paper considers an arbitrary selection of 20 firms. Recall that the STE can also procure domestic soybeans like the other private firms.

Plugging the values in Table 5 into the tariff equivalent equations (15), (20), and (25) provides the extent of trade distortion effects over the three cases under the influence of the STE. Table 6 summarizes the computed tariff equivalent measures. The positive tariff equivalent measures in all three cases suggest the existence of a trade barrier effect attributable to STE soybean imports.

**Table 6:** Tariff Equivalents for the STE Import

| Case | Maximization objective | Numbers of private firms and STEs | Tariff equivalent |
|---|---|---|---|
| 1 | Profit | 20, 1 | 7.4% |
| 2 | Producer surplus | 20, 1 | 11.0% |
| 3 | Consumer surplus | 20, 1 | 5.5% |

More specifically, Case 1 reveals that when the STE pursues profit maximization with its exclusive right, the trade effect would be equivalent to 7.4% of the tariff. Taking into account

the current TRQ system for soybean, with 5% of in-quota and 487% of out-of-quota bound rates, this computed level may not be regarded as a significant distortion. In reality, profit maximization by the STE is largely limited under a situation where inflation control remains a high priority for the government. It is because imported soybeans are mostly used as raw ingredients for the processed food tofu, which is considered as an essential food item in the country.

Case 2 with the producer surplus maximization objective shows a tariff equivalent level of 11%, which is the highest tariff equivalent level among the three cases. This implies that the STE operates in the interest of domestic soybean producers and does not fully exercise its exclusive right to import to its own advantage. The lack of exertion, or a weaker incentive to expand imports by the STE, brings about the most trade distorting effects.

Although it is difficult to ensure a sufficient supply of domestic soybeans to the processed food industry, the government nevertheless attempts to balance the interests of domestic producers and the food industry. The government's repetitive expansions in the annual quota import for soybeans even beyond the WTO's binding level in order to meet the food industry's needs, appears as a policy bias against domestic producers. However, this is a carefully chosen strategy to harmonize two seemingly contrasting policy goals: maintaining stable food prices and ensuring domestic producers' welfare.

Finally, Case 3 considers the maximization of consumer surplus associated with the STE's exclusive right to import soybeans. Under this case, the STE does not work to exploit its monopsony power in imports. Instead, it lays great emphasis on consumer concerns and only considers the benefit of consumers. This is likely to result in an import increase, as higher imports lead to price stabilization and more varieties, and hence, higher consumer satisfaction.

The tariff equivalent level is computed as 5.5%, which is the lowest among the three cases. This suggests that the trade distorting effect by the STE should be redressed by weaker

monopsony power over imports or by enhanced imports.

## V. Implications and Conclusions

State trading is a widely adopted trade policy instrument in Korea. This import measure has been employed to ensure food security and protect sensitive agricultural products in the country. Established by the tariffication process during the Uruguay Round, the tariff-rate quota regime allows STEs to implement quota imports of deep political significance. Since then, a number of sensitive agricultural products, including rice, soybeans, red pepper, onions, garlic, sesame seeds, and ginseng, are administered by the TRQ system.

The merits of state trading cannot be ignored by this largely food-deficit country. Recording the lowest food self-sufficiency rate among OECD members, Korea has pursued stability and predictability in food supply by emphasizing domestic production and stockpiles. In this vein, the government desires to have some control over the amounts of foreign farm products allowed into the country. This food security argument is especially relevant to staple grains, such as rice and soybeans.

STEs have long attracted charges of trade policy bias owing to their positive role in stabilizing the domestic food market. Soybean imports to Korea manifest how an STE's monopsony power can serve as a double-edged sword. In one sense, the STE is bound to supply imported soybeans as per the requirements of the food industry. Given the fact that the price premium of domestic soybeans is about four times higher than that of imported varieties, the Korean food industry enjoys cheaper ingredients sourced from the world market, allowing it to offer essential foods like tofu at relatively low prices.

In another sense, the quota import must be carefully managed so as not to discourage domestic production. The logic of food security plays here. Even when an ad hoc increase of

in-quota import is permitted, it is subject to a strict balance between demand and supply. Besides, the STE collects mark-ups from soybean end-users to ensure the price wedge and support agricultural programs.

Owing to the trade distortion effect, state trading is confronted with widespread criticisms, both domestic and international. Domestic food manufacturers complain that monopsony power over import deters the right to choose their own ingredients, leading to the lack of product diversity and quality. As a part of policy reform being induced by the WTO, negotiations are ongoing to ensure greater transparency and market-oriented TRQ administration by the STEs.

This paper finds that the trade distortion effect of the STE importing soybean, measured by tariff equivalent levels, depends on its strategic practices. When the STE behaves to maximize the welfare of domestic producers, it is likely to import less than what it is supposed to import under its own profit maximization case. On the contrary, when consumer interests take priority, the STE tends to place high weight on price stabilization, and thus, imports more than it would otherwise.

Given the existing tariffs for in- and over-quota imports, the computed tariff equivalent of up to 11% may indicate minimal trade distortion. This empirical finding sheds light on the fact that imported soybeans are largely untied to domestic production. In other words, the tariff equivalent measures, as a whole, suggest that the STE has deliberately avoided conflicting interests between end-use manufacturers and domestic producers. Nonetheless, the low adverse effect on trade by the STE's actions does not by any means guarantee that the current TRQ administration will be free of the reforms intended by the WTO. After tiered cuts in both in- and over-quota rates, imported soybeans are likely to gain substantial market access opportunities and attain a position at par with domestic soybeans.

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