Competition Policy or Tariff Policy: Which is More Effective?

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Abstract

In the recent literature, it has been demonstrated that competition policy can serve as a substitute for tariff policy in creating a beggar-thy-neighbor effect. Common wisdom, however, tells that competition policy is at best the second best in creating such an effect; obviously the first best is tariff policy. The present study demonstrates that this common wisdom no longer holds if a country can impose a tariff on only a part of the entire spectrum of imports. In that case, tariff policy may not be as effective a beggar-thy-neighbor policy as competition policy.

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1. Introduction

Since the 1980s, it has been argued by many policy makers that permitting imperfect competition in a country's non-tradable sector can serve as a trade impediment; for this reason, for example, the US has long urged Japan to promote domestic competition as a means of reducing the US trade deficit with Japan. Motivated by this fact, Yano (2001) and Yano and Dei (2003) demonstrate that a competition policy can serve as a substitute for a tariff policy in creating a beggar-thy-neighbor effect. That is, just like the imposition of a tariff, a large country's suppression of competition in a non-tradable sector can create a

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terms-of-trade effect that raises that country's own utility at the same time as reduces that of its trading partner country. This raises a natural question as to how effective a competition policy might be relative to a tariff policy.

Common wisdom tells that competition policy is at best the second best in creating a beggar-thy-neighbor effect on terms of trade; obviously the first best is tariff policy. The present study demonstrates that this common wisdom no longer holds if a country can impose a tariff on only a part of the entire spectrum of imports. In that case, tariff policy may not be as effective a beggar-thy-neighbor policy as competition policy.

Under the current world political and economic environments, it is highly important to study the case in which tariffs are imposed on only a part of the spectrum of goods that a country imports. Under the current GATT-WTO regime, a developed country is permitted to impose tariffs only on selected imports. Currently, for example, Japan imposes tariffs only on some 36 per cent of the imports;[1] and the current Japanese tariff rate is as low as 2 per cent if it is measured by the ratio between the total tariff revenue and the total volume imports. In contrast, a country can relatively easily control the degree of competition in the entire non-tradable sector, because such a policy tends to be perceived as a country's internal economic policy.

The present study constructs a simple example of a trade model in which a country can increase its own utility to just about the same extent by using optimal competition policy as optimal tariff policy if a country is permitted to impose a tariff on 36 per cent of that country's total volume of imports. Measured by the ratio between the total tariff revenue and the total value of imports, the optimal tariff rate is about 30 per cent. This implies that if, as in the Japanese case, the tariff rate that a country can possible adopt is in the range of several percent, the beggar-thy-neighbor effect of tariff policy should be much smaller than that of competition policy.

This study is not the first to recognize that competition policy may be more effective than tariff policy in creating a beggar-thy-neighbor effect on terms of trade. By using a simple example of Yano and Dei's two-country model of vertical production chain, Takahashi (2005) investigates optimal tariff in the case in which tariff is imposed on the entire import sector. She demonstrates that for various possible parameter values, the optimal tariff rates are extremely high (they are in magnitudes of several hundred per cent) and that if the tariff rate is kept at 2 per cent, its beggar-thy-neighbor effect is significantly smaller than the optimal competition policy. In her study, however, the choice of the tariff rate is ad-hoc and has no theoretical justification. In the present study, in contrast, we compare optimal tariff policy and optimal competition policy and demonstrates that competition policy can be just as effective as a tariff policy if a tariff is permitted to be imposed on only a part of the imports.

The model of this study is closely related to the highly influential model of Sanyal and Jones (1982), in which consumables are assumed to be nontradables produced from tradable middle products. Yano (2001) and Yano and Dei (2003) extend the Sanyal-Jones

[1] More precisely, the volume of imported goods on which a tariff is imposed is about 36% of total import volume.

model into models of vertical production chain, in which the retail sector's services are necessary for tradable middle products to become consumables.[2] They investigate the effect of competition policy on the retail sector in that setting.

The rest of this paper is organized as follows. In Sections 2 and 3, we introduce the basic model and explain the optimal competition policy and the optimal tariff policy for subset of tradable goods. In Section 4, we compare the extent of welfare effects between optimal competition policy and optimal tariff policy by a numerical analysis.

2. Competition Policy

In this and subsequent sections, we set up our model by extending the Yano-Dei model and, then, compare optimal competition policy with optimal tariff policy. Because the modelling and derivation of the results are explained in detail in Takahashi, Kenzaki, and Yano (2006), only a rough sketch is provided here.

In our model, three tradable middle products are produced upstream and transformed into non-tradable final consumption goods downstream. Middle product A is produced in the home country, and middle products B and C are produced in the foreign country.

The home country exports product A to the foreign country and imports products B and C from the foreign country. The home country can impose a tariff on product B but not product C. These middle products are produced upstream by using only labor with a Ricardian technology. A final consumption good, which is non-tradable, is produced downstream by using three middle products A, B and C, and labor in each country. The total labor endowment is used as inputs for producing middle products and a final consumption good F and for consumption of leisure.

In this section, we present a model in which the home government adopts competition policy and free trade. The basic structure is characterized in five equations as follows:

$$1 = wa_{LA}, \tag{1}$$

$$(1-\rho)p_F = c(1, p_B, p_C, w), \tag{2}$$

$$p_F x_F(p_F, w, u) + wx_L(p_F, w, u) = wL + \rho p_F x_F(p_F, w, u), \tag{3}$$

$$[p_B a_{BF}(1, p_B, p_C, w) + p_C a_{CF}(1, p_B, p_C, w)]x_F(p_F, w, u) = M^*(p_B), \tag{4}$$

$$p_B/a^*_{LB} = p_C/a^*_{LC}. \tag{5}$$

Equation (1) is the zero profit condition; (2) is the $MR = MC$ condition in the home downstream sector; (3) is the representative consumer's budget constraint in the home country; (4) states the trade balance between two countries; (5) is the zero profit conditions in the foreign upstream sector.

[2] See Ma (2005), Honryo and Yano (2006), and Ota (2006) for related studies.

By solving (1)–(5) with respect to five variables, u, p_F, w, p_B and p_C, we can express utility u as a function of the Lerner index, ρ. The optimal competition policy can be obtained by maximizing this function with respect to ρ. The first order condition of optimization, $\frac{du}{d\rho} = 0$, gives rises to the optimal Lerner index

$$\rho^{opt} = \frac{\xi}{\xi + e + (\eta^* - 1)}, \tag{6}$$

where ξ, e, and η^* are defined as follows.

$$\xi \equiv \frac{p_B a_{BF} + p_C a_{CF}}{c};$$

$$e \equiv -\left[\frac{p_B}{\left(a_{BF} + \frac{a^*_{LC}}{a^*_{LB}} a_{CF}\right)}\left(\frac{\partial a_{BF}}{\partial p_B} + \frac{a^*_{LC}}{a^*_{LB}} \frac{\partial a_{CF}}{\partial p_B}\right) + \frac{p_C}{\left(a_{BF} + \frac{a^*_{LC}}{a^*_{LB}} a_{CF}\right)}\left(\frac{\partial a_{BF}}{\partial p_C} + \frac{a^*_{LC}}{a^*_{LB}} \frac{\partial a_{CF}}{\partial p_C}\right)\right];$$

$$\eta^* \equiv \frac{dM^*}{dp_B} \frac{p_B}{M^*}.$$

3. Tariff Policy

In this section, we examine the case in which the home country imposes a tariff on one of the two imported goods; for B and C are imported, let good B be the good on which a tariff is imposed. The non-tradables market in the downstream sector is perfectly competitive. The basic structure is characterized in seven equations as follows.

$$1 = wa_{LA}, \tag{7}$$

$$p_F = c(1, p_B, p_C, w), \tag{8}$$

$$p_F x_F(p_F, w, u) + wx_L(p_F, w, u) = wL + tp^*_B a_{BF}(1, p_B, p_C, w)x_F(p_F, w, u), \tag{9}$$

$$[p^*_B a_{BF}(1, p_B, p_C, w) + p^*_C a_{CF}(1, p_B, p_C, w)]\, x_F(p_F, w, u) = M^*(p^*_B), \tag{10}$$

$$p_B = (1 + t)p^*_B, \tag{11}$$

$$p_C = p^*_C, \tag{12}$$

$$p^*_B / a^*_{LB} = p^*_C / a^*_{LC}. \tag{13}$$

This follows a standard model of tariff; the only difference is that, in the present setting, there are two types of home country's imported middle products, product B and C; the home government imposes a tariff on product B but not on product C. Equation (9) shows that the tariff revenue is redistributed into the home consumers, where p_B^* and p_B are respectively the world and domestic prices of product B; (11) determines the price differential for product B between the two countries; (12) shows that no price differential exists for product C between the two countries.

4. Quantitative Comparison

In this section, we compare welfare effects between competition policy and tariff policy by adopting specific utility and production functions. Assume that the utility functions are of the Stone-Geary form,

$$u = \mu \log(x_F + \gamma) + (1 - \mu)\log x_L, \tag{14}$$

$$u^* = \mu^* \log(x_F^* + \gamma^*) + (1 - \mu^*)\log x_L^*, \tag{15}$$

where $0 < \mu < 1$, $x_F + \gamma > 0$, $0 < \mu^* < 1$ and $x_F^* + \gamma^* > 0$. Assume the following unit cost functions:

$$c = \left(\frac{1}{\psi}\right)^{\psi} \left(\frac{(p_B)^{\alpha}(p_C)^{1-\alpha}}{\theta}\right)^{\theta} \left(\frac{w}{\lambda}\right)^{\lambda}; \tag{16}$$

$$c^* = \left(\frac{1}{\psi^*}\right)^{\psi^*} \left(\frac{p_B^*}{\theta^*}\right)^{\theta^*} \left(\frac{w^*}{\lambda^*}\right)^{\lambda^*}, \tag{17}$$

where parameters are non-negative and satisfy $\psi + \theta + \lambda = 1$, $\alpha \leq 1$, and $\psi^* + \theta^* + \lambda^* = 1$.

Since $\xi = \theta$ and $e = 1 - \theta$ in the present setting, given these functions, the optimal Lerner index satisfies the following formula:

$$\rho^{opt} = \frac{\theta}{\eta^*}, \tag{18}$$

and the optimal tariff rate satisfies the following formula:

$$(2\alpha\theta - 1)(1 - \alpha)\,\eta^*\,(t^{opt})^2 + [(2\alpha\theta - 1)\,\eta^* - (2\theta - 1)]\,t^{opt} - (2\theta - 1) = 0, \tag{19}$$

where

$$\eta^* = \frac{\mu^* L^* p_B^* - (1 - \psi^*)(1 - \mu^*)\,a_{LB}^*\,\gamma^* c^*}{\mu^* L^* p_B^* - (1 - \mu^*)\,a_{LB}^*\,\gamma^* c^*}. \tag{20}$$

We measure the extent to which a country's welfare is increased by a protection policy by the Laspeyres quantity index, which we call a protection rate. That is, the protection rate of optimal competition policy is given by

$$R_\rho \equiv \frac{p_F x_F^\rho + w x_L^\rho - (p_F x_F + w x_L)}{p_F x_F + w x_L}, \tag{20}$$

where x_F^ρ and x_L^ρ are, respectively, the demand for final good and that for leisure by the optimal competition policy, x_F and x_L are respectively those by no policies and p_F and w are the final good price and wage rate by no policies. The protection rate of optimal tariff policy is given by

$$R_t \equiv \frac{p_F x_F^t + w x_L^t - (p_F x_F + w x_L)}{p_F x_F + w x_L}, \tag{21}$$

where x_F^t and x_L^t are, respectively, the demand for final good and that for leisure when the tariff rate to the import value of the middle product on which a tariff is optimally set.

Let $\Theta = \dfrac{p_B^* a_{BF}}{p_B^* a_{BF} + p_C^* a_{CF}}$, which is the ratio between the value of imports on which a tariff is imposed and the total value of imports. We call this fraction, Θ, the rate of tariff coverage. In equilibrium, the rate of tariff coverage is determined as

$$\Theta = \frac{\alpha}{\alpha + (1-\alpha)(1+t)}. \tag{22}$$

We first calculate the equilibrium for the following parameter values:

$\mu = 0.4,\ \psi = 0.2,\ \theta = 0.2,\ \lambda = 0.6,\ L = 24,\ a_{LA} = 6,\ \gamma = 1;$

$\mu^* = 0.4,\ \psi^* = 0.2,\ \theta^* = 0.2,\ \lambda^* = 0.6,\ L^* = 24,\ a_{LB}^* = a_{LC}^* = 6,\ \gamma^* = 1.$

Under this setting, the protection rate of optimal competition policy becomes $R_\rho = 0.86$. Under optimal tariff policy, as (22) shows, the rate of tariff coverage Θ depends on α; optimal tariff rate t^{opt}, which is endogenously determined, depends on α as well. If $\alpha = 0.518$, $R_t = 0.86$ and $\Theta = 0.36$.

This result shows that, under the above setting, the welfare increasing effect of optimal competition policy, measured by R_ρ, is much the same as that of optimal tariff policy, measured by R_t, given that the rate of tariff coverage is kept at 0.36, which is about equal to the relative magnitude of imports on which the Japanese government imposes tariffs.[3] In order to examine the robustness of this result, we examine various equilibria for changing values of one of the four crucial parameters μ, L, a_{LA}, and γ^*.[4] Table 1 reports the protection rates in the case in which α is adjusted in such a way that the tariff coverage rate is set at $\Theta = 0.36$. As the table shows, the protection rate of optimal competition policy and that of optimal tariff policy is much the same if the tariff coverage rate is controlled at $\Theta = 0.36$.

Table 1: Comparison of Protective Effects
optimal competion policy (R_ρ), optimal tariff policy (R_t)

μ	R_ρ	R_t	L	R_ρ	R_t	a_{LA}	R_ρ	R_t	γ^*	R_ρ	R_t
0.2	0.32	0.21	12	0.75	0.57	1	0.92	1.06	0.1	1.02	1.08
0.4	0.86	0.86	24	0.86	0.86	6	0.86	0.86	1	0.86	0.86
0.6	1.04	1.55	48	0.89	1.06	12	0.82	0.77	3	0.32	0.26
0.8	0.79	2.20	120	0.90	1.23	18	0.79	0.71	6	0.003	0.002

Table 2 summarizes tariff rates measured in terms of the ratio between the tariff revenue and the total value of imports in the equilibrium under optimal tariff summarized in Table 1, i.e.,

$$T^{opt} = \frac{t^{opt}\, p_B^* a_{BF}\, x_F}{(p_B^* a_{BF} + p_C^* a_{CF})\, x_F} .$$

As this table shows, these tariff rates are about 30 per cent.

These results show that tariff policy may not be as effective as a beggar-thy-neighbor policy as competition policy if tariffs are permitted only on selected imports and at sufficiently low rates.[5]

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[3] According to *Zaisei Kinyu Toukei Geppou* 640, the ratio between the value of imported goods on which tariffs are imposed and the total value of imports in fiscal year 2003 and in fiscal year 2004 is 0.351 and 0.371 respectively, in Japan.

[4] The home country's marginal propensity to consume the final good μ determines the shape of the home country's utility function. The total labor endowment L determines the shape of the home country's production possibility frontier. The labor input coefficient in the home upstream sector a_{LA} determines the home country's wage rate, w. The foreign subsistence level of the final good γ^*determines the shape of the foreign offer curve.

[5] It is an interesting issue to investigate the relationship between the effective tariff rate, T^{opt}, and the rate of tariff coverage, Θ. A study of this issue, which is beyond the space limit for this study, is presented in a separate paper (see Takahashi, Kenzaki, and Yano, 2006). That study shows, for example, that Θ must be about 3.5% in order to keep the effective tariff rate at 2%, which is the current Japanese effective tariff rate.

Table 2 : Effective Tariff Rates, T^{opt}(%)

μ	T^{opt}	L	T^{opt}	a_{LA}	T^{opt}	γ^{*}	T^{opt}
0.2	30.41	12	31.08	1	34.55	0.1	37.48
0.4	32.65	24	32.65	6	32.65	1	32.65
0.6	33.39	48	33.63	12	31.59	3	16.45
0.8	33.80	120	34.53	18	30.83	6	1.25

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