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# ENDOGENOUS PROTECTION, PRODUCT QUALITY AND CONSUMERS' WELFARE IN OLIGOPOLY

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*Abstract*: This paper examines the quality choice by home and foreign firms in the first period in a two period oligopoly when the government of the home country may implement some protection policy in the second period, the level of which depends on the volume of imports in the first period. I will show that when the effect of the protection policy by the home country on the profits of the foreign firms is larger than that on the profits of the home firms, the quality of the foreign (or home) products in the first period with endogenous protection is lower (or higher) than without it. When the effect of the protection policy by the home country on the profits of the home firms is larger than that on the profits of the foreign firms, we have the converse result. Further I will show that endogeneity of the protection policy decreases the average consumers' welfare in the first period compared to the case without endogeneity.

## 1. INTRODUCTION

The level or probability implementation of protection policies by the home country such as tariffis and quotas to foreign firms and subsidies to home firms may depend on the conduct and performance of the firms, that is, the protection policies may be endogenous. Such endogeneity of protection policies may be due to lobbying activities of interest groups. For example, we may consider that the larger the market share of an imported good is, the stronger the lobbying activity is. Bhagwati and Srinivasan (1976) examined the case of an exporting country that faces a possible quota imposed by the importing country under perfect competition, and showed that exports decrease if the exporting country takes into account the probability of a quota. More recently Fischer (1992) studied the effects of endogenous probability of protection in a duopoly.

In this paper I examine the quality choice by home and foreign firms in the first period in a two period oligopoly when the government of the home country may implement some protection policy in the second period, the level of which

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depends on the volume of imports in the first period. I use a two period model of monopolistic competition on a circle according to Salop (1979) in which home and foreign firms produce differentiated products, and I allow that the quality of the products is endogeneously determined by the firms.[1] The firms choose the price and quality of their products in the first period taking into account the protection policy by the home government in the second period. The government of the home country chooses the level of some protection measure in the second period, which depends on the volume of imports in the first period.

In Section 2, I present the model and consider the conditions for Nash equilibrium. In Section 3, I examine the effects of endogenous protection in the second period on the quality of the products in the first period. I will show the following results. When the effect of the protection policy by the home country on the profits of the foreign firms is larger than that on the profits of the home firms, the quality of the foreign (or home) products in the first period with endogenous protection is lower (or higher) than without it, and the market share of the foreign (or home) firms in the first period with endogenous protection is smaller (or larger) than without it. When the effect of the protection policy by the home country on the profits of the home firms is larger than that on the profits of the foreign firms, we have the converse results. In section 4, I will show that endogeneity of the protection policy decreases the average consumers' welfare in the first period compared to the case without endogeneity. Section 5 concludes this paper.

## 2. THE MODEL AND NASH EQUILIBRIUM

Consider two countries, the home country and the foreign country, and an oligopolistic industry in which firms produce differentiated products whose quality is endogenously determined. There are $n$ home firms and $n$ foeign firms. For simplicity I consider only the home market. The (products of the) firms and (most preferred products of) a continum of uniformly distributed consumers locate along a circle of unit circumference. According to Dornbusch (1987), I assume that the (products of the) home and foreign firms alternate along the circle. $2n$ firms are equally spaced, so each two firms are separated by the distance $1/2n$.[2] Consider a two period model. Firms choose the price and quality of their products in the first period taking into account the protection policy by the home government in the second period. The goverment of the home country chooses the level of some protection measure such as a tariff or a quota to the foreign firms, or a subsidy to the home firms in the second period, which depends on the volume of imports of the foreign products in the first period.

Consider the optimization conditions for consumers and firms in the first period.

[1] Salop's model with exogeneous product quality has been applied to international economic problem by Dornbusch (1987) to analyze the effects of exchange rate movements on the prices of products.

[2] Reitzes (1992), using a similar model, studies quality choice by firms in an international duopoly.

Let the price of the product of a home firm $p$, and the price of the product of a foreign firm $p^*$. Each consumer buys a single, non divisible unit of a differentiated product from one or the other of the first adjacent to his preferred location. Consumers can observe the quality of the product.[3] The surplus for a consumer derived from buying a product supplied by a home firm that is a distance $d$ from the best location on the circle for this consumer depends on the price and quality of the product and the distance. The relationship is represented by

$$v = h(q) - td - p$$

where $h(q)$ represents the utility for consumers derived from consuming a product whose quality is $q$ ($>0$), and $t$ ($>0$) denotes the utility cost per unit distance from the consumer's best location. I assume

$$h'(q) > 0 \quad \text{and} \quad h''(q) < 0$$

Similarly, the consumer's surplus derived from buying a product supplied by a foreign firm that is a distance $d$ from the best location for the consumer is

$$v^* = h(q^*) - td - p^*$$

where $q^*$ ($>0$) is the quality of the foreign product.

Denote by $x_1$ the distance between a product of a home firm and a consumer for whom the product of this firm and the product of one of the adjacent firm, that is a foreign firm, are indifferent. Then, denoting the price and quality of the product of this home firm by $p$ and $q$, and the price and quality of the adjacent foreign firm by $p_1$ and $q_1$, we have the following relationship:

$$h(q) - p - tx_1 = h(q_1) - p_1 - t\left(\frac{1}{2n} - x_1\right)$$

From this we obtain

$$x_1 = \frac{1}{2t}[h(q) - h(q_1) - p + p_1] + \frac{1}{4n} \tag{1}$$

$x_1$ represents the market segment for this home firm in one direction. Similarly, let $x_2$ denote the distance between this home firm and a consumer for whom the product of this firm and the product of another adjacent foreign firm are indifferent. Then we obtain

$$x_2 = \frac{1}{2t}[h(q) - h(q_2) - p + p_2] + \frac{1}{4n} \tag{2}$$

where $p_2$ and $q_2$ are the price and quality of the product of this adjacent foreign firm.

[3] In this paper I do not consider imperfect observability of quality or imperfect information. Some authors have studied trade and trade policy problems under imperfect observability of quality. See, for example, Donnenfeld (1986) and Falvey (1989).

From (1) and (2) we have

$$\frac{\partial x_1}{\partial p}=\frac{\partial x_2}{\partial p}=-\frac{1}{2t}$$

and

$$\frac{\partial x_1}{\partial q}=\frac{\partial x_2}{\partial q}=\frac{1}{2t}h'(q)$$

Similarly, we can obtain the market segment for a foreign firm in each direction as follows:

$$x_1^*=\frac{1}{2t}[h(q^*)-h(q_1^*)-p^*+p_1^*]+\frac{1}{4n} \tag{3}$$

and

$$x_2^*=\frac{1}{2t}[h(q^*)-h(q_2^*)-p^*+p_2^*]+\frac{1}{4n} \tag{4}$$

where $p_1^*$, $p_2^*$, $q_1^*$ and $q_2^*$ are the prices and quality of the products of the adjacent home firms of this foreign firm. From (3) and (4) we obtain

$$\frac{\partial x_1^*}{\partial p^*}=\frac{\partial x_2^*}{\partial p^*}=-\frac{1}{2t}$$

and

$$\frac{\partial x_1^*}{\partial q^*}=\frac{\partial x_2^*}{\partial q^*}=\frac{1}{2t}h'(q^*)$$

I assume that all home fims have the same cost function, and all foreign firms have the same cost function.

The cost function for a home firm is described by

$$c(q)(x_1+x_2)+f(q)$$

where $x_1+x_2$ is the output of this home firm which equals its total market segment. $c(q)$ is unit production cost which depends on the quality of the product, and $f(q)$ is fixed cost which is unrelated to production, but depends on the quality of the product. Similarly, the cost function for a foreign firm is

$$c^*(q^*)(x_1^*+x_2^*)+f^*(q^*)$$

where $x_1^*+x_2^*$ is the output of this foreign firm.

I assume

$$c'(q)>0\,,\quad c''(q)\geq 0\,,\quad c'^*(q^*)>0\quad\text{and}\quad c''^*(q^*)\geq 0$$

and

$$f'(q)>0\,,\quad f''(q)\geq 0\,,\quad f'^*(q^*)>0\quad\text{and}\quad f''^*(q^*)\geq 0$$

The marginal production cost for each home or foreign firm given the quality of its product is constant, but the cost for quality increment is increasing and convex with respect to the quality. The fixed cost is increasing and convex with respect to the quality.

The profit of a home firm over two periods is represented by

$$\pi=(x_1+x_2)[p-c(q)]-f(q)+\bar{\pi}(\tau)$$

The profit of a foreign firm over two periods is

$$\pi^*=(x_1^*+x_2^*)[p^*-c^*(q^*)]-f^*(q^*)+\bar{\pi}^*(\tau)$$

where $\bar{\pi}$ and $\bar{\pi}^*$ are the discounted value of the profit of a home firm and that of a foreign firm in the second period, and $\tau$ denotes the level of some protection measure by the government of the home country which will be implemented in the second period. If the protection policy is endogeneously determined, $\tau$ is increasing in the volume of imports of the foreign products in the first period. Denoting

$$\tau=\tau(X)$$

where

$$X=n(x_1^*+x_2^*)\,,\qquad \tau_X>0$$

$X=2nx^*$ in a symmetric Nash equilibrium which will be considered below. $\tau_X$ is the partial derivative. It represents the response of the protection policy in the second period to the volume of imports in the first period, and it is the degree of endogeneity of the protection policy. Further I assume that $\tau_X$ depends on some variably $Y$. It summarizes, for example, the political conditions for the protection policy which causes endogeneity of the protection policy. Thus we have $\tau_X=\tau_X(Y)$ and $\tau_{XY}>0$, which is the partial derivative of $\tau_X$. The larger $Y$ is, the more endogenous the protection policy is. When $Y=0$, we have $\tau_X=0$, and the protection policy is not endogenous.

The profit of a foreign firm in the second period is decreasing in $\tau$, and the profit of a home firm in the second period is increasing in $\tau$. Denote

$$\phi=\frac{\partial\bar{\pi}}{\partial\tau}>0\quad\text{and}\quad\phi^*=\frac{\partial\bar{\pi}^*}{\partial\tau}<0$$

I assume that $\phi$ and $\phi^*$ are approximately constant, and their derivatives are negligible.

Denote

$$\Gamma=\phi+\phi^*$$

It seems that the effects of tariffs and quotas on the profits of the foreign firms

are larger than those on the profits of the home firms, and subsidies to the home firms have the converse effects. Then $\Gamma<0$ with tarifis and quotas, and $\Gamma>0$ with subsidies.

The price and quality of a home firm, $p$ and $q$, enter (3) and (4) as $p_1^*$, $p_2^*$, $q_1^*$ and $q_2^*$. From (3) and (4) we obtain

$$\tau_p=\frac{\partial\tau}{\partial p}=\frac{1}{t}\tau_X$$

$$\tau_q=\frac{\partial\tau}{\partial q}=-\frac{1}{t}h'(q)\tau_X$$

$$\tau_{p^*}=\frac{\partial\tau}{\partial p^*}=-\frac{1}{t}\tau_X$$

and

$$\tau_{q^*}=\frac{\partial\tau}{\partial q^*}=\frac{1}{t}h'(q^*)\tau_X$$

These are the effects of the price and quality of one home or foreign firm's good in the first period on the protection in the second period.

Each home or foreign firm simultaneously chooses the price and quality of its product in the first period given the prices and quality of the producs of all other firms taking into account the effects of its behavior on its profit in the second period through the protection policies by the home government.

The first order conditions for the optimal price and quality choice for a home firm are

$$\frac{\partial\pi}{\partial p}=(x_1+x_2)-\frac{1}{t}[p-c(q)]+\frac{1}{t}\phi\tau_X=0 \tag{5}$$

and

$$\frac{\partial\pi}{\partial q}=\frac{1}{t}[p-c(q)]h'(q)-(x_1+x_2)c'(q)-f'(q)-\frac{1}{t}h'(q)\phi\tau_X=0 \tag{6}$$

Similarly, the first order conditions for the optimal price and quality choice for a foreign firm are

$$\frac{\partial\pi^*}{\partial p^*}=(x_1^*+x_2^*)-\frac{1}{t}[p^*-c^*(q^*)]-\frac{1}{t}\phi^*\tau_X=0 \tag{7}$$

and

$$\frac{\partial\pi^*}{\partial q^*}=\frac{1}{t}[p^*-c^*(q^*)]h'(q^*)-(x_1^*+x_2^*)c'^*(q^*)-f'^*(q^*)$$
$$+\frac{1}{t}h'(q^*)\phi^*\tau_X=0 \tag{8}$$

From (5) we have

$$p=c(q)+t(x_1+x_2)+\phi\tau_X \tag{9}$$

Substituting this into (6), we obtain

$$(x_1+x_2)[h'(q)-c'(q)]-f'(q)=0 \tag{10}$$

Similarly, for a foreign firm, from (7) and (8) we obtain

$$p^*=c^*(q^*)+t(x_1^*+x_2^*)-\phi^*\tau_X \tag{11}$$

and

$$(x_1^*+x_2^*)[h'(q^*)-c'^*(q^*)]-f'^*(q^*)=0 \tag{12}$$

From (10) we find

$$h'(q)-c'(q)>0 \tag{13}$$

Similarly, for a foreign firm, we get

$$h'(q^*)-c'^*(q^*)>0 \tag{14}$$

The second order conditions for a home firm are

$$\frac{\partial^2\pi}{\partial p^2}=-\frac{2}{t}<0,$$

$$\frac{\partial^2\pi}{\partial q^2}=(x_1+x_2)[h''(q)-c''(q)]-f''(q)-\frac{2}{t}h'(q)c'(q)<0$$

and

$$\left(\frac{\partial^2\pi}{\partial p^2}\right)\left(\frac{\partial^2\pi}{\partial q^2}\right)-\left(\frac{\partial^2\pi}{\partial pq}\right)^2=-\frac{2}{t}\left\{(x_1+x_2)[h''(q)-c''(q)]+\frac{1}{2t}[h'(q)-c'(q)]^2-f''(q)\right\}>0 \tag{15}$$

where

$$\frac{\partial^2\pi}{\partial pq}=\frac{1}{t}[h'(q)+c'(q)]$$

Similarly, the second order conditions for a foreign firm are

$$\frac{\partial^2\pi^*}{\partial p^{*2}}=-\frac{2}{t}<0,$$

$$\frac{\partial^2\pi^*}{\partial q^{*2}}=(x_1^*+x_2^*)[h''(q^*)-c''^*(q^*)]-f''^*(q)-\frac{2}{t}h'(q^*)c'^*(q^*)<0$$

and

$$\left(\frac{\partial^2\pi^*}{\partial p^{*2}}\right)\left(\frac{\partial^2\pi^*}{\partial q^{*2}}\right)-\left(\frac{\partial^2\pi^*}{\partial p^*q^*}\right)^2=-\frac{2}{t}\left\{(x_1^*+x_2^*)[h''(q^*)-c''^*(q^*)]\right.$$
$$\left.+\frac{1}{2t}[h'(q^*)-c'^*(q^*)]^2-f''^*(q^*)\right\}>0 \quad (16)$$

where

$$\frac{\partial^2\pi^*}{\partial p^*q^*}=\frac{1}{t}[h'(q^*)+c'^*(q^*)]$$

Since all home firms and all foreign firms, respectively, have the same cost function, in an Nash equilibrium the quality and prices of all home products are equal, and the quality and prices of all foreign products are equal, and the market segments for all home firms in each direction are equal, and the market segments for all foreign firms in each direction are equal. That is, the equilibrium is symmetric. I assume that there exists a unique and stable symmetric Nash equilibrium in this market in which the prices and quality of the home and foreign products are positive and bounded.

Denoting the equilibrium price and quality of the home products by $p$ and $q$, those of the foreign products by $p^*$ and $q^*$, and the equilibrium market segments for the home and foreign firms by $x$ and $x^*$, we have $p_1=p_2=p^*$, $p_1^*=p_2^*=p$, $q_1=q_2=q^*$, $q_1^*=q_2^*=q$, $x_1=x_2=x$ and $x_1^*=x_2^*=x^*$. Then, in an equilibrium, from (1), (2), (3) and (4) with some calculations, we obtain

$$2x=\frac{1}{3t}[h(q)-h(q^*)-c(q)+c^*(q^*)-\Gamma\tau_X]+\frac{1}{2n} \quad (17)$$

Similarly, for a foreign firm, we obtain

$$2x^*=\frac{1}{3t}[h(q^*)-h(q)-c^*(q^*)+c(q)+\Gamma\tau_X]+\frac{1}{2n} \quad (18)$$

From (10) and (12) with (17) and (18), we obtain

$$[h'(q)-c'(q)]\left\{\frac{1}{3t}[h(q)-h(q^*)-c(q)+c^*(q^*)-\Gamma\tau_X]+\frac{1}{2n}\right\}-f'(q)=0 \quad (19)$$

and

$$[h'(q^*)-c'^*(q^*)]\left\{\frac{1}{3t}[h(q^*)-h(q)-c^*(q^*)+c(q)+\Gamma\tau_X]+\frac{1}{2n}\right\}-f'^*(q^*)=0 \quad (20)$$

We can obtain the equilibrium quality of the products from (19) and (20).

From (19) and (20) the stability condition for the Nash equilibrium is obtained as follows,

$$AC-B^2>0$$

where

$$A=\left\{\frac{1}{3t}[h(q)-h(q^*)-c(q)+c^*(q^*)-\Gamma\tau_X]+\frac{1}{2n}\right\}[h''(q)-c''(q)]$$
$$+\frac{1}{3t}[h'(q)-c'(q)]^2-f''(q)$$

$$B=-\frac{1}{3t}[h'(q)-c'(q)][h'(q^*)-c'^*(q^*)]$$

and

$$C=\left\{\frac{1}{3t}[h(q^*)-h(q)-c^*(q^*)+c(q)+\Gamma\tau_X]+\frac{1}{2n}\right\}[h''(q^*)-c''^*(q^*)]$$
$$+\frac{1}{3t}[h'(q^*)-c'^*(q^*)]^2-f''^*(q^*)$$

We find $A<0$ and $C<0$ from (15) and (16), and $B<0$ from (13) and (14).

## 3. THE QUALITY EFFECTS OF ENDOGENOUS PROTECTION

In this section I examine the effects of endogeneous protection in the second period on the quality of the products in the first period. I consider endogeneity of the protection policies by examining the effects of an increase in $Y$. An increase in $Y$ implies that the foreign country becomes more protective.

Differentiating (19) and (20) with respect to $Y$, we obtain

$$\begin{pmatrix} A & B \\ B & C \end{pmatrix}\begin{pmatrix} dq \\ dq^* \end{pmatrix}=\frac{1}{3t}\begin{pmatrix} \Gamma\tau_{XY}[h'(q)-c'(q)] \\ -\Gamma\tau_{XY}[h'(q^*)-c'^*(q^*)] \end{pmatrix}dY \tag{21}$$

Solving (21) yields

$$\frac{dq}{dY}=\frac{1}{3y\Delta}\{[h'(q)-c'(q)]C+[h'(q^*)-c'^*(q^*)]B\}\Gamma\tau_{XY} \tag{22}$$

and

$$\frac{dq^*}{dY}=-\frac{1}{3t\Delta}\{[h'(q^*)-c'^*(q^*)]A+[h'(q)-c'(q)]B\}\Gamma\tau_{XY} \tag{23}$$

where

$$\Delta=AC-B^2>0$$

We find that when $\Gamma<0$, (22) is positive and (23) is negative, and when $\Gamma>0$,

(22) is negative and (23) is positive. $\Gamma<0$ means that the effect of the protection policy by the home country on the profits of the foreign firms is larger than that on the profits of the home firms, and $\Gamma>0$ means that the effect of the protection policy by the home country on the profits of the home firms is larger than that on the profits of the foreign firmes. Then we obtain.

PROPOSITION 1. *When the effect of the protection policy by the home country on the profits of the foreign firms is larger than that on the profits of the home firms, the quality of the foreign (or home) products in the first period with endogenous protection is lower (or higher) than without it. When the effect of the protection policy by the home country on the profits of the home firms is larger than that on the profits of the foreign firms, we have the converse result.*

From (17) and (18) with $x_1=x_2=x$ and $x_1^*=x_2^*=x^*$, we have

$$\frac{dx}{dY}=\frac{1}{6t}[h'(q)-c'(q)]\frac{dq}{dY}-\frac{1}{6t}[h'(q^*)-c'^*(q^*)]\frac{dq^*}{dY}-\frac{1}{6t}\Gamma\tau_{XY} \quad (24)$$

and

$$\frac{dx^*}{dY}=\frac{1}{6t}[h'(q^*)-c'^*(q^*)]\frac{dq^*}{dY}-\frac{1}{6t}[h'(q)-c'(q)]\frac{dq}{dY}+\frac{1}{6t}\Gamma\tau_{XY} \quad (25)$$

We find that when $\Gamma<0$, (24) is positive and (25) is negative, and when $\Gamma>0$, (24) is negative and (25) is positive. Summarizing the result,

PROPOSITION 2. *When the effect of the protection policy by the home country on the profits of the foreign firms is larger than that on the profits of the home firms, the market share of the foreign (or home) firms in the first period with endogenous protection is smaller (or larger) than without it. When the effect of the protection policy by the home country on the profits of the home firms is larger than that on the profits of the foreign firms, we have the converse result.*

## 4. THE ENDOGENOUS PROTECTION POLICY AND CONSUMERS' WELFARE

Next consider the effect of endogeneity of the protection policy on consumers' welfare. Let evaluate the effect of small endogeneity at the no endogeneity case. And I assume that the cost function of the home firms and that of the foreign firms are the same. Denote them as $c(q)$ and $c(q^*)$. Then without endogeneity of protection the Nash equilibrium is fully symmetric, and we have $q=q^*$, $x=x^*$ and $\tau_X=0$.[4]

Using (9) and (11), consumers' surplus of the home good and that of the foreign good, $v$ and $v^*$, are rewritten as follows,

[4] But $\tau_{XY}$ is not zero.

$$v = h(q) - c(q) - td - 2tx - \phi\tau_X$$

and

$$v^* = h(q^*) - c(q^*) - td - 2tx^* + \phi^*\tau_X$$

The average consumers' surplus is represented as

$$CS = 2n\int_0^x [h(q) - c(q) - td - 2tx - \phi\tau_X]dd + 2n\int_0^{x^*} [h(q^*) - c(q^*) - td^* - 2tx^* + \phi^*\tau_X]dd^*$$

where we have $x + x^* = 1/2n$. Calculating this equation, we get

$$CS = 2n\left\{[h(q) - c(q) - \phi\tau_X]x - \frac{5}{2}tx^2 + [h(q^*) - c(q^*) + \phi^*\tau_X]x^* - \frac{5}{2}tx^{*2}\right\}$$

Differentiating $CS$ with respect to $Y$,

$$\frac{dCS}{dY} = 2n[h(q) - c(q) - \phi\tau_X]\frac{dx}{dY} + 2nx\left\{[h'(q) - c'(q)]\frac{dq}{dY} - \phi\tau_{XY}\right\} - 5tx\frac{dx}{dY} + 2n[h(q^*) - c(q^*) + \phi^*\tau_X]\frac{dx^*}{dY} + 2nx^*\left\{[h'(q^*) - c'(q^*)]\frac{dq^*}{dY} + \phi^*\tau_{XY}\right\} - 5tx^*\frac{dx^*}{dY} \tag{26}$$

When $q = q^*$, $x = x^*$ and $\tau_X = 0$, we obtain

$$\frac{dq}{dY} = -\frac{dq^*}{dY} \quad \text{and} \quad \frac{dx}{dY} = -\frac{dx^*}{dY}$$

Substituting $q = q^*$, $x = x^*$ and $\tau_X = 0$ into (26), we find

$$\frac{dCS}{dY} = 2nx(-\phi + \phi^*)\tau_{XY} = \frac{1}{2}(-\phi + \phi^*)\tau_{XY} \tag{27}$$

Since $\phi > 0$ and $\phi^* < 0$, (27) is unambiguously negative. Thus we obtain

PROPOSITION 3. *Endogeneity of the protection policy decreases the average consumers' welfare in the first period compared to the case without endogeneity.*

From (9) and (11) we know that the prices of the goods with equal quality under the endogenous protection policy is higher than those under no endogeneity. Therefore consumers' welfare is decreased by endogeneity of the protection policy.

## 5. CONCLUSION

The foreign firms have incentives to reduce their market share in the first period to make the protection policy by the home country in the second period softer. The home firms also have incentives to reduce their market share in the first period to make the protection policy by the home country in the second period harder. Therefore the price and quality choices by the firms in the first period with endogeneous protection depend on whether the protection policy by the home country in the second period affects the profits of the foreign firms more or less than the profits of the home firms. From the results of this paper we can consider that tariffs and quotas to the foreign firms lower the quality of the foreign products, and raise the quality of the home products, and subsidies to the home firms have the converse effects.

And I have shown that endogeneity of the protection policy decreases consumers' welfare because the prices of the goods are higher under endogeneity. The higher price of the home good in the first period leads to larger import in the first period and harder protection in the second period. On the other hand the higher price of the foreign good in the first period leads to smaller import in the first period and softer protection in the second period. Therefore both home and foreign firms have incentives to set higher prices in the first period.

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