E C O N O M I C S B U L L E T I N

Strategic Trade Policy in Bargaining over Managerial Delegation Competition

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Abstract

In this paper, we assess the influence of the generalized Nash bargaining model on strategic trade policies. In particular, how the trade policy and the bargaining process over managerial contract are strategically connected within the context of bargaining over the sales delegation model is analyzed. We explore the policy impacts in two different models: the export rivalry model and the import-competing model, and show that the introduction of managers' bargaining process leads to a decrease in the export subsidy and optimal tariff in different models.

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1. Introduction

Strategic managerial delegation research started with Vickers (1985), Fershtman and Judd (1987) and Sklivas (1987) (henceforth VFJS). It is meaningful to understand how trade policy will be affected by intra-firm incentive schemes, and in particular, to see how optimal trade policy may be designed in light of changes in managerial incentive contracts. Das (1997) and Colonques (1997) extended Brander and Spencer (1984, 1985) by adopting sales delegation specification, to study strategic trade policy in the context of delegated firms. They concluded that strategic trade policy under delegation results in lower levels of the trade policy instruments. Bandyopadhyay and Bandyopadhyay (2001) presented an efficient bargaining model and analyzed the welfare effects of unionization, where rival exporting governments employ strategic export policy.

Strategic delegation analysis was hitherto limited to sales delegation cases, until Jansen et al. (2007) and Ritz (2008) presented the case of market share delegation. They pointed out that the manager's objectives not only focus on sales revenue, but on product market share rate as well. Wang et al., (2008) assess the influence upon optimal trade policy of introducing market share delegation in a trade duopoly context. It shows that delegation matters, and different forms of delegation coupled with asymmetric costs will imply different degrees of government intervention.

Along with the market expansion of global capitalism, the problem with globalization is that the state intends to "capture" the overseas market by using production subsidies as instruments to support exporting firms in shifting foreign profit, as well as to "protect" the domestic market by imposing tariffs against foreign exporters. It is well-known that the rationale for such "monopoly power" of the state on strategic trade policy is owed to profit-shifting motives. In the name of corporate capitalism, power separation prevails between the owner and manager in large corporations, where different delegation contracts with or without bargaining are being implemented and analyzed. The incentive of delegation to managers by the owners is a profit-shifting mechanism, which will reduce the scale of intervention by the government. The new element here is the bargaining scheme, and due to that, the authorities give some power to managers, and they may play a role as partners under a tendency towards trade liberalization. In such global corporate capitalist models, shouldn't less government intervention be expected?

In this paper, we look at the influence of the generalized Nash bargaining model on strategic trade policies. In particular, it analyzes how the trade policy and the bargaining process over managerial contract are strategically connected within the context of bargaining over the sales delegation model *á la* Van Witteloostuijn et al., (2007) which integrates bargaining process and the managerial contracts in delegation game[1]. The timing of our model is that the government adopts trade policy in the first stage. In the second stage, the owners negotiate with their managers about executive remuneration in the sales delegation game. Finally, in the third stage, the managers decide on the output level of their firms.

We first explore the export rivalry model where a homogeneous good is produced

[1] Van Witteloostuijn et al., (2007) examined in the sales delegation case how profits and social welfare depend on managerial power, which has been extended by Nakamura (2008), Kamaga and Nakamura (2008) for examining the implications of sequential move and product differentiation respectively.

by two different firms, each located in a different country, and exporting to a third country. Subsequently, in an import-competing model, both home and foreign firms sell homogeneous goods in the home country. The home government imposes a specific tariff on the foreign firm to support the development of its industry. Given that the issue about the relationship between optimal-welfare tariff and maximum-revenue tariff has attracted scholarly attention, we study two cases: the home government may seek to maximize either national welfare, or tariff revenue. We compare our results with the Das (1997) model without bargaining process, and show that the introduction of managers' bargaining process leads to a decrease in the export subsidy and optimal tariff in different models. In the export rivalry model, we demonstrate that the optimal subsidy difference is scaled-down by the bargaining power on the marginal cost difference. In an import-competing model, we derive the finding that the manager's bargaining power is negatively associated with the specific tariff. Furthermore, we rank the optimal tariffs under managerial delegation with and without bargaining stage, and simple Cournot game.

The remainder of this paper is organized as follows. Section 2 sets up the export rivalry model and presents the equilibrium values. Section 3 examines the import-competing model in the tariff revenue maximization case and national welfare cases. Section 4 concludes the paper.

2. The Export Rivalry Model

We analyze the market for homogeneous goods that are produced by two different firms, each located in a different country, indexed 1 and 2 respectively. The marginal production cost of firm i is constant at $c_i < 1$, $i = 1, 2$. Both firms sell products in a third country's market, and the inverse demand is given by p=1-Q, where $Q = q_1 + q_2$ is the total output of the two firms. Country 1 and 2's governments provide specific export subsidies, s_i, $i = 1, 2$, to their producers. Assume that the owners of both firms hire a manager and delegate the output decision to that manager. Each manager receives a fixed salary and a bonus which is based on a weighted sum of profits and sales revenue (sales delegation), $u_i = \pi_i + w_i q_i$, where $\pi_i = (p - c_i)q_i + s_i q_i$ denotes the profits of the i th firm and the weight w_i is a non-negative number. The bargaining process is modeled by means of the generalized Nash bargaining solution: $B_i = u_i^{\beta} \pi_i^{1-\beta} = q_i^{2\beta}(q_i^2 - w_i q_i)^{1-\beta}$, and $\beta \in [0,1)$ is a measure for the relative bargaining power of the manager.

We propose a three-stage game with the following timing. In the first stage, the exporting countries decide on the optimal subsidy to maximize its welfare: $SW_i = \pi_i - s_i q_i$. The second stage is the bargaining process. Then, in the last stage, the managers simultaneously and independently choose their outputs. We assume that how the firms choose output levels follows the policy decisions that are committed by their respective governments. We solve the game by applying backward induction from the last stage of the game to obtain a Subgame Perfect Nash Equilibrium (SPNE).

Stage 3: Managers choose the output to maximize their remuneration:

$$u_i = \pi_i + w_i q_i = [(1 - c_i + s_i) - Q + w_i]q_i . \quad (1)$$

Maximizing Equation (1), we get

$$\begin{cases} \dfrac{\partial u_1}{\partial q_1} = 0 \\ \dfrac{\partial u_2}{\partial q_2} = 0 \end{cases} \Leftrightarrow \begin{cases} q_1 = \dfrac{1}{3}(1 - 2c_1 + c_2 + 2s_1 - s_2 + 2w_1 - w_2) \\ q_2 = \dfrac{1}{3}(1 - 2c_2 + c_1 + 2s_2 - s_1 + 2w_2 - w_1) \end{cases}. \tag{2}$$

From the above equations, we can easily deduce the following results:

$$u_i = q_i^2$$
$$\pi_i = u_i - w_i q_i = q_i^{\,2} - w_i q_i \quad \text{for} \quad i = 1, 2 .$$

Stage 2: The bargaining stage,

$$B_i = u_i^{\beta} \pi_i^{1-\beta} = q_i^{2\beta} (q_i^2 - w_i q_i)^{1-\beta} . \tag{3}$$

According to the following first-order conditions,

$\dfrac{\partial B_i}{\partial w_i} = 0 \Leftrightarrow [-(1+\beta) w_i + 2q_i] \dfrac{\partial q_i}{\partial w_i} - (1-\beta) q_i = 0$, we have the expressions of w_i and q_i, which are function of s_i and s_j.

Stage1: The policy stage,

$$SW_i = (\pi_i - s_i q_i) = (1 - c_i - Q) q_i . \tag{4}$$

The specific subsidy s_i provided for the firms will decrease their marginal cost. We then redefine $c_i' = c_i - s_i$, $i = 1, 2$, and use the results deduced from the first-order conditions of the above stages to obtain the following equilibrium outcomes:

$$q_{iC}^B = \frac{(3+\beta)(1-\beta-4c_i+(3+\beta)c_j)}{(7+\beta)(1-\beta)},$$
$$w_{iC}^B = \frac{(3+\beta)(1+3\beta)(1-\beta-4c_i+(3+\beta)c_j)}{2(1-\beta)(1+\beta)(7+\beta)}, \tag{5}$$
$$s_{iC}^B = \frac{(1-\beta)(1-\beta-4c_i+(3+\beta)c_j)}{2(1+\beta)(7+\beta)}.$$

The superscript *B* denotes competition in incentive with bargaining process and the subscript *C* denotes Cournot competition among the managers.

De Meza (1986) pointed out that the lower a firm's marginal cost, the higher subsidy its country will offer, which implies that the low-cost firm will have an even larger market share after subsidization. It is meaningful to examine the relationship between the difference in optimal subsidies and that in marginal costs.

Assume that the firm i has a lower marginal cost, $c_i < c_j$, then

$$s_{iC}^B - s_{jC}^B = \frac{(1-\beta)(c_j - c_i)}{2(1+\beta)} > 0 .$$

As noted in Mai and Hwang (1988, p.281), "provided the demand curve is linear, the optimal subsidy difference is equal to the marginal cost difference". Introducing the bargaining power in our model reduces the scale of optimal subsidy difference, but

the power reinforces the owner's incentive difference and accordingly enlarges the output difference.[2]

The optimal subsidy with sales delegation in Das (1997), denoted by superscript I, is $s_{iC}^{I} = (1/14)(1-4c_i+3c_j)$ and that in a simple Cournot game without delegation is $s_{iC} = (1/5)(1-3c_i+2c_j)$. We can clearly see that

$$\begin{cases} s_{iC}^{B} = s_{iC}^{I} < s_{iC}, & when \quad \beta = 0 \\ s_{iC}^{B} < s_{iC}^{I} < s_{iC}, & when \quad \beta > 0 \end{cases}. \tag{6}$$

In the absence of bargaining process, $\beta = 0$, we have the results as shown in Das (1997). When the bargaining power approaches one, it appears from (5) that the subsidy goes to zero, i.e. $\lim_{\beta \to 1} s_{iC}^{B} = 0$.[3]

Proposition 1: The optimal export subsidy with the bargaining process is less than the result without bargaining process, and the export subsidy in the simple Cournot equilibrium is the highest.

3. The Import-Competing Model

The import tariff rate may be determined through revenue maximization rather than the national welfare maximization, which reflects the operation of an inefficient tax system in many developing countries.

Johnson (1951-1952) demonstrated that the maximum-revenue tariff exceeds the optimum-welfare tariff. Brander and Spencer (1984) have shown that a tariff has a profit-shift effect besides its effect on consumer surplus and tariff revenue. Collie (1991), and Clarke and Collie (2006) further demonstrated that optimum-welfare tariff may exceed the maximum-revenue tariff under both Cournot and Bertrand duopoly.

In the import-competing model, both home (indexed h) and foreign (indexed f) firms sell homogeneous products in the home country. The inverse demand function of the home country is $p = 1 - Q$. Each firm produces the good at constant marginal cost $c_f, c_h < 1$; subscripts f and h denote the foreign and home firm respectively. In order to support the home country's industries, government tends to protect domestic industries through adopting a variety of trade policies, such as import quotas, export subsidies, specific tariffs, etc. We assume that the government imposes a specific tariff on the foreign firm, so the foreign firm will have to endure an increase in marginal cost, $c_f + t$. The other stages are the same as in the export rivalry model.

The home country may seek to maximize social welfare or tariff revenue. We will study the two cases respectively, and the import tariff ranking under Cournot duopoly with different form of delegation vis-à-vis no delegation.

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[2] From (5), we get $\frac{\partial(s_{iC}^{B} - s_{jC}^{B})}{\partial \beta} = -\frac{(c_j - c_i)}{(1+\beta)^2} < 0$, $\frac{\partial(w_{iC}^{B} - w_{jC}^{B})}{\partial \beta} = \frac{(5+6\beta+5\beta^2)(c_j - c_i)}{(1-\beta^2)^2} > 0$, and $\frac{\partial(q_{iC}^{B} - q_{jC}^{B})}{\partial \beta} = \frac{(c_j - c_i)}{(1-\beta)^2} > 0$.

[3] We have to exclude the extreme case in order to avoid an irrational denominator in equilibrium and keep the delegating capability of the owner.

3.1 Social Welfare Maximization

The objective of the home country is to choose an optimal tariff t to maximize its social welfare:

$$W = CS + \pi_h + tq_f = \frac{1}{2}(Q)^2 + (a - Q - c_h)q_h + tq_f . \tag{7}$$

We obtain the following equilibrium outcomes:

$$\begin{aligned}
q_{hC}^{BW} &= \frac{(1+\beta)(3+\beta)(1-\beta-2c_h+(1+\beta)c_f)}{(1-\beta)(5+3\beta)}, \\
q_{fC}^{BW} &= \frac{(1+\beta)((1-\beta)^2+8(1+\beta)c_h-(3+\beta)^2c_f)}{2(1-\beta)(5+3\beta)}, \\
w_{hC}^{BW} &= \frac{(1+3\beta)(3+\beta)(1-\beta-2c_h+(1+\beta)c_f)}{2(1-\beta)(5+3\beta)}, \\
w_{fC}^{BW} &= \frac{(1+3\beta)((1-\beta)^2+8(1+\beta)c_h-(3+\beta)^2c_f)}{4(1-\beta)(5+3\beta)}, \\
t_C^{BW} &= \frac{1}{4}(1\text{-}\beta)\ (1-c_f), \quad \frac{\partial t_C^{BW}}{\partial \beta} = -\frac{1}{4}(1-c_f) < 0 .
\end{aligned} \tag{8}$$

The last superscript W denotes the outcome when the home country seeks to maximize its social welfare.

The results from Equation (8) show that the manager's bargaining power is negatively associated with the specific tariff; the amelioration of the manager's bargaining power urges the home country to reduce the welfare-maximizing tariff. When the bargaining power approaches one, it appears that the tariff goes to zero, i.e. $\lim_{\beta \to 1} t_C^{BW} = 0$.

In Das (1997), the optimal tariff is $t_C^I = (1/4)(1-c_f)$ and in the simple Cournot model it is $t_C = (1/3)(1-c_f)$. Clearly,

$$\begin{cases} t_C^{BW} = t_C^I < t_C, & when \quad \beta = 0 \\ t_C^{BW} < t_C^I < t_C, & when \quad \beta > 0 \end{cases}. \tag{9}$$

In the absence of bargaining process, $\beta = 0$, we have the results as shown in Das (1997).

Proposition 2: When a bargaining process over managerial delegation is allowed, the welfare-maximizing tariff is less than the case without bargaining, but it is the highest one in the simple Cournot game.

3.2 Tariff Revenue Maximization

Rather than maximizing social welfare, the home firm may determine the import tariff rate through tariff revenue maximization. The objective function is $R = tq_f$, where q_f denotes the foreign firm's output level.

We obtain the following outcomes:

$$q_{fC}^{BR}=\frac{(1+\beta)(1-\beta+2(1+\beta)c_h-(3+\beta)c_f)}{(1-\beta)(5+3\beta)},$$
$$q_{hC}^{BR}=\frac{2(1+\beta)(4-\beta-\beta^2)-(7+2\beta-\beta^2)c_h+(1+\beta)(3+\beta)c_f)}{(1-\beta)(3+\beta)(5+3\beta)},$$
$$w_{fC}^{BR}=\frac{(1+3\beta)(1-\beta+2(1+\beta)c_h-(3+\beta)c_f)}{2(1-\beta)(5+3\beta)}, \tag{10}$$
$$w_{hC}^{BR}=\frac{(1+3\beta)(4-2\beta-2\beta^2)-(7+2\beta-\beta^2)c_h+(1+\beta)(3+\beta)c_f)}{(1-\beta)(3+\beta)(5+3\beta)},$$
$$t_C^{BR}=\frac{(1-\beta)+2(1+\beta)c_h-(3+\beta)c_f}{2(3+\beta)},\ \frac{\partial t_C^{BR}}{\partial\beta}=-\frac{2(1-c_h)}{(3+\beta)^2}<0.$$

The last superscript R denotes the outcome when the home country seeks to maximize its tariff revenue. When the bargaining power approaches one, it appears from (10) that the tariff goes to zero only when $c_h=c_f$.

The results from Equation (10) show that the tariff pursued by the home country decreases if the bargaining power of the managers is improved. Similarly, the optimal tariffs under tariff revenue maximization without bargaining stage and simple Cournot games are $t_C^I=(1/6)(1-c_h)+(1/2)(c_h-c_f)$ and $t_C=(1/4)(1-c_h)+(1/2)(c_h-c_f)$, and in a market share delegation game $t_C^M=(1/14)(4-\sqrt{2})(1-c_h)+(1/2)(c_h-c_f)$, the superscript M denotes market share delegation game.[4]

Comparing the tariff rates obtained, we get the following important results:

$$t_C^{BR}-t_C^I=\frac{2\beta(c_h-1)}{3(3+\beta)}<0 \quad \text{and} \quad t_C^{BR}-t_C=\frac{(1+3\beta)(c_h-1)}{4(3+\beta)}<0.$$

Clearly,

$$\begin{cases} t_C^{BR}=t_C^I<t_C^M<t_C, & when \quad \beta=0 \\ t_C^{BR}<t_C^I<t_C^M<t_C, & when \quad \beta>0 \end{cases}. \tag{11}$$

Proposition 3: With a bargaining process in a sales delegation game, the tariff revenue-maximizing government will impose a least tariff on the foreign firm, while in a simple Cournot competition it has a greatest value.

4. Concluding Remarks

In this paper, we examined the influence of the generalized Nash bargaining model on strategic trade policy in different models. In the export rivalry model, it showed that the optimal export subsidy with the bargaining process is less than the result without bargaining process, and the export subsidy in the simple Cournot equilibrium is the highest. In an import-competing model, we derived the tariff rate through two methods: social welfare maximization and tariff revenue maximization, and showed that the introduction of managers' bargaining process always leads to a decrease in the optimal tariff rate, whether the government is maximizing social welfare or tariff

[4] See Wang et al., (2008) for tariff rankings under social welfare or/and tariff revenue maximization.

revenue.

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