

# 行政院國家科學委員會專題研究計畫 成果報告

## 最適策略性貿易政策的再研究：進口關稅與出口補貼政策的 相互影響

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## 研究計畫中文摘要：

關鍵詞：策略性貿易政策、出口補貼/出口稅、關稅制度、不完全資訊

## 最適策略性貿易政策的再研究：進口關稅與出口補貼政策的相互影響

### 摘要

本文採用 Brander-Spencer (1985) 兩出口國與一進口國的基本模型，來探討當進口國採行不同的關稅制度時，兩出口國的出口補貼政策。本文發現當進口國採行單一關稅制度，兩出口國會採用出口補貼，而當進口國採行歧視性關稅制度，在某些情況下，兩出口國會課徵出口稅。此外，本文發現進口國的最適關稅制度為單一關稅制度，但在某些情況下，兩出口國卻偏好歧視性關稅制度。

本文亦探討當此三國政府皆不知道兩出口廠商的成本時，在進口國採行不同的關稅制度下，兩出口國出口補貼政策的 Nash 均衡。在線性市場需求及高低兩種成本類型的假設下，本文發現當進口國採行單一關稅制度，兩出口國均提供單一出口補貼，而當進口國採行歧視性關稅制度，兩出口國均課徵單一出口稅。本文亦發現進口國的最適關稅制度為單一關稅制度，但只要兩出口廠商的預期成本差距夠小，兩出口國均偏好歧視性關稅制度。

## 研究計畫英文摘要：

Keywords : strategic trade policies, export subsidies/taxes, tariff regime, incomplete Information

### **Reexamination on Optimal Strategic Trade Policies: Policy Interactions of Import Tariffs and Export Subsidies**

#### **Abstract**

This project examines the non-cooperative interactions between two exporting countries and one importing country when all of them are seeking the optimal policies to improve their welfare. While the importing country has the incentive to impose tariffs on the goods coming from the two exporting countries, the export policies chosen by the exporting countries depend on the tariff regime, whether uniform or discriminatory tariffs are used. With complete information, it is argued that export taxes are chosen by both exporting countries in some cases, and that while the importing country prefers a uniform tariff regime, the exporting countries find a discriminatory tariff regime preferable.

We also extend the Brander-Spencer (1985) framework to examine the non-cooperative Nash equilibrium of export subsidy policy under incomplete information when the firms' costs are unknown to the exporting and importing countries. With the assumptions of linear demand and two types of a firm's cost, the non-cooperative Nash equilibrium is that both exporting countries use a single pooling export subsidy (tax) under a uniform (discriminatory) tariff regime. Moreover, we find that the importing country would optimally choose a uniform tariff regime. However, both exporting countries prefer a discriminatory tariff regime as long as the expected cost differential between the two firms is small enough.

## **I. Introduction**

This project attempts to combine two branches of literature on strategic trade policies together, and to analyze two strategic trade policies in a unified framework in order to provide a better insight into the policy interactions among the governments of two exporting countries and an importing country.

Brander and Spencer's (1985) paper initiates a great deal of interest on the proper use of export subsidies. It has been shown that Brander and Spencer's result is sensitive to some of the assumptions in the model. Moreover, in the Brander-Spencer and related models, the government of the third country, which imports the goods from the two countries, is assumed to be inactive.

On the other hand, there is a separate literature which analyzes the optimal policies for an importing country facing foreign oligopoly. Gatsios (1990) and Hwang and Mai (1991) show that the importing country will optimally impose a higher tariff on the import from the more cost-efficient exporter. Choi (1995) and Horiba and Tsutsui (2000) extend the literature by comparing the impacts of discriminatory and uniform tariffs on the level of technologies chosen by the exporting firms. All these papers focus on the policies of the importing country, while assuming that the exporting governments are inactive.

In this project, we allow all three governments to be active in choosing the optimal values of the policy parameters: an export subsidy/tax for each exporting country and a tariff/subsidy for the importing country. We analyze the impacts of two different tariff regimes: a uniform tariff regime, as required by the "Most-Favored-Nations" clause of the GATT/WTO, and a discriminatory tariff regime. Moreover, we consider two cases: complete information and incomplete information. Under incomplete information, we assume that all the exporting and importing countries are uncertain about the firms' costs, while each firm knows its

rival's cost. Thus, an export subsidy policy is used to signal the firm's cost to the importing country.

Some of the results obtained in the complete information model can be linked to the existing results. Under a uniform tariff regime, as required by the MFN clause, the Brander-Spencer argument kicks in, and each country has the right incentive to promote the export of its own firm with an export subsidy. If the importing country is using discriminatory tariffs, the argument in the papers by Gatsios (1990), Hwang and Mai (1991), Choi (1995), and Horiba and Tsutsui (2000) is applicable: An importing country tends to impose a higher tariff on the more cost-efficient exporter. Thus, in our model, there are two forces that affect the export subsidy chosen by an exporting country: the profit-shifting argument of Brander and Spencer and the tariff effect that tends to induce each government to raise the effective marginal cost of its own firm in order to avoid a higher tariff. As a result, the actual export subsidy can be negative. We also compare the uniform tariff and discriminatory tariff regimes in terms of the welfare of the countries. We find that, at least in the case when the two exporting countries are identical, the importing country would choose a uniform tariff regime while the export countries prefer a discriminatory tariff regime.

In the incomplete information model, we find that the dominant strategy for each exporting country is to use a single pooling export subsidy (tax) under a uniform (discriminatory) tariff regime. The non-cooperative Nash equilibrium is that both use pooling strategies to conceal their firms' types. Moreover, the importing country prefers a uniform tariff regime because it induces both exporting countries to use export subsidies. However, both exporting countries prefer a discriminatory tariff regime as long as the difference between the expected costs of the two firms is small enough.

## II. The Model

We consider a one-product, two-firm, three-country model. Two of the countries, which are labeled 1 and 2, have a firm producing a homogeneous product to be exported to the third country, M. There is no other producer of this product in country M and there is no consumption of this product in the two exporting countries. Demand in country M is given by the inverse demand function,  $p = p(Q)$ . Firm  $i$  has a constant marginal cost,  $c_i$ , and a fixed cost,  $f_i$ . Fixed cost  $f_i$  is set to zero because it will not affect the equilibrium of the game. All technology and demand information is known to all parties.

The governments of all three countries are active in setting policy parameters to improve the welfare of its economy. The government of each exporting country considers an export subsidy (may be negative), while the importing country, M, chooses a tariff. Facing the goods from countries 1 and 2, country M can choose to impose the same tariff rates on these goods, or choose to impose different tariff rates on the goods from different countries. In order to analyze how the exporting countries may respond to these two types of tariff treatments, it is assumed that country M has announced credibly whether it is going to impose a uniform tariff rate or differential tariff rates. After the governments have announced their policies, the firms compete in a Cournot way.

To analyze the interactions among the countries, we consider the following four-stage, one-shot non-cooperative game. In the first stage, country M announces whether it is using a uniform tariff regime or a discriminatory tariff regime. In the second stage, the two exporting countries choose their export subsidies simultaneously and non-cooperatively. In the third stage, after observing the export subsidies, country M imposes tariffs according to the tariff regime it announced in the first stage. All government announcements are credible and cannot be reversed. In the

fourth stage, the two firms compete in quantities in the market of country M.

In the incomplete information model, to keep the model tractable, we assume that the demand in country M is linear, given by  $p = a - b(q_1 + q_2)$ . For simplicity, each firm is assumed to be one of two types, high cost,  $c_i^H$ , or low cost,  $c_i^L$ . The uncertainty of the cost realization can be interpreted as the demand shock, or input shock, for instance. The cost realizations are assumed to be privately known by the firms, and each firm knows its rival's cost. All the governments are uninformed about the firms' true costs. It is common knowledge that  $\text{Prob}(c_1 = c_1^H) = \mu$  and  $\text{Prob}(c_2 = c_2^H) = \rho$ , where  $0 \leq \mu \leq 1$  and  $0 \leq \rho \leq 1$ .  $\mu$  and  $\rho$  could be the same when the two firms are affected by the same demand shock, or when they use a common input.

We consider the following three-stage, one-shot non-cooperative game. In the first stage, country M announces its tariff regime, either discriminatory or uniform. In the second stage, country  $i$  designs its export subsidy policy, either an incentive-compatible policy or a single pooling policy. Under an incentive-compatible policy, country  $i$  provides two different export subsidy rates associated with lump-sum transfers for firm  $i$  to choose, and such an incentive-compatible policy will induce firm  $i$  to tell its type truthfully. Firm  $i$  picks up the rate corresponding to its type, and at the same time reveals its type. Under a single pooling policy, country  $i$  provides one export subsidy rate for firm  $i$ , regardless of its type. Such a pooling policy thus provides no specific information about firm  $i$ 's type. In the third stage, after observing the policy provided by country  $i$  (and the selection of firm  $i$  if an incentive-compatible policy is provided), country M updates its belief about firm  $i$ 's type and imposes tariffs according to the tariff regime it announced in the first stage. If an incentive-compatible policy is used by country  $i$  in the second stage, country M

sets tariffs based on the cost type revealed by firm  $i$ . If a single pooling policy is adopted by country  $i$  in the second stage, country M sets tariffs based on its prior belief about the cost of firm  $i$ . All government announcements are credible and cannot be reversed. Then the two firms compete in quantities in the market of country M, and the welfare of each country is realized.

### **III. Main Results**

As is well known in the literature and from the work of Brander and Spencer (1985), exporting countries have the temptation to use an export subsidy to shift profit from a rival firm to its own firm. In the present model, an export subsidy could have other impacts that are not so desirable for an exporting country. In particular, under a discriminatory tariff regime, an export subsidy could cause a sufficiently large tariff to be imposed on the export of a country's firm, severely hurting the competitiveness of the firm. Under certain plausible conditions (e.g., linear demand function), including the use of discriminatory tariffs by the importing country, the optimal export subsidy for each exporting country is negative, suggesting an export tax should be used.

We compare the uniform tariff and discriminatory tariff regimes in terms of the welfare of the countries. We found out that, at least in the case when the two exporting countries are identical, the importing country would choose a uniform tariff regime while the export countries prefer a discriminatory tariff regime. For the importing country, this result, which is consistent with countries' willingness to apply the "Most-Favored-Nations" (MFN) clause of the GATT/WTO, may seem to be contrary to the usual belief that a discriminatory tariff regime should dominate a uniform tariff regime because under the former the country can also choose the same tariffs. Our result suggests that this preconception does not hold in the present model because the exporting countries react with export subsidies under a uniform tariff regime but possibly export taxes under a discriminatory tariff regime.



We also extend the model to the incomplete information case in which the firms' costs are unknown to all the three governments, but each firm knows its rival's cost. With the assumptions of linear demand and two types of a firm's cost, the non-cooperative Nash equilibrium is that both exporting countries use a single pooling export subsidy (tax) under a uniform (discriminatory) tariff regime. Moreover, we find that the importing country would optimally choose a uniform tariff regime, the same result as in the complete information case. However, both exporting countries prefer a discriminatory tariff regime as long as the expected cost differential between the two firms is small enough. Otherwise, the country with a higher expected cost prefers a discriminatory tariff regime while the one with a lower expected cost prefers a uniform tariff regime.

#### **IV. Self-Evaluation (計畫成果自評)**

In this project, we only examined the case of Cournot competition because it is much more complicated under Bertrand competition. However, we analyzed the issue with two separate papers: one is under complete information, and the other under incomplete information. The former has been submitted to the *Southern Economic Journal* for second review. The latter has been accepted by *Academia Economic Papers*, forthcoming in December 2004. We think that our results provide good contributions to the theoretical model of strategic trade policy.

We plan to make use of the basic model to examine the effects of tariff regimes on the R&D choice of firms with international R&D spillovers. We expect that we are able to obtain some results different from that in Choi (1995).

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