Research in Economics 66 (2012) 106–109

Contents lists available at SciVerse ScienceDirect

Research in Economics

journal homepage: www.elsevier.com/locate/rie

Domestic entry, optimum-welfare and maximum-revenue tariffs☆

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ARTICLE INFO

Article history:
Received 10 March 2011
Accepted 9 July 2011

Keywords:
Cournot competition
Free entry
Tariff ranking

ABSTRACT

In this paper, we examine the ranking of the maximum-revenue tariff and the optimum-welfare tariff under a linear Cournot oligopoly model without and with free entry of domestic firms. We demonstrate that in a regulated entry oligopoly with asymmetric costs, when the marginal cost of the domestic firms exceeds a critical value, the maximum-revenue tariff is higher than the optimum-welfare tariff. We then show that under free entry of domestic firms with asymmetric costs, when the fixed cost gets larger and the domestic firms become fewer, the difference between the optimum-welfare tariff and the maximum-revenue tariff becomes larger.

1. Introduction

In a traditional tariff analysis, Johnson (1951–1952) argued that the maximum-revenue tariff is higher than the optimum-welfare tariff because a 'large' country could change the terms of trade in order to raise its social welfare level. From the strategic trade aspect, Brander and Spencer (1984) have shown that a government could improve its terms of trade through tariffs in an oligopoly market and take a leading position to transfer a foreign firm's revenue to a domestic firm by using tariff as a strategic instrument. Collie (1991) demonstrated that in a Cournot quantity competition oligopoly market with a linear demand function and an asymmetric marginal cost, the optimum-welfare tariff will be higher than the maximum-revenue tariff if the domestic firm's marginal cost is relatively lower than that of the foreign firm. Larue and Gervais (2002) allowed asymmetric numbers of domestic and importing firms, and showed that if the numbers of producing firms and importing firms are the same, the maximum-revenue tariff is higher than the optimum-welfare tariff. Clarke and Collie (2006) found that in a Bertrand price competition model, the optimum-welfare tariff is higher than the maximum-revenue tariff when the product is highly substitutable.[1]

Recently, Wang et al. (2009) introduced market share delegation in a trade duopoly context, and demonstrated that the home government unambiguously imposes a higher optimum-welfare tariff than maximum-revenue regardless of the form of delegation. Wang et al. (2010) examined the tariff ranking issue under a linear mixed oligopoly model with foreign competitors and asymmetric costs. In particular, they demonstrated that under Cournot competition and Stackelberg public follower, when the domestic private and foreign private firms become more unequally distributed, the optimum-welfare tariff will exceed the maximum-revenue tariff; however, under the Stackelberg public follower, the maximum-revenue tariff

☆ Acknowledgments: We would like to thank the referee for providing us with constructive suggestions. The work described in this paper was supported by the National Science Council of Taiwan under Grant NSC 99-2410-H-390-006-MY3.

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[1] Clarke and Collie (2008) have also shown that in a game between two exporting countries, both countries may be better off if they both delegate decisions to policymakers who maximize tax revenue rather than welfare. However, both countries delegating to policymakers who maximize revenue is not necessarily a Nash equilibrium.

1090-9443/$ – see front matter
doi:10.1016/j.rie.2011.07.001

may be higher than the optimum-welfare tariff. Wang et al. (forthcoming) examined Cournot and two Stackelberg cases in mixed duopoly with partial privatization and foreign competitors, and found that the optimum-welfare tariff is higher than the maximum-revenue tariff if the degree of privatization is sufficiently high; otherwise, the maximum-revenue tariff will be higher than the optimum-welfare tariff.

Is free entry desirable for social efficiency? This important question has been studied extensively in a closed economy.[2] When a developing country transforms its industrial structure, it is concurrently facing the pressure of opening its home market for multinational firms (MNEs). It is pertinent to consider whether anti-competition entry regulation policies should be relaxed and at the same time, for the purpose of fiscal reform, whether the optimum-welfare tariff is needed for replacing the revenue-maximum tariff. In this paper, we intend to examine the ranking of the optimum-welfare tariff and the maximum-revenue tariff under a linear Cournot oligopoly model without and with free entry of domestic firms.[3] We first demonstrate that in a regulated entry oligopoly with asymmetric costs, when the marginal cost of the domestic firms exceeds a critical value, the maximum-revenue tariff is higher than the optimum-welfare tariff. Otherwise, the optimum-welfare tariff is higher than the maximum-revenue tariff. We then show that under free entry of domestic firms with asymmetric costs, when the fixed cost gets larger and the domestic firms become fewer, the difference between the optimum-welfare tariff and the maximum-revenue tariff becomes larger.

The remainder of this paper is organized as follows. Basic modeling is provided in Section 2. Section 3 contains the analysis of tariff ranking under regulated entry of firms, while in Section 4 tariff ranking is analyzed under free entry of domestic firms. Section 5 has the concluding remarks.

2. Basic model

Consider a domestic market for a homogeneous good produced by n domestic firms and m foreign firms. The linear demand function is $P = a - Q$. The supply equation is given by $Q = \sum_{i=1}^{n} q_i + \sum_{j=1}^{m} q_j$, where q_i and q_j denote, respectively, domestic firms' and foreign firms' productions. The marginal costs for the domestic firms and foreign firms are c_i and c_j respectively. We assume that $c_i > c_j > 0$, which means that the production efficiency of domestic firms is lower than that of foreign firms.

The domestic government imposes a specific tariff on the foreign firm and the tariff rate is t, so the tariff revenue is

$$R = t \sum_{j=1}^{m} q_j. \tag{1}$$

The social welfare is defined as,

$$W = CS + \sum_{i=1}^{n} \pi_i + t \sum_{j=1}^{m} q_j \tag{2}$$

where the consumer surplus is given by $CS = \frac{1}{2}\left(\sum_{i=1}^{n} q_i + \sum_{j=1}^{m} q_j\right)^2$. And the profits of domestic firms and foreign firms are given by:

$$\pi_i = (P - c_i)q_i \tag{3}$$

$$\pi_j = (P - c_j - t)q_j. \tag{4}$$

In this model, backward induction is used to solve the sub-game perfect Nash equilibrium.

3. Tariff analysis at regulated entry of firms

In this section, the case of regulated entry of firms is analyzed in order to see the ranking of optimum-welfare tariff and maximum-revenue tariff.

In the 2nd stage, the $(m+n)$ firms maximize their profits, $\frac{\partial \pi_i}{\partial q_i} = 0$, and $\frac{\partial \pi_j}{\partial q_j} = 0$. From the first-order conditions, we have

$$q_i = \frac{a - c_i + m(c_j + t - c_i)}{1 + m + n} \tag{5}$$

$$q_j = \frac{a - c_i - (1 + n)(c_j + t - c_i)}{1 + m + n}. \tag{6}$$

[2] In an open economy, Marjit and Mukherjee (2011) showed that entry in the domestic country may be socially excessive or insufficient under competitive labor markets, but it is always socially insufficient under a domestic labor union. Wang and Chen (2010) demonstrated that partial privatization is always the best policy for the public firm in a free entry open economy.

[3] For example, Tanaka (1991) used the Nash bargaining approach to analyze the negotiation of tariffs between two countries in free-entry oligopolies under integrated markets. Tanaka (1992) further examined the welfare effects of tariffs in international free-entry oligopolies under integrated markets in a two-country world model.