Foreign Penetration, Policy Burden and Optimal Privatization

Angela C. Chao

Department of Economics, Southeast University, Nanjing, China.

Jen-yao Lee

Department of International Business, National Kaohsiung University of Applied Science, Taiwan

Leonard F.S. Wang[*]

Department of Applied Economics, National University of Kaohsiung, Taiwan,

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Abstract

In this paper, we examine how the foreign ownership and policy burden will affect the privatization and subsidization policies in mixed oligopoly model-setting. We show that (1) The optimum subsidy rate is always positive and the optimal privatization policy is partial privatization in the presence of social cost of public fund and foreign ownership; (2) The optimum subsidy rate and the degree of privatization are decreasing in the social cost of public fund; (3) The optimum subsidy rate is increasing and the degree of privatization is decreasing in the degree of foreign ownership; (4) The profit of the privatized firm and private firms, the consumer surplus and social welfare are decreasing in the social cost of public fund, but are increasing in the equity share held by foreign investors. The important policy implication is that the host country should improve macro-scope governance to attract more foreign investor's incentive to own the share of domestic private firms under liberalized capital market policy for improving consumer and social welfare.

Keywords: Foreign ownership; Policy burden; Production subsidy; Social welfare

JEL classification: F13; H21; L13

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1. Introduction

The modelling of a mixed oligopoly with foreign competitors begins with Fjell and Pal (1996) who investigated the effect of introducing foreign private firms on the equilibrium price and allocation of production.[1] To see the impact of trade policy, White (1996) introduced the production subsidy into the mixed market and found that welfare is unchanged by privatization if subsidies are used before and after privatization.[2] This privatization neutrality theorem was supported by Tomaru (2006), who showed that the optimal subsidy, all firms' output, profits and social welfare are identical regardless of the share in a state-owned enterprise (SOE), and Matsumura and Okumura (2013), who also showed with the optimal output floor regulation, privatization does not affect welfare regardless of the time structure and the degree of privatization.

Other theoretical literature has analyzed import tariff in a mixed market. Chang (2005) examined a mixed duopoly model with a more efficient foreign firm under Cournot and Stackelberg competition, and showed that the optimal level of

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[1] See, for example, Fjell and Heywood (2002), and Matsumura (2003) for modelling Stackelberg competition in mixed markets with foreign competitors.

[2] In the strategic trade literature, Brander and Spencer (1984, 1985) firstly showed that government could improve its terms of trade through tariff or subsidy to take a leader position transferring a foreign firm's revenue to a domestic firm. Eaton and Grossman (1986) and Collie (1993) also analyzed the welfare effects of trade and industrial policies for a range of specifications of an oligopolistic industry and cost asymmetry. Long and Stähler (2009) examined that the home government can simultaneously subsidize domestic firms and impose tariffs. It is well-known proposition of trade theory that in the absence of directly trade-related distortions or policy goals, subsidies are superior to tariffs for achieving any economic objective.

privatization depends crucially upon the strategic substitutability-complementarity assumption. Chao and Yu (2006) found that foreign competition lowers the optimal tariff rate but partial privatization raises it. Wang *et al.* (2012) examined the effect of privatization on the priority of the maximum revenue tariff and the optimum-welfare tariff under Cournot and Stackelberg competitions, and showed that the optimum-welfare tariff will be lower than the maximum-revenue tariff regardless of the order of firms' move when the asymmetric marginal cost of the privatized firm is higher than a critical value.

Some studies simultaneously consider the relations between privatization policy and dual trade instruments, production subsidy or import tariff only in a mixed market. Pal and White (1998) examined the interaction between privatization and strategic trade policies, and found that the welfare is always increased with privatization if production subsidy is used only. However, privatization increases welfare over much of the parameter space if import tariff is used only. Pal and White (2003) also showed that the existence of SOE lowers optimal tariffs and subsidies, but also lowers the total volume of trade between the two countries. The lower volume of trade, however, does not translate into lower levels of welfare for the trading countries. Chang (2007), Yu and Lee (2011), Han (2012), and Lee *et al.* (2013) examined the optimal privatization and trade policies in an international mixed market and showed that full nationalization is the best choice under Cournot competition, but the privatization strategy is affected strongly by trade instruments and cost difference between firms.

Matsumura and Tomaru (2012) found that under the optimal tax-subsidy policy, if there is no foreign competitor, privatization does not matter regardless of the number of firms. However, it is not true if there are foreign competitors; further, privatization is more likely to improve welfare when the number of firms is larger even under the optimal tax-subsidy policy.[3]

Lin and Li (2008) based on China experience exploring the pervasive syndromes of **soft budget constraint** (SBC) in socialist and transition economies, and argued that the policy burdens on enterprises result in the SBC problems. In their paper, the policy burdens will induce low effort input of firm manager and thus the low efficiency of production; with the policy burdens, increasing market competition will make the SBC syndromes arise more likely. Accordingly, privatization will not necessarily harden the budget constraint of the enterprise. On the contrary, when a public firm still bears the policy burdens, privatization will only aggravate the SBC problems and besides, a private enterprise will demand more *ex post* subsidies from the government, than a public firm under the same condition. However, in their paper, the impact of policy burden on privatization was not dealt with in the context of mixed oligopoly market.

In the literature on mixed oligopolies, Capuano and De Feo (2010), Wang and Chen (2011) and Matsumura and Tomaru (2013) have tackled the policy burden issue

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[3] Wang *et al.* (2014) examined privatization policy and entry regulation in a mixed oligopoly market with foreign competitors and free entry. It demonstrated that as long as the entry cost is relatively lower, free entry is socially excessive whether it is free trade or the domestic government imposes the tariff policy.

by examining the welfare effect of a change in a public firm's objective function when the government takes into account the shadow cost of public funds (or, henceforth, excess taxation burden, ETB). Wang and Chen (2011) considered only the case of Cournot competition with cost efficiency gap, while Matsumura and Tomaru (2013) compared the optimal subsidies and the resulting welfare levels among four regimes: mixed and private Cournot duopolies and Stackelberg competition with public and private leaderships. Using a mixed oligopoly model with foreign competitors and the feasibility of partial privatization policy in this paper, we extend Matsumura and Tomaru (2012, 2013) to examine how the policy burden and foreign ownership will affect the privatization policy in the presence of strategic tax/subsidy policies under Cournot competition. We show that (1) The optimum subsidy rate is always positive and the optimal privatization policy is partial privatization in the presence of social cost of public fund and foreign ownership; (2) The optimum subsidy rate and the degree of privatization are decreasing in the social cost of public fund; (3) The optimum subsidy rate is increasing and the degree of privatization is decreasing in the degree of foreign ownership; (4) The profit of the privatized firm and private firms, the consumer surplus and social welfare are decreasing in the social cost of public fund, but are increasing in the equity share held by foreign investors.

This paper is organized as follows. Basic modeling is provided in Section 2. Section 3 explores how the policy burden and foreign penetration will affect the privatization policy in the presence of strategic tax/subsidy policies. Section 4

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provides conclusions.

2. Basic Model

Consider a domestic market for a homogeneous good produced by one public

firm, and n domestic firms. The linear demand function is specified as $P = a - Q$.

The supply equation is given by $Q = q_0 + \sum_{i=1}^{n} q_i$, where q_0, and q_i denote,

respectively, the output of public firm, and domestic firms. Following Wang *et al.*

(2009) and Wang and Chen (2010), all firms use an identical technology and have the

increasing marginal cost function: $\frac{q_0^2}{2}$, and $\frac{q_i^2}{2}$, respectively.

The profits of domestic firms and foreign firms are given by:

$$\pi_0 = \left(a - q_0 + \sum_{i=1}^{n} q_i - \sum_{j=1}^{m} q_j + s\right)q_0 - \frac{q_0^2}{2} \tag{1}$$

$$\pi_i = \left(a - q_0 + \sum_{i=1}^{n} q_i - \sum_{j=1}^{m} q_j + s\right)q_i - \frac{q_i^2}{2} \tag{2}$$

where s is the unit subsidy rate.

The social welfare is defined as,

$$W = CS + (1 - \alpha)\sum_{i=1}^{n} \pi_i - (1 + \lambda)(s\sum_{i=1}^{n} q_i + sq_0 - \pi_0) \tag{3}$$

where the consumer surplus is given by $CS = Q^2/2$, α is the shareholding ratio of

the foreigners, and λ signifies the social cost of public fund for representing

administrative inefficiency of government bureaucracy.[4] As explained in Matsumura

and Tomaru (2012), when all private firms are symmetric and α denotes the share of

foreign investors in the private firms, then there are αn foreign private firms and

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[4] The similar specification can be found in Capuano and De Feo (2010), Wang and Chen (2011), and Matsumura and Tomaru (2013).

$(1 − \alpha)n$ domestic private firms. As such, two formulations yield exactly the same equilibrium outcomes.[5] It is important to be aware that privatization or share release is not always the best policy option when a government tries to improve the efficiency of public firms.[6]

When government privatizes the public firm partially, the optimization problem for the semi-public firm is:

$$max._{\{q_0\}} S = \theta \pi_0 + (1 − \theta)W \tag{4}$$

where θ is the weight assigned to the profits in the decision-making process of the firm, and $1 > \theta > 0$.[7] Following Matsumura (1998), the government can indirectly control θ through its shareholding. The fully privatized firm only seeks the profit if $\theta = 1$; contrarily, a fully nationalized firm maximizes the social welfare if $\theta = 0$.[8] The government chooses the subsidy rate and the degree of privatization to maximize social welfare.

We construct a two-stage game. In the first stage of the game, the government decides the subsidy rate and the degree of privatization. In the second stage, the firms

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[5] Foreign ownership of public firms is not considered in this paper. Lin and Matsumura (2012) also investigated the presence of foreign investors in privatized firms and confirmed Wang and Chen's finding that an increase in the stockholding ratio of foreign investors in a privatized firm increases the optimal degree of privatization, whereas an increase in the penetration of foreign firms in product markets reduces it. These results imply that the degree of openness of financial markets and that of product markets have contrasting implications for the optimal privatization policy.

[6] For example, Mukherjee and Sinha (2014) theoretically show that if the profit-maximizing private firm is technologically superior to that of the welfare-maximizing public firm, both the society and the private firm gain from technology licensing. In particular, both the equilibrium output of the private firm and the equilibrium degree of privatization are zero under technology licensing.

[7] Public firms may have other different targets, such as maximizing the profit, income, employee's income or management of license, etc. See De Fraja and Delbono (1989), Fjell and Pal (1996), and Pal and White (1998) on the modeling of a public firm as a social welfare maximizer.

[8] Lee and Hwang (2003) elaborated on the framework of Matsumura (1998) by allowing for managerial inefficiency, and showed that under moderate conditions partial ownership is a reasonable choice of government in a monopoly market as well as in a mixed duopoly market, where a public firm competes with a profit-maximizing private firm.

engage in Cournot competition. The backward induction is used to derive the

sub-game perfect Nash equilibrium (SPNE).

3. Foreign Ownership, Privatization and Welfare

The outputs of the domestic private firms and the public firm are obtained by

partially differentiating Eqs. (2) and (4) with respect to q_i, and q_0, the first-order

conditions are:

$$\frac{\partial \pi_i}{\partial q_i} = a + s - q_0 - 2q_i - nq_i = 0 \tag{5}$$

$$\frac{\partial S}{\partial q_0} = a + s\theta + a\lambda - a\theta\lambda + (-2 - \theta + 3(-1 + \theta)\lambda)q_0$$

$$+n(-1 + \alpha - \alpha\theta + (-1 + \theta)\lambda)q_i = 0 \tag{6}$$

The equilibrium outputs are:

$$q_i^*(s, \theta) = \frac{a + 2s + a\theta - (2a + 3s)(-1 + \theta)\lambda}{4 + n + n\alpha + 2\theta + n\theta - n\alpha\theta - 2(3 + n)(-1 + \theta)\lambda} \tag{7}$$

$$q_0^*(s, \theta) = a + s - \frac{(2 + n)(a + 2s + a\theta + (2a + 3s)(1 - \theta)\lambda)}{4 + n + n\alpha + 2\theta + n\theta - n\alpha\theta + 2(3 + n)(1 - \theta)\lambda} \tag{8}$$

Substituting Eqs. (7) and (8) into Eq. (3) and then differentiating with respect to

s and θ, the optimum subsidy and degree of privatization are given as

$$s^* = \frac{a + an\alpha}{2 + n - n\alpha + (3 + n)\lambda} \tag{9}$$

$$\theta^* = 1 - \frac{2(4 + n)}{2 - 9\lambda + n(1 - \alpha - 2\lambda)} \tag{10}$$

We have the following proposition.

Proposition 1: *The optimum subsidy rate is always positive and the optimal*

privatization policy is partial privatization.

Proposition 1 show that the optimum subsidy rate is always positive and the

optimal privatization policy is partial privatization which is different from the result

obtained by Matsumura and Tomaru (2012). Matsumura and Tomaru (2012) showed

that, in mixed oligopoly with foreign ownership, the government's optimum policy

may be subsidy or taxation when the number of firms is fixed. When the equity share

held by foreign investors goes beyond a critical value, the government will levy

production tax. Otherwise, the government will provide production subsidy. Profit

shifting arises when foreign investors held the equity shares of any domestic private

firms. Thus, when the equity shares held by foreign investors is too high, positive

production subsidy by the government may degrade the domestic social welfare.

Therefore, the government should levy production tax. On the contrary, when the

equity shares held by foreign investors is not high, the government will provide firms

positive subsidy in order to rectify the production insufficiency in oligopoly market.

However, in our partial privatization framework, the government is able to adjust the

degree of privatization to create the output-substitution effect cum unit output subsidy

for improving the social welfare.

Taking differentiation of s^* and θ with respect to λ, we obtain:

$$\frac{\partial s^*}{\partial \lambda} = -\frac{(3+n)(a+an\alpha)}{(2+n-n\alpha+(3+n)\lambda)^2} < 0, \tag{11}$$

$$\frac{\partial \theta^*}{\partial \lambda} = -\frac{2(4+n)(9+2n)}{(2-9\lambda+n(1-\alpha-2\lambda))^2} < 0. \tag{12}$$

We have the following proposition.

Proposition 2: *The optimum subsidy rate and the degree of privatization are both*

decreasing in the social cost of public fund.

When the social cost of public fund is more severe, and the degree of privatization and production subsidy are complementary instruments for a given degree of foreign ownership; the degree of privatization and the production subsidy should decrease in order to mitigate the policy distortion.

Taking differentiation of s^* and θ with respect to α, we obtain that

$$\frac{\partial s^*}{\partial \alpha} = \frac{an(3+n)(1+\lambda)}{(2+n-n\alpha+(3+n)\lambda)^2} > 0, \tag{13}$$

$$\frac{\partial \theta^*}{\partial \alpha} - \frac{2n(4+n)}{(2-9\lambda+n(1-\alpha-2\lambda))^2} < 0. \tag{14}$$

We have the following proposition.

Proposition 3: *The optimum subsidy rate is increasing in the degree of foreign ownership, while the degree of privatization is decreasing in the degree of foreign ownership.*

The higher output subsidy will attract the foreign investors to own more share of domestic private firms, and under such circumstance, the government will not need to push the public firm more privatized for welfare maximization in the presence of excess taxation burden. Matsumura and Tomaru (2012) found that under the optimal tax-subsidy policy, if there is no foreign competitor, privatization does not matter regardless of the number of firms. However, it is not true if there are foreign competitors; further, privatization is more likely to improve welfare when the number of firms is larger even under the optimal tax-subsidy policy. We extend their finding

and further show that partial privatization will improve welfare unequivocally instead of adopting full privatization policy. It is because in our partial privatization framework with higher foreign ownership, the government is able to reduce the degree of privatization in couple with the higher unit output subsidy to affect industry output via the output-substitution effect for improving the social welfare.

Substituting Eqs. (9) and (10) into Eqs. (1)-(3), we have the following equilibrium outcomes:

$$q_0 = \frac{a(1+\lambda)}{2+n-n\alpha+(3+n)\lambda}, \ q_i = \frac{a(1+\lambda)}{2+n-n\alpha+(3+n)\lambda}, \ Q = \frac{a(1+n)(1+\lambda)}{2+n-n\alpha+(3+n)\lambda},$$

$$P^* = a - \frac{a(1+n)(1+\lambda)}{2+n-n\alpha+(3+n)\lambda}, \ \pi_0^* = \frac{3a^2(1+\lambda)^2}{2(2+n-n\alpha+(3+n)\lambda)^2},$$

$$\pi_i^* = \frac{3a^2(1+\lambda)^2}{2(2+n-n\alpha+(3+n)\lambda)^2}, \ CS^* = \frac{a^2(1+n)^2(1+\lambda)^2}{2(2+n-n\alpha+(3+n)\lambda)^2},$$

$$W^* = \frac{a^2(2+n(3-5\alpha+n(1-2\alpha))+3\lambda)(1+\lambda)^2}{2(2+n-n\alpha+(3+n)\lambda)^2}.$$

Taking differentiation of π_0^*, π_i^*, CS^*, and W^* with respect to λ, we obtain that

$$\frac{\partial \pi_0^*}{\partial \lambda} = -\frac{3a^2(1+n\alpha)(1+\lambda)}{H^3} < 0,$$

$$\frac{\partial \pi_i^*}{\partial \lambda} = -\frac{3a^2(1+n\alpha)(1+\lambda)}{H^3} < 0,$$

$$\frac{\partial CS^*}{\partial \lambda} = -\frac{a^2(1+n)^2(1+n\alpha)(1+\lambda)}{H^3} < 0,$$

$$\frac{\partial W^*}{\partial \lambda} = \frac{a^2(1+\lambda)(2-2n^3\alpha(1-2\alpha)-2n^2(1+\alpha(1-5\alpha))-9\lambda(1+\lambda)+3n(1-\alpha+3\alpha\lambda-\lambda(2+\lambda)))}{H^3} < 0.$$

where $H \equiv 2 + n(1 - \alpha) + (3 + n)\lambda > 0$.

We have the following proposition.

Proposition 4: *The profit of the privatized firm and private firm, the consumer surplus and social welfare are decreasing in the social cost of public fund.*

From the viewpoint of firms' objectives, Tomaru (2006) showed the robustness by adopting the partial privatization approach formulated by Matsumura (1998). Kato and Tomaru (2007) considered non-profit-maximizing private firms and showed that the theorem holds true under various payoff functions of private firms. These works demonstrated that the privatization neutrality theorem is quite robust. Wang and Chen (2011), and Matsumura and Tomaru (2013) further investigated optimal tax-subsidy policies in mixed and private oligopolies with excess burden of taxation. Matsumura and Tomaru (2013) compared the optimal subsidies and the resulting welfare levels among four regimes: mixed and private Cournot duopolies and Stackelberg competition with public and private leaderships. They show that under general demand and cost functions, all four regimes yield the same equilibrium welfare under the optimal subsidy policies if and only if $\lambda = 0$. In other words, the privatization neutrality theorem holds only when there is no excess burden of taxation.

Our proposition points out that the profit of the privatized firm and private firm, the consumer surplus and social welfare are decreasing in the social cost of public fund. In other words, the higher the excess burden of taxation, the lower for all the important equilibrium outcomes. It is one "lose-lose-lose" result for a given degree of foreign ownership.

We further want to see how the change of foreign ownership (liberalization of capital market) will affect all the important equilibrium outcomes.

Taking differentiation of π_0^*, π_i^*, CS^*, and W^* with respect to α, we obtain that

$$\frac{\partial \pi_0^*}{\partial \alpha} = \frac{3a^2 n(1+\lambda)^2}{H^3} > 0,$$

$$\frac{\partial \pi_i^*}{\partial \alpha} = \frac{3a^2 n(1+\lambda)^2}{H^3} > 0,$$

$$\frac{\partial CS^*}{\partial \alpha} = \frac{a^2 n(1+n)^2(1+\lambda)^2}{H^3} > 0,$$

$$\frac{\partial W^*}{\partial \alpha} = -\frac{a^2 n(1+\lambda)^2(6+9\lambda+2n^2(\alpha+\lambda)+n(3+5\alpha+11\lambda))}{H^3} > 0.$$

We have the following proposition.

Proposition 5: *The profit of the privatized firm and private firm, the consumer surplus and social welfare are increasing in the equity share held by foreign investors.*

In other words, the higher the foreign ownership, the higher for all the important equilibrium outcomes. It is one "win-win-win" result when there is excess burden of taxation. From the above propositions 4 and 5, we may infer the important policy implication: the host country should improve macro-scope governance to attract more foreign investor's incentive to own the share of domestic private firms under liberalized capital market policy for improving consumer and social welfare.

4. Conclusions

We used a mixed oligopoly model with foreign penetration examining how the policy burden and foreign competition will affect the privatization policy in the presence of strategic tax/subsidy policies. We showed that (1) The optimum subsidy rate is always positive and the optimal privatization policy is partial privatization in

the presence of social cost of public fund and foreign ownership; (2) The optimum subsidy rate and the degree of privatization are decreasing in the social cost of public fund; (3) The optimum subsidy rate is increasing and the degree of privatization is decreasing in the degree of foreign ownership; (4) The profit of the privatized firm and private firms, the consumer surplus and social welfare are decreasing in the social cost of public fund, but are increasing in the equity share held by foreign investors. The important policy implication is that the host country should improve macro-scope governance to attract more foreign investor's incentive to own the share of domestic private firms under liberalized capital market policy for improving consumer and social welfare.

References

Brander, J.A., & Spencer, B.J. (1984). Trade warfare: tariffs and cartels. *Journal of International Economics*, 16, 227-242.

Brander, J. A., & Spencer, B. J. (1985). Export subsidies and international market share rivalry. *Journal of international Economics*, 18, 83-100.

Capuano, C., & De Feo, G. (2010). Privatization in oligopoly: the impact of the shadow cost of public funds. *Rivista Italiana Degli Economisti*, 15, 175-208.

Chang, W.W. (2005). Optimal trade and privatization policies in an international duopoly with cost asymmetry. *Journal of International Trade & Economic Development*, 14, 19-42.

Chang, W.W. (2007). Optimal trade, industrial, and privatization policies in a mixed duopoly with strategic managerial incentives. *Journal of International Trade & Economic Development*, 16, 31-51.

Chao, C.C., & Yu, E.S.H. (2006). Partial privatization, foreign competition, and optimum tariff. *Review of International Economics*, 14, 87-92.

Collie, D. (1993). Strategic trade policy under asymmetric oligopoly. *European Journal of Political Economy*, 9, 275-280.

De Fraja, G., & Delbono, F. (1989). Alternative strategies of a public enterprise in oligopoly. *Oxford Economic Papers*, 41, 302-311.

Eaton, J., & Grossman, G. M. (1986). Optimal trade and industrial policy under oligopoly. *Quarterly Journal of Economics*, 101, 383-406.

Fjell, K., & Pal, D. (1996). A mixed oligopoly in the presence of foreign private firms. *Canadian Journal of Economics*, 29, 737-743.

Fjell, K., & Heywood, J. S. (2002). Public Stackelberg leadership in a mixed oligopoly with foreign firms. *Australian Economic Papers*, 41, 267-281.

Han, L. (2012). Strategic privatization and trade policies in an international mixed oligopoly. *The Manchester School*, 80, 580-602.

Kato, K., & Tomaru, Y. (2007). Mixed oligopoly, privatization, subsidization and the order of firms' moves: several types of objectives. *Economics Letters*, 96, 287-292

Lee, S.H., & Hwang, H.S. (2003). Partial ownership for the public firm and competition. *Japanese Economic Review*, 54, 324-335.

Lee, S.H., Xu, L.L., & Chen, Z. (2013). Competitive privatization and tariff policies in an international mixed duopoly. *The Manchester School*, 81, 763-779.

Lin, J. Y., & Li, Z. (2008). Policy burden, privatization and soft budget constraint. *Journal of Comparative Economics*, 36, 90-102.

Lin, M.S., & Matsumura, T. (2012). Presence of foreign investors in privatized firms and privatization policy. *Journal of Economics*, 107, 71-80.

Long, V. N., & Stähler, F. (2009). Trade policy and mixed enterprises. *Canadian Journal of Economics,* 42, 590-614.

Matsumura, T. (1998). Partial privatization in a mixed duopoly. *Journal of Public Economics*, 70, 473-483.

Matsumura, T. (2003). Stackelberg mixed duopoly with a foreign competitor. *Bulletin of Economic Research*, 55, 275-287.

Matsumura, T., & Okumura, Y. (2013). Privatization neutrality theorem revisited. *Economics Letters*, 118, 324-326.

Matsumura, T., & Tomaru, Y. (2013). Mixed duopoly, privatization, and subsidization with excess burden of taxation. *Canadian Journal of Economics*, 46, 526-554.

Matsumura, T., & Tomaru, Y. (2012). Market structure and privatization policy under International competition. *Japanese Economic Review*, 63, 244-258.

Mukherjee, A., & Sinha, U. B. (2014). Can cost asymmetry be a rationale for privatisation? *International Review of Economics and Finance*, 29, 497-503.

Pal, D., & White, M.D. (1998). Mixed oligopoly, privatization, and strategic trade policy. *Southern Economic Journal*, 65, 264-281.

Pal, D., & White, M.D. (2003). Intra-industry trade and strategic trade police in the presence of public firms. *International Economic Journal*, 17, 29-41.

Tomaru, Y. (2006). Mixed oligopoly, partial privatization and subsidization. *Economics Bulletin*, 12(5), 1-6.

Wang, L.F.S., & Chen, T-L. (2010). Do cost efficiency gap and foreign competitors matter concerning optimal privatization policy at the free entry market? *Journal of Economics*, 100, 33-49.

Wang, L. F. S., & Chen, T-L. (2011). Privatization, efficiency gap, and subsidization with excess taxation burden. *Hitotsubashi Journal of Economics*, 52, 55-68.

Wang, L.F.S., Lee, J.Y., & Hsu, C.C. (2014). Privatization, foreign competition and social efficiency of free entry. *International Review of Economics and Finance*, 31, 138-147.

Wang, L.F.S., Lee, J.Y., & Huang, C.S. (2012). Maximum-revenue and optimum-welfare tariffs in international mixed duopoly: does the order of firms' move matter? *Journal of Industry, Competition and Trade*, 12, 273-283.

Wang, L.F.S., Wang, Y.C., & Zhao, L. (2009). Privatization and efficiency gain in an international mixed oligopoly with asymmetric costs. *Japanese Economic Review*, 60, 539-559.

White, M. D. (1996). Mixed oligopoly, privatization and subsidization. *Economics Letters*, 53, 189-195.

Yu, R., & Lee, S.H. (2011). Optimal trade and privatization policies in an international mixed market. *Seoul Journal of Economics*, 24, 51-71.