The University of Nottingham

# research paper series

Theory and Methods

Research Paper 2007/21

## *Privatisation, strategic foreign direct investment and the host country welfare*

**by**

Arijit Mukherjee and Kullapat Suetrong

The Centre acknowledges financial support from The Leverhulme Trust under Programme Grant F114/BF

GEP Leverhulme Centre for Research on Globalisation and Economic Policy

**The Authors**

Arijit Mukherjee is an Associate Professor in the School of Economics, University of Nottingham, and an Internal Fellow in the Leverhulme Centre for Research on Globalisation and Economic Policy. Kullapat Suetrong is a Postgraduate Research Student in the School of Economics, University of Nottingham.

**Acknowledgements**

We thank Hartmut Egger, Catia Montagna, Zhihong Yu, and the seminar participants at the Univeristy of Nottingham and the 6th postgraduate conference for useful comments and suggestions. A. Mukherjee gratefully acknowledges financial support from The Leverhulme Trust under Programme Grant F114/BF. K. Suetrong thanks the Royal Thai Government for financial support. The usual disclaimer applies.

# Privatisation, strategic foreign direct investment and the host country welfare

**by**

**Arijit Mukherjee and Kullapat Suetrong**

## Abstract

Recent evidence shows that developing countries and transition economies are increasingly privatising their public firms and at the same time experiencing rapid growth of inward foreign direct investment (FDI). In an international mixed oligopoly, we analyse the interaction between privatisation and FDI. We show that privatisation increases the incentive for FDI, which in turn, increases the incentive for privatisation compared to the situation of no FDI. The optimal degree of privatisation depends on the cost difference between the public and the foreign firms, and on the foreign firm's mode of entry. We show that our results are robust with respect to the incentive contracts between the owners and the managers. The incentive for FDI and is higher under the incentive contract than under the no incentive contract, and the optimal degree of privatisation is almost always higher under the incentive contract than under the no incentive contract.

**JEL Classifications:** F12; F13; F23; L13; L33

**Key Words:** Privatisation; FDI; Welfare; Incentive contract

## Outline

## Non-Technical Summary

Recent evidence shows that developing countries and transition economies are increasingly privatising their public firms and at the same time experiencing rapid growth of inward foreign direct investment (FDI). We analyse the interaction between privatisation and FDI under an international mixed oligopoly framework. The host country government is considering to partially privatise its public firm, and a private firm in the home country is deciding to serve the host country by undertaking FDI or exporting. We show that privatisation increases the incentive for FDI and the possibility of FDI increases the incentive for privatisation compared to the situation of no FDI. The optimal degree of privatisation depends on the cost difference between the public and the foreign firms, and on the foreign firm's mode of entry. We also show that our results are robust with respect to the incentive contracts between the owners and the managers. The incentive for FDI is higher under the incentive contract than under the no incentive contract, and the optimal degree of privatisation is almost always higher under the incentive contract than under the no incentive contract.

## 1. Introduction

Two important developments in many developing and transition economies are the privatisation of their state-owned enterprises across several sectors and the significant inflow of foreign direct investments (FDI). Is there any relationship between privatisation and FDI? We address this question in this paper. To the best of our knowledge, this is the first theoretical paper that considers the relationship between the incentives for privatisation and FDI.

In a mixed Cournot oligopoly, we show that privatisation of a public firm in the host country increases foreign firm's incentive for FDI. And with the possibility of FDI, the government will have higher incentive for privatisation compared to the situation of no FDI. We find that partial privatisation is the optimal strategy of the host country. In other words, neither complete privatisation nor complete nationalisation maximises the host country welfare in presence of foreign competition. This result is in line with the evidences suggested by Maw (2002), which shows that partial privatisation of the public firms are mostly observed in transition countries while their economies are increasingly open to foreign competitions.

We extend our basic analysis to incorporate the implications of incentive contracts where the owners hire managers to decide on the output level based on the given contracts which are the combination of profit and revenue. As pointed out by Fershtman and Judd (1987) that strategic benefit in the oligopolistic product markets may induce the owners of the firms to distort their managers' objectives away from strict profit maximisation. In this present paper, we show that the positive relationship between privatisation and FDI, and partial privatisation as the optimal choice of the host country remain even under the incentives scheme. However, the incentive for FDI is higher under the incentive contracts than under no incentive contract, and the

optimal degree of privatisation is almost always higher under the incentive contracts than under the no incentive contract.[1]

Our results are in line with the empirical evidences. Using annual data for 1990-99 for eight Asian and nine Latin American and Caribbean countries, Gani (2005) provides strong evidence that privatisation is positively related to FDI. In an earlier study on Latin America, Baer (1994) notes that the presence of foreign capital has increased as the presence of state has declined. It is also mentioned in UNCTAD (2002) that along with a combination of several reform measures such as improved investment climate, openness to trade and FDI, macroeconomic stability, etc., privatisation has increased FDI inflow over the 1990s. Focusing on the Central and Eastern European countries (CEECs), Marlevede and Schoors (2005) show the effect of direct privatisation sale, which is more likely to be invested by the foreign investors, and non-direct privatisation sale (i.e., vouchers and insider sale), which is less likely to be invested by the foreign investors, on FDI. They show that privatisation history positively affects FDI irrespective of direct or non-direct privatisation, though direct privatisation has an immediate positive effect on FDI.

It has been found that, during 2000-2003, China accounted for almost 90 per cent of the privatisation proceeds[2] in East Asia and the Pacific and it is, at the same

[1] Like most of the literature on privatisation, we consider the situation where privatisation implies the sale of shares of the public firm to the domestic private sector, and show the effects of privatisation on FDI. The overviews of privatisation literature are provided in Vickers and Yarrow (1991) and Schmidt and Schnitzer (1997). There is a recent literature that considers the situation where foreign investors take over a part or whole of the public firms in the host countries, which is often called "foreign privatisation" (see, e.g., Kalotay and Hunya, 2000, Norbäck and Persson, 2004 and 2005, Merlevede and Schoors, 2005). However, as mentioned in Norbäck and Persson (2005), often some countries restrict foreign individuals and firms to acquire domestic firms, or apply special restrictions to foreign firms in certain industries, as is the case in Malaysia and the Republic of Korea, for example. Though the practice of the countries in this respect changes over time, the government policies still favour green-field investment (UNCTAD, 2000). Hence, our analysis is more relevant for the economies where the domestic private sectors hold shares of the public firms.

[2] Privatisation proceeds are defined to include all monetary receipts to the government resulting from partial and complete divestitures (via asset sales or sale of shares), concessions, leases, and other arrangements. The data do not cover management contracts, new green field investments, investments

time, the biggest FDI recipient in the region. India also shares a similar story. Other regions, such as Latin America and Europe and Central Asia, also recorded the same trend of FDI and privatisation proceeds.[3] Figure 1 shows the relationship between privatisation and FDI in the developing countries. In general, the figure shows similar trends for both FDI and privatisation proceeds of the developing countries, thus suggesting a positive relationship between FDI and privatisation.[4]

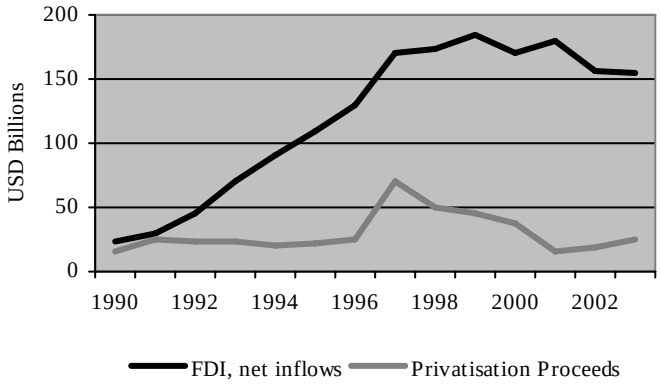


Figure 1: Total FDI and privatisation proceeds from all developing countries
Source: Kikeri and Kolo (2005), World Bank Development Data Platform and FDI database

The remainder of the paper is structured as follows. The next section describes the related literature and indicates the present paper's contribution to the literature on privatisation. Section 3 explains the setting of the basic model. The effects of privatisation on FDI incentive and welfare are demonstrated in Section 4. Section 5 extends the basic model by considering the implications of the incentive contracts. Section 6 concludes.

committed by new private operators as part of concession agreements, and 'voucher' privatisations (Kikeri and Kolo, 2005).

[3] Kikeri and Kolo (2005) provide full details on privatisation in developing countries.

[4] It is important to note that this figure represents the effect of privatisation and FDI at an aggregate level, and therefore, it is not showing explicitly whether the sectors or the developing countries where privatisation has taken place are also the sectors or the developing countries experiencing higher FDI.

## 2. Related literature

The studies related to privatisation are generally demonstrated in a mixed oligopoly framework. A mixed oligopoly market is characterised by a market that has a small number of firms and the objective function of at least one firm is different from the others. Specifically, it is the market that comprises of both public and private firms in which the public firm maximises welfare, whereas the firm owned by the private agent aims to maximise profit.[5] Moreover, the literature on privatisation analysis has, for the most part, considered the case of a closed economy which consists of a number of producers and consumers that are in the same country.

Because of the growing evidences on privatisation, a fair attention has already paid to show the effects of privatisation on social welfare, yet the conclusion is inconclusive. Furthermore, while literatures on privatisation and FDI are growing in numbers, to the best of our knowledge, there seems to exist no theoretical study investigating the relationship between privatisation and FDI. This present paper attempts to create a bridge between the literatures on privatisation and FDI. [6]

The seminal works on privatisation by Harris and Wiens (1980), Beato and Mas-Colell (1984) and Cremer et al. (1989) are in favour of full nationalisation of the public firm. The papers show how a public firm can be used as an effective policy instrument to reduce inefficiency created in imperfect competitive markets. The public firm, who maximises social welfare, acts as a disciplining device and helps to obtain the first best allocation of outputs.

Recent work by Barros (1995) introduces the incentive contracts in a principal-agent framework where each firm hires manager to control its production

[5] In case of a partially nationalised firm, the firm puts positive weights on both welfare and profits. De Fraja and Delbono (1989) provide definition of mixed oligopoly in more details.
[6] Pal and White (1998) provide an excellent survey on privatisation in mixed oligopoly.

output. The analysis suggests that privatisation leads to a fall in welfare as there is a fall in consumer surplus when the public firm maximises profit instead of social welfare. Hence, the country is better off with a state-owned firm.

In contrast, using a model with adverse selection, Rees (1988) suggests that inefficiencies arise with the performance of public enterprise, thus questioning the rationale for having public firms. The works on privatisation get further momentum with De Fraja and Delbono (1989), which determine the welfare effects of privatisation in a mixed oligopoly, where a welfare maximising state-owned firm competes with $n$ profit maximising private firms. They show that privatisation may increase welfare if the marginal costs of production are rising.

Anderson et al. (1997) show a source of welfare loss due to a public firm when there is a domestic free entry. The paper shows that while privatisation of the public firm may produce negative effect in the short run; it can be beneficial in the long run as privatisation induces entry of the domestic firms provided that consumers have a taste for product variety and the public firm was making loss prior privatisation. In a model which comprises of one public firm competing with private firms that offer differentiated products, the public firm acts as an entry deterrent by keeping the price low, so that the private competitors have to lower their mark-ups. Privatisation would lead to higher product prices and a lower welfare in the short run. In the long run, a reduction in the role of the public firm encourages the entry of domestic firms, increasing product varieties to the market.

While earlier works compare complete privatisation with complete nationalisation, Fershtman (1990) and Matsumura (1998) have put forward justifications for partial privatisation. In a mixed duopoly, Fershtman (1990) shows that the market equilibrium can be such that the partially privatised firm realises

higher profit than its private, profit-maximising, competitor. Assuming that the two firms are equal in cost, the partial nationalisation serves as a credible commitment to increase output beyond the profit maximising level. Such degree of nationalisation shifts the firm's reaction function rightward, leading to a higher market share of the public firm while reducing the private firm's share. The paper also allows for the asymmetry in the firms' cost where the public firm is relatively cost inefficient than the private firm. In such a situation, the welfare effect of nationalisation depends on the relative gain in consumer surplus and the loss from allocative efficiency. If the public firm is more cost inefficient than its private competitor, nationalisation may reduce welfare.

Matsumura (1998) investigate the extent to which the government should control the public firm. More specifically, the paper determines the optimal shareholding by the government in a privatised public firm. In a mixed duopoly where products are perfect substitutes, the paper shows that full nationalisation is welfare reducing unless the public firm is a monopoly in the product market. However, whether partial or complete privatisation is optimal depends on the cost difference between the public and private firms. If the firms are equal in cost or the public firm is strictly more cost efficient than the private firm, full privatisation is never the optimal policy. However, irrespective to the firms' cost structure, the public firm should be (at least partially) privatised. If the cost of the public firm is sufficiently higher than that of the private firm, complete privatisation is the optimal strategy.

A common feature of these papers is to consider privatisation in a closed economy. Though these studies have their own merits, they are not appropriate for economies where significant amount of competition is due to the presence of foreign firms. The present paper is more close to the recently growing literature on

privatisation in an open economy where a great deal of competition is due to foreign competition. However, most of these papers are mainly concentrated on privatisation and strategic trade policies issue[7].

Pal and White (1998) investigate privatisation effect in presence of strategic trade policies such as domestic production subsidies and import tariffs. The paper indicates that even though the public firm is as efficient as the private firm, privatisation may still improve welfare. If the production subsidy is used as the policy instrument, welfare improves with privatisation. Alternatively, if tariffs are used, welfare can increase provided there are at least two firms in the market and the marginal cost curve for production is not very flat.

Ohori (2004) shows the effects of privatisation on tariff and environmental taxes and shows that privatisation is not beneficial for social welfare. Thereafter, Ohori (2006) considers strategic government policies in an economy where two public firms compete in a third country through exports. The paper shows that partial privatisation of the state-owned enterprises is the optimal strategy of the respective countries.

Unlike the above-mentioned papers, Fjell and Heywood (2002) and Isibashi et al. (2005) are the only few papers which consider privatisation in an open economy without other strategic government policies.

Fjell and Heywood (2002) consider privatisation effects when a public firm behaves like a Stackelberg leader where there are *m* domestic private firms and *n* foreign private firms acting as Cournot followers. Assuming that the public firm retains its Stackelberg leader even after privatisation, the paper shows that the welfare

[7] There are other papers investigate the issue of privatisation in this type of framework. However, we do not attempt to review them here. They are Fujiwara (2006), Chang (2005), and Chao and Yu (2006).

effects on firms' outputs, profits and welfare depend upon the relative number of domestic and foreign firms.

Isibashi et al. (2005) extend Anderson et al. (1997) to the case with foreign competitors, and show that privatisation is more likely to increase welfare in the long run when the competitors of the public firm are foreign than when they are domestic. However, neither Fjell and Heywood (2002) nor Isibashi et al. (2005) consider the optimal degree of privatisation.

Though, there are some studies looking at privatisation in open economies, a common feature of these studies is to ignore FDI by the foreign firms. To the best of our knowledge, there is only another paper by Norbäck and Persson (2005) that considers both privatisation and FDI. However, our focus is completely different from theirs by at least two important points. Firstly, we show how the degree of privatisation affects and is also affected by FDI, whereas they show that while selling assets of a state-owned firm whether it is welfare improving to allow a foreign firm to acquire this asset when the foreign firm has the option to enter the market by exporting and FDI. So, unlike us, they do not consider the effects of privatisation on FDI and vice versa. Instead, they determine whether it is better to sell the asset of a state-owned firm to a foreign investor or to a domestic investor. Another important difference to note is that, in their analysis, the state-owned firm is not a competitor in the product market, whereas in our analysis, the foreign firm competes with the state-owned firm.

The present paper is also related to the vast literature on FDI. While the existing literature on FDI has explained the reasons for doing FDI compared to other modes of foreign market entry such as exporting, technology licensing, etc., and also uncovered several issues related to FDI, those works have focused on profit

maximising private firms, thus ignoring the issue of privatisation. Instead of reviewing the vast literature on FDI, we refer to Pack and Saggi (1997) and Saggi (2002) for recent surveys on FDI.

## 3. The Model

We consider a two-country model, which consists of a home country and a host country, and assume that there is one firm in each country. The firms produce a homogenous product. The firm in the home country is called firm $M$. Firm $M$ would like to serve the demand in the host country market either by FDI or by exports. The firm in the host country is a public (or state-owned) firm, called firm $P$.

An important difference between firms $M$ and $P$ is about their objective functions. While the former firm maximises profit, the latter firm maximises a convex combination of profit and social welfare depending on the share distribution between the government and the private owners of the host country.[8] In the following analysis, we will assume that, at the beginning, firm $P$ is completely nationalised, which means that, to start with, the objective function of firm $P$ is to maximise the welfare of the host country.

We consider the following cost structure for the firms. We assume that the constant marginal cost of firm $P$ is $c_p$. The constant marginal costs of firm $M$ under export and FDI are respectively $c_X$ and $c_f$, where $c_f < c_x$. For simplicity, we normalise $c_f$ to $0$. We assume that firm $M$ is more cost efficient than firm $P$, with the following relationship between the marginal costs: $0 = c_f < c_X \leq c_p$. We assume that, under FDI, firm $M$ needs to incur a fixed cost $f$.

[8] We consider privatisation as the process of a change in the structure of the public firm. Privatisation reflects the transfer of the public firm's ownership from the government to the private owners.

We further assume that the inverse market demand function in the host country is $p = a - Q$ where the notations have the usual meanings, and $a > c_i$ where $i = x, f, p$.

In the next section, we consider the following game. At stage 1, the host country government decides on the level of privatisation, i.e., the fraction of shareholdings of firm $P$ that can be held by the private owners of the host country. At stage 2, firm $M$ decides whether to undertake export or FDI. At stage 3, the firms compete in the product market like Cournot duopolists. We solve the game through backward induction.

## 4. The effects of privatisation on the FDI incentive and social welfare

*4.1. Privatisation and FDI incentives*

The objective of firm $M$ is to maximise its profits. Therefore, firm $M$ maximises

$$\pi^m = (a - q_m - q_p - c_m)q_m - K \qquad (1)$$

where $q_m$ and $q_p$ denote the outputs of firms $M$ and $P$ respectively. We have $c_m$ and $K$ equal to $c_x$ and 0 respectively under export, while $c_m$ and $K$ equal to 0 and $f$ respectively under FDI.

The objective function of firm $P$ depends on the share distribution between the government and the private owners of the host country. Following the existing literature (e.g., Fershtman, 1990), we assume that firm $P$ maximises a convex combination of profit and social welfare, where the weights on profits and social welfare are given by the fractions of shareholdings by the private owner and the government of the host country. As a justification for this type of objective function of the public firm, Fershtman (1990) argues that the behaviour of a partly nationalised

firm result from a conflict of interests between the directors representing the private owners' interests and the directors representing the government's interest. This conflict of interests is assumed to be resolved through a compromise. Consequently, the firm's output choice is a compromise between the output that maximises profits and the output that maximises welfare.

So, the objective function of firm $P$ is:

$$Obj^{p} = \alpha\pi^{p} + (1-\alpha)w \qquad (2)$$

where $\alpha$ indicates the level of privatisation, i.e., the fraction of shareholdings by the private owners. Note that complete nationalisation and complete privatisation are the special cases of equation (2). If firm $P$ is completely privatised, $\alpha$ becomes one, and if firm $P$ is completely nationalised, $\alpha$ becomes zero. Specifically, the higher the $\alpha$, the lesser the government holds shares in the privatised firm and the firm moves more towards profit maximisation. Equation (2) can be expanded to:

$$Obj^{p} = \alpha(a - q_m - q_p - c_p)q_p + (1-\alpha)\left[(a - q_m - q_p - c_p)q_p + \frac{(q_m + q_p)^2}{2}\right]$$

$$= (a - q_m - q_p - c_p)q_p + (1-\alpha)\left[\frac{(q_m + q_p)^2}{2}\right]. \qquad (3)$$

We find that the equilibrium outputs of firms $P$ and $M$ are respectively $\frac{(a(2-\alpha)+\alpha c_m - 2c_p)}{2+\alpha}$ and $\frac{(a\alpha-(1+\alpha)c_m + c_p)}{2+\alpha}$. The total output is $\frac{2a - c_m - c_p}{2+\alpha}$. Substituting these equilibrium outputs into both firms' objective functions yield the following:

$$Obj^{p} = \frac{2(a\alpha - c_p(1+\alpha) + c_m)(a(2-\alpha) - 2c_p + \alpha c_m) + (1-\alpha)(2a - c_m - c_p)^2}{2(2+\alpha)^2} \qquad (4)$$

$$\pi^{m} = \left[\frac{a\alpha - (1+\alpha)c_m + c_p}{2+\alpha}\right]^2 \qquad (5)$$

Note that under complete privatisation, $c_p$ must be less than $\frac{a}{2}$ to ensure a duopoly market structure. We assume that this condition holds throughout our analysis.

It is worth pointing out that, if the degree of privatisation is not very high, the profit generated in the (partially) privatised firm is negative. Hence, it is important to discuss why the private sector is interested to buy the shares of the public firm. There are at least two ways to induce the shareholding in the public firm by the private sector. First, the government can induce the private investors to acquire shares of the public firm by offering them a lump sum payment, which can be generated by imposing lump sum tax on the consumers. Since this lump sum payment simply represents a redistribution of surplus between consumers and private producers, output equilibriums and degree of privatisation are not affected. In other words, if a properly chosen degree of privatisation maximises social welfare, while creating negative profit in the public firm, there is always the case for compensating the private sector investors through non-distortionary subsidy for inducing them to buy the shares of the public firm. Another way to induce the private sector investors in acquiring shares of the public firm is to impose a minimum profit requirement for the public firm. However, as evident from Saha and Sensarma (2003) this constraint on the profit of the public firm induces the government to privatise in a way that generates lower welfare compared to situation with no such constraint. Hence, the first procedure dominates the effect of the second one, and our analysis assumes that such a tax-subsidy mechanism mentioned in the first procedure can be introduced effectively to induce the private sector investors to buy the shares of the public firm.

Let us now consider the optimal production strategy of firm $M$. Given the level of privatisation, firm $M$ prefers to undertake FDI than export provided:

$$\pi_f^{m,p} > \pi_x^{m,p}$$

$$\left(\frac{a\alpha + c_p}{2+\alpha}\right)^2 - f > \left(\frac{a\alpha - c_x(1+\alpha) + c_p}{2+\alpha}\right)^2 \tag{6}$$

$$\frac{c_x(1+\alpha)(2a\alpha + 2c_p - (1+\alpha)c_x)}{(2+\alpha)^2} = f_p(\alpha) > f \tag{7}$$

where $\pi_f^{m,p}$ and $\pi_x^{m,p}$ represent the profits of firm *M* from FDI and export respectively. Equation (7) suggests that firm *M* chooses to undertake FDI if and only if the fixed cost $f$ is lower than the critical value $f_p(\alpha)$, where $f_p(\alpha)$ represents the difference between the gross profits of firm $M$ under FDI and export. The higher $f_p(\alpha)$, the greater the gross profit difference between FDI and export and, therefore, the higher the incentive for FDI.

Let us now see how the incentive for FDI changes with respect to the degree of privatisation, i.e., how $f_p(\alpha)$ changes with respect to $\alpha$. We find that

$$X = \frac{df_p(\alpha)}{d\alpha} = \frac{2c_x(a + 2a\alpha - c_x - \alpha c_x + c_p)}{4\alpha + \alpha^2 + 4} + \frac{2c_x(c_x - 2c_p - 2\alpha c_p - 2a\alpha + 2\alpha c_x - 2a\alpha^2 + \alpha^2 c_x)}{12\alpha + 6\alpha^2 + \alpha^3 + 8} \tag{8}$$

Ceteris paribus, we find that $X$ becomes smaller as $c_p$ rises, and this is shown in the following equation:

$$\frac{dX}{dc_p} = \left(\frac{2c_x}{4\alpha + \alpha^2 + 4}\right) - \left(\frac{4c_x(1+\alpha)}{12\alpha + 6\alpha^2 + \alpha^3 + 8}\right) < 0 \tag{9}$$

Further, we get that $X > 0$ at $c_p = \frac{a}{2}$. Hence, this implies that, $X = \frac{df_p(\alpha)}{d\alpha}$ is always positive, i.e., the incentive for FDI increases with $\alpha$ (or higher degree of privatisation).

The following proposition follows from the above discussion.

***Proposition 1****: As the degree of privatisation increases, the incentive for FDI increases.*

The above result can be explained as follows. If the host country government increases the degree of privatisation in firm $P$, the objective of firm $P$ moves from welfare maximisation towards profit maximisation. As a result, given the output of firm $M$, a higher degree of privatisation shifts the reaction function of firm $P$ inward, and in the new equilibrium, the output of firm $M$ increases, while the output of firm $P$ decreases. Furthermore, the gain in market share by firm $M$ increases with its lower marginal cost of production, which, in turn, implies that a higher degree of privatisation increases the outputs and profits of firm $M$ more under FDI than under export. Hence, the incentive for FDI increases with a higher degree of privatisation.

It is worth noting that the derivative of $f_p(\alpha)$ with respect to $c_x$ is positive, suggesting that a fall in $c_x$ reduces $f_p(\alpha)$. Assuming that $c_x$ involves trade costs, this relationship between $c_x$ and $f_p(\alpha)$ implies that, ceteris paribus, trade liberalisation, which helps to reduce the trade cost, reduces the incentive for FDI. This is consistent with the well-known "tariff jumping" argument, which states that lower trade costs reduce the incentive for FDI.

*4.2. Privatisation and the host country welfare*

The purpose of this section is to find the optimal degree of privatisation for the host country. Since Proposition 1 suggests that a higher degree of privatisation increases the incentive for FDI, i.e., $f_p(\alpha)$ is positively related to $\alpha$, it is immediate that FDI

will always occur irrespective of the degree of privatisation if $f < f_p(0)$ and FDI will never occur irrespective of the degree of privatisation if $f > f_p(1)$. Therefore, depending on the fixed cost of FDI, we have the following three possibilities: (i) (F,F),[9] i.e., firm *M* always undertakes FDI irrespective of the degree of privatisation, and it occurs for $f < f_p(0)$, (ii) (X,X), i.e., firm *M* always exports irrespective of the degree of privatisation, and it occurs for $f > f_p(1)$, and (iii) (X,F), i.e., privatisation may induce firm *M* to switch its mode of production from exporting to FDI, and it occurs for $f_p(0) < f < f_p(1)$.

Let us now determine the host country welfare. Given the degree of privatisation, the host country welfare is:

$$w(\alpha) = \frac{2(a\alpha - c_p(1+\alpha) + c_m)(a(2-\alpha) - 2c_p + \alpha c_m) + (2a - c_p - c_m)^2}{2(2+\alpha)^2}, \tag{10}$$

where $c_m = c_x$ if firm $M$ exports and $c_m = 0$ if firm $M$ undertakes FDI.

*4.2.1. Case when the foreign firm always undertakes FDI*

Now, we are in a position to determine the optimal degree of privatisation depending on the plant location strategy of firm $M$. First, let us consider the situation where the fixed cost of FDI is sufficiently small so that $f < f_p(0)$, i.e., we have the situation (F,F). In this situation, given the degree of privatisation, the host country welfare is:

$$w_p^f(\alpha) = \frac{2(a\alpha - c_p(1+\alpha))(a(2-\alpha) - 2c_p) + (2a - c_p)^2}{2(2+\alpha)^2} \tag{11}$$

Differentiating $w_p^f$ with respect to $\alpha$, we obtain:

[9] The first (second) letter in the bracket indicates the firm's mode of entry before (after) privatisation takes place.

$$A = \frac{\partial w_p^f}{\partial \alpha} = \left( \frac{2a\alpha c_p - 3ac_p + 2a^2 - 2a^2\alpha + 2c_p^2}{4\alpha + \alpha^2 + 4} \right) + \left( \frac{8ac_p + 6a\alpha c_p - 4a^2 - 4a^2\alpha - 5c_p^2 - 4\alpha c_p^2 - 2a\alpha^2 c_p + 2a^2\alpha^2}{12\alpha + 6\alpha^2 + \alpha^3 + 8} \right) \quad (12)$$

Further, differentiating $A$ with respect to $c_p$ yields:

$$\frac{\partial A}{\partial c_p} = \left( \frac{2a\alpha - 3a + 4c_p}{4\alpha + \alpha^2 + 4} \right) + \left( \frac{8a + 6a\alpha - 10c_p - 8ac_p - 2a\alpha^2}{12\alpha + 6\alpha^2 + \alpha^3 + 8} \right) > 0, \quad (13)$$

which suggests that $A$ is positively related to $c_p$. We also find that:

(i) if $c_p = 0$ and $\alpha = 0$, $A = 0$

(ii) if $c_p = 0$ and $\alpha > 0$, $A < 0$

(iii) if $c_p = \frac{a}{2}$ and $\alpha = 0$, $A > 0$

(iv) if $c_p = \frac{a}{2}$ and $\alpha = 1$, $A < 0$

(v) At any given $c_p$, $A$ reduces with higher $\alpha$.

(vi) At any given $\alpha$, the relationship between $A$ and $c_p$ is concave, and the value of $c_p$ that maximises *A* is greater than $\frac{a}{2}$. Hence, *A* shows a positive slope for $c_p \in \left(0, \frac{a}{2}\right)$.

The information obtained above enables us to construct Figure 2 which illustrates the relationship between $A$, $c_p$ and $\alpha$.

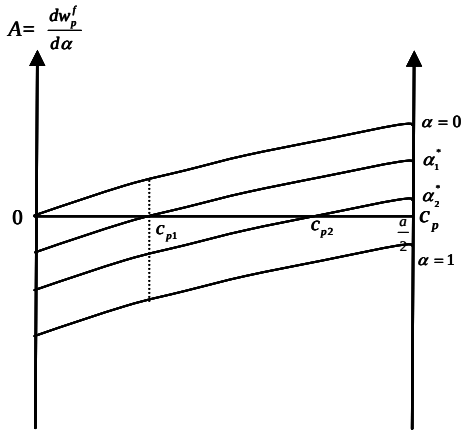


Figure 2. The effect of privatisation on welfare when the foreign firm always undertake FDI

It is clear from Figure 2 that if $c_p$ could be equal to $0$, any degree of privatisation would reduce the host country welfare if firm $M$ always undertake FDI. However, for any $c_p$ such that $0 < c_p < \frac{a}{2}$, there always exists a value of $\alpha \in (0,1)$ such that $A = 0$, which implies that partial privatisation is always an optimal strategy for the host country government. For example, if $c_p = c_{p1}$, the optimal degree of privatisation is $\alpha = \alpha_1^*$. Further, $\alpha^*$, which indicates the degree of privatisation that maximises the host country welfare for a given $c_p$, increases with higher $c_p$. It is also clear from Figure 2 that a complete privatisation is never optimal if firm $M$ always undertakes FDI.

The above discussion is summarised in the following proposition.

***Proposition 2****: Given that* $0 = c_f < c_X \leq c_p$ *and assuming that the fixed cost of FDI is very small so that the foreign firm always undertakes FDI irrespective of the degree of privatisation, partial privatisation is the optimal strategy of the host country government for any* $c_p \in (0, \frac{a}{2})$.

The reason for the above finding can be explained as follows. Since a higher degree of privatisation reduces the weight on welfare maximisation and increases the weight on profit maximisation for the public firm, it tends to lower the consumer surplus by restricting the output of the public firm, thus creating a negative impact on the host country welfare. However, this output reduction by the public firm is being partially compensated by the higher output of the foreign firm, thus reducing the negative impact of lower output by the public firm. Moreover, the lower the marginal cost of the foreign firm compared to the public firm, the lower the effect of consumer surplus loss due to privatisation. There is also another effect of privatisation. A higher degree of privatisation increases the profit of the public firm, thus creating a positive impact on the host country welfare.

If the public firm is (almost) completely nationalised, the significantly higher weight on welfare maximisation induces the public firm to produce a large amount of output. Hence, a slight amount of privatisation does not have significant negative effects on consumer surplus, while it helps to increase the profit of the public firm. Therefore, if the public firm is (almost) completely nationalised, the effect of higher profit generation due to privatisation dominates the loss of consumer surplus, for any cost difference between the public firm and the foreign firm, thus creating an incentive for privatisation.

On the other hand, if the public firm is almost completely privatised, the output of the public firm is not very large, and a further reduction of the public firm's output due to privatisation creates a significant negative impact on consumer surplus. Hence, in this situation, the loss of consumer surplus due to privatisation dominates the effect of higher profit in the public firm, thus reducing the incentive for

privatisation. Therefore, for any cost difference between the public firm and the foreign firm, there exists a degree of privatisation that balances the positive effect of higher profit in the public firm and the negative effect of the loss of consumer surplus due to privatisation, and gives us the optimal degree of privatisation. Furthermore, as the cost efficiency of the foreign firm compared to the public firm increases, it reduces the loss of consumer surplus for a given degree of privatisation, thus increasing the incentive for higher degree of privatisation. Hence, as the cost difference between the foreign firm and the public firm increases, it increases the optimal degree of privatisation.

*4.2.2. Case when the foreign firm always exports*

Let us now consider the situation where the fixed cost of FDI is sufficiently high so that $f > f_p(1)$, and firm *M* always exports irrespective of the degree of privatisation. In this situation, the host country welfare is:

$$w(\alpha) = \frac{2\left(a\alpha - c_p(1+\alpha) + c_x\right)\left(a(2-\alpha) - 2c_p + \alpha c_x\right) + \left(2a - c_p - c_x\right)^2}{2(2+\alpha)^2} \tag{14}$$

The following equation shows the relationship between the host country welfare and degree of privatisation.

$$\begin{aligned} B = \frac{\partial w_p^x}{\partial \alpha} &= \left( \frac{2a\alpha c_p - ac_x - 3ac_p + 2a\alpha c_x - c_p c_x - 2\alpha c_p c_x + 2a^2 - 2a^2\alpha + 2c_p^2 + c_x^2}{4\alpha + \alpha^2 + 4} \right) \\ &+ \left( \frac{8ac_p + 6a\alpha c_p + 2a\alpha c_x + 2c_p c_x + 2\alpha c_p c_x - 4a^2 - 4a^2\alpha - 5c_p^2 - c_x^2 - 4\alpha c_p^2 - 2\alpha c_x^2}{12\alpha + 6\alpha^2 + \alpha^3 + 8} \right) \\ &+ \left( \frac{2\alpha^2 c_p c_x - 2a\alpha^2 c_x - 2a\alpha^2 c_p + 2a^2\alpha^2}{12\alpha + 6\alpha^2 + \alpha^3 + 8} \right) \end{aligned} \tag{15}$$

We also find that:

$$\frac{\partial B}{\partial c_p} = \left( \frac{2a\alpha - 3a + 4c_p - c_x - 2\alpha c_x}{4\alpha + \alpha^2 + 4} \right) + \left( \frac{8a + 6a\alpha - 10c_p + 2c_x - 8\alpha c_p + 2\alpha c_x - 2a\alpha^2 + 2\alpha^2 c_x}{12\alpha + 6\alpha^2 + \alpha^3 + 8} \right) > 0 \quad (16)$$

which suggests that $B$ and $c_p$ are positively related. At any given $\alpha$, the relationship between $B$ and $c_p$ is concave and the value of $c_p$ which maximises $B$ is greater than $\frac{a}{2}$. Hence, $B$ is positively sloped with respect to $c_p$ over the interval $[c_x, \frac{a}{2}]$. We also find that the qualitative relationship between $B$, $c_p$ and $\alpha$ is similar to the relationship between $A$, $c_p$ and $\alpha$ shown in Figure 2. The relationship between $B$, $c_p$ and $\alpha$ is shown in Figure 3.

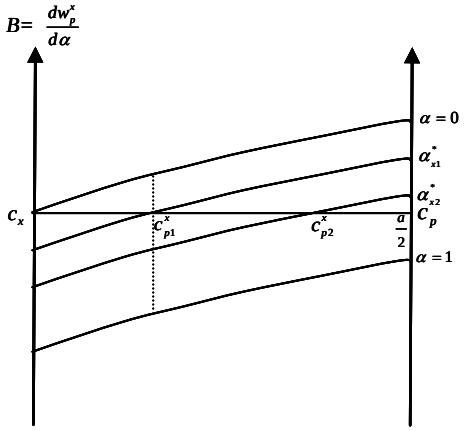


Figure 3: The effect of privatisation on welfare when the foreign firm always exports

Hence, we get the following proposition immediately from Figure 3.

***Proposition 3****: Given that* $0 = c_f < c_X \leq c_p$ *and the fixed cost of FDI is very high so that the foreign firm always exports irrespective of the degree of privatisation, complete nationalisation is the optimal strategy of the host country government if the public firm is equally efficient to the private firm (i.e.,* $c_x = c_p$*), and partial privatisation is the optimal strategy of the host country government if the public firm is cost inefficient than the foreign firm (i.e.,* $c_x < c_p < \frac{a}{2}$*).*

The intuition for the above result is similar to that of Proposition 2.

Since, in Figure 3, the higher difference between $c_p$ and $c_x$ implies the higher degree of privatisation, an implication of the above result is that, ceteris paribus, a fall in $c_x$, which may be the outcome of trade liberalisation, increases the host country government's incentive for privatising its public firm as trade liberalisation increases the cost difference between the public firm and the foreign firm. Hence, trade liberalisation may increase the incentive for privatisation.

*4.2.3. Privatisation attracting FDI*

Let us now consider the situation where the fixed cost of FDI is moderate so that $f_p(0) < f < f_p(1)$. In this situation, the foreign firm exports without any degree of privatisation, whereas it may undertake FDI under a suitable degree of privatisation. Hence, privatisation can induce the foreign firm to switch its production strategy from exporting to FDI. However, it remains to see whether attracting FDI through a privatisation policy is worth for the host country.

From the expressions in equation (6), we find that, given the fixed cost of FDI, there exists a minimum $\alpha$ (say, $\alpha_{f1}$) such that the foreign firm is indifferent between FDI and exporting at this minimum $\alpha$, and if $\alpha$ is greater than this minimum $\alpha$, the foreign firm finds it more profitable to undertake FDI than to export. Furthermore, as the fixed cost of FDI increases, the minimum $\alpha$ that makes the foreign firm indifferent between undertaking FDI and exporting increases. We also find that, while for a given $\alpha$, $c_p$ and $c_x$, the host country welfare is higher under FDI than under exporting by the foreign firm, the *maximum* welfare under exporting by the foreign firm is higher than the welfare "if the foreign firm undertakes FDI and there is complete privatisation".

Depending on the fixed cost of FDI, which determines the minimum $\alpha$ required to attract FDI, the welfare analysis in this subsection can be summarised into three possible cases. Figure 4 shows the situation where the fixed cost of FDI is moderate but sufficiently small so that $\alpha_{f1}$ is less than the value of $\alpha$ that maximises the host country welfare under FDI (say, $\alpha_f^*$). Hence, in this situation, it is clear that the host country government prefers to privatise up to $\alpha_f^*$, since this helps to attract FDI and also maximises the host country welfare under FDI. So, the possibility of FDI under privatisation induces the host country government to increase the degree of privatisation compared to the situation with no possibility of FDI, where the optimal degree of privatisation is given by $\alpha_x^*$, which is the degree of privatisation that maximises the host country welfare under exporting by the foreign firm.

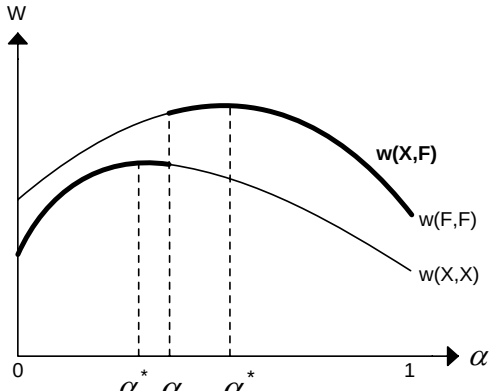


Figure 4: Privatisation attracting FDI, when $\alpha_{f1} < \alpha_f^*$

Next, consider the situation where the fixed cost of FDI is such that $\alpha_{f1} > \alpha_f^*$ and the host country welfare under FDI at $\alpha_{f1}$ is greater than the maximum host country welfare under exporting (B>A). This is shown in Figure 5. In this situation, the optimal degree of privatisation is $\alpha_{f1}$.

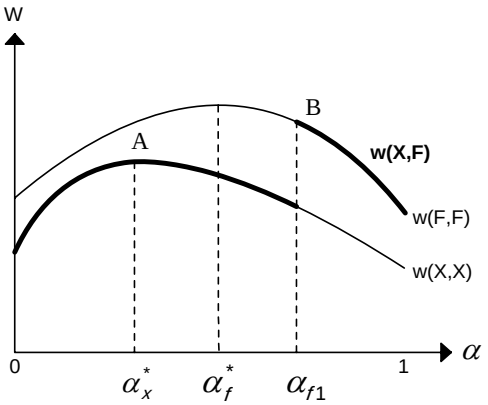


Figure 5: Privatisation attracting FDI, when $\alpha_{f1} > \alpha_f^*$

Lastly, consider the situation, where $\alpha_{f1} > \alpha_f^*$ and the host country welfare under FDI at $\alpha_{f1}$ is lower than the maximum host country welfare under exporting (A>B in Figure 6). In this situation, the optimal degree of privatisation is $\alpha_x^*$, which implies that, though there exists a degree of privatisation that can attract FDI, here it is not optimal for the host country to privatise in a way that actually attracts FDI.

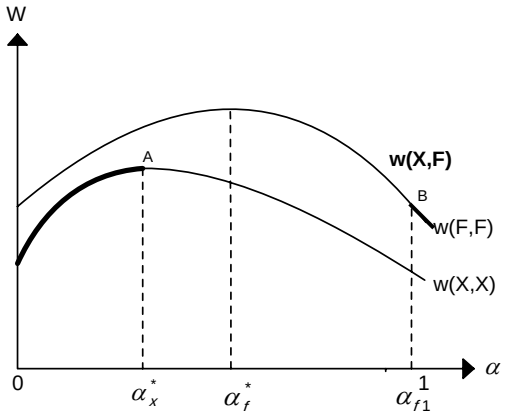


Figure 6 Privatisation attracting FDI, when $\alpha_{f1}$ is very large

In summary, the above analysis shows that whether privatisation that brings FDI improves the host country welfare is not clear and depends on the extent of privatisation required to attract FDI. It is possible that W(X,X) is higher than W(X,F) and the host government prefers firm *M* to export than to undertake FDI. Moreover, we also show that the host government will at least privatise its state-owned firm up to $\alpha_x^*$ and it will privatise beyond this point only if W(X,F) is higher than maximum W(X,X). In other words, the possibility of attracting FDI increases the incentive for privatisation.

The above discussion is summarised in the following proposition.

***Proposition 4****: Whether privatisation that brings FDI improves the host country welfare depends on the extent to which privatisation is required to attract FDI. The possibility of attracting FDI increases the incentive for privatisation. However, if a high level of privatisation is needed to attract FDI, it may be possible that such privatisation for attracting FDI is not beneficial for the host country, and, in this situation, the host government privatises in a way that does not attract FDI an maximises the host country welfare under exporting by the foreign firm.*

*4.3. The effects of cost reduction under privatisation*

It has been noted that one of the main aims of privatisation is to promote efficiency to the economy and to raise revenue for the state.[10] The high costs of production in the public firms compared to its private competitors may due to the limited provision on the firm's R&D resources and/or managerial slackness. Privatisation may help to correct this inefficiency of the public firm. However, in the above analysis, to show the relationship between the effects of privatisation and FDI in the simplest way, we have abstracted away the possibility of public firm's cost reduction due to privatisation.

Recently, Mukherjee and Sinha (2006) show that cost reduction in the domestic firm may reduce the foreign firm's incentive for FDI by making the domestic industry more competitive. Hence, it suggests that if there is a cost reduction in the public firm, the net effect of privatisation on FDI depends on the relative strengths of higher private shareholdings, which tends to increase the market share of the foreign firm, and the cost reduction in the public firm, which tends to reduce the market share of the foreign firm. If the cost reduction in the public firm due to privatisation is significantly large, privatisation may reduce the incentive for FDI. In other words, Proposition 1 remains if the cost reduction effect due to privatisation is not very strong.

It should also be clear that a higher cost efficiency in the public firm due to privatisation would increase the incentive for privatisation if the degree of privatisation did not affect the mode of operation of the foreign firm. But, if the degree of privatisation affects the production strategy of the foreign firm, it is not so

[10] See Megginson and Netter (2001) for a recent survey on privatisation, profitability and efficiency of the firms.

straightforward whether the cost efficiency in the public firm due to privatisation increases the host government's incentive for privatisation. It would depend on the cost reduction in the public firm due to privatisation (which would also affect the incentive for FDI) and the cost change in the foreign firm due to its change of production strategy following privatisation. If the cost reduction in the public firm due to privatisation does not reduce the incentive for FDI, cost reduction in the public firm is likely to increase the incentive for privatisation.

## 5. The effects of the incentive contracts

Fershtman and Judd (1987) show that, in an oligopolistic industry with profit maximising firms, strategic separation of owners and managers, where owners design incentive schemes for managers who take production decisions, may make the owners better off compared to the situation where the owners take the production decisions.

In a closed economy, Barros (1995) extends this literature of incentive delegation to the case of mixed oligopoly, and concludes that complete nationalisation is the optimal strategy for the government. [11]

In this section, we extend our above analysis by introducing incentive delegation by the owners to the managers, and show that our qualitative results derived in the previous section hold. Hence, our results of the previous section are robust with respect to wider strategies of the firms. The analysis of this section also implies that the main conclusion of Barros (1995), i.e., no privatisation is the optimal strategy of the government, may not hold when the public firm faces competition mainly from a foreign private firm.

[11] Barros (1995) provides detailed justifications of incentive schemes under mixed oligopoly framework.

We consider the following game in this section. At stage one, the host country government decides the degree of privatisation. At stage two, the public firm decides whether to undertake FDI or export.[12] At stage three, owners of the public and the foreign firms design the incentive contracts for their managers. At stage four, the managers choose the optimal outputs of the firms that maximise the incentive schemes given to them. We solve the game through backward induction.

*5.1. Privatisation and the incentive for FDI*

Under the incentive contracts regime, each owner offers his manager a contract that is a linear combination of profit and revenue, i.e.,

$$M_i = \lambda_i \pi_i + (1-\lambda_i) R_i, \tag{17}$$

where $M_i$ is the incentive contract delegated by owner $i$ to its manager, and $\pi_i$ and $R_i$ denote the profit and revenue of firm $i$ respectively. Equation (17) expands to

$$\begin{aligned} M_i &= \lambda_i (a - Q - c_i) q_i + (1-\lambda_i)(a-Q) q_i . \\ &= (a-Q) q_i - \lambda_i c_i q_i . \end{aligned} \tag{18}$$

Given $\lambda_i$, the Cournot reaction function for manager $i$ is

$$q_i^{ic} = \frac{a - q_j - \lambda_i c_i}{2}, \tag{19}$$

where $i, j = m, p$ and $i \neq j$. The equilibrium output of firm $i$ is

$$q_i^{ic} = \frac{a + \lambda_j c_j - 2\lambda_i c_i}{3} \tag{20}$$

Let us now determine the optimal values of $\lambda_i$ determined by owner $i$, $i = m, p$. Similar to section 4, the objective functions of firms $M$ (the foreign firm) and $P$ (the

[12] Since the purpose of this section is to show the implications of incentive delegation, we assume away any cost of hiring managers, and therefore, in equilibrium, both firms will hire managers and will delegate incentive schemes to them.

public firm) are given by equations (1) and (2), respectively, and they maximise the respective objective functions by $\lambda_m$ and $\lambda_p$. The equilibrium $\lambda_p$ and $\lambda_m$ are as follows:

$$\lambda_p = \frac{8c_p + 3a\alpha - 4a - 2c_m\alpha}{c_p(4+\alpha)} \tag{21}$$

$$\lambda_m = \frac{6c_m + 2c_m\alpha - a\alpha - 2c_p}{c_m(4+\alpha)} \tag{22}$$

From equation (21) - (22), we get the equilibrium outputs as:

$$q_p^{ic} = \frac{4a - 6c_p - 2a\alpha + 2c_m\alpha + 2c_m}{(4+\alpha)} \tag{23}$$

$$q_m^{ic} = \frac{2a\alpha - 4c_m - 2\alpha c_m + 4c_p}{(4+\alpha)} \tag{24}$$

and the total output is $\frac{2(2a - c_m - c_p)}{4+\alpha}$, where $c_m = \{0, c_x\}$. Note that $c_p$ needs to be less than $\frac{a}{3}$ to ensure the duopoly market structure under complete privatisation and $c_m = 0$. We assume that this holds.

We get the equilibrium values of (1) and (2) respectively as:

$$\pi_m = \frac{(a\alpha + 2c_p - \alpha c_m - 2c_m)(2a\alpha - 4c_m - 2\alpha c_m + 4c_p)}{(4+\alpha)^2} \tag{25}$$

$$Obj_p^{ic} = \frac{(a\alpha - 2c_p + 2c_m - \alpha c_p)(4a - 6c_p - 2a\alpha + 2c_m\alpha + 2c_m) + 2(1-\alpha)(2a - c_p - c_m)^2}{(4+\alpha)^2} \tag{26}$$

Now we are ready to examine the effect of privatisation on the incentive for FDI. Firm $M$ prefers to undertake FDI than export if and only if

$$\pi_f^{m,p,ic} > \pi_x^{m,p,ic}$$

$$\frac{(a\alpha + 2c_p)(2a\alpha + 4c_p) - (a\alpha + 2c_p - \alpha c_x - 2c_x)(2a\alpha + 4c_p - 4c_x - 2\alpha c_x)}{(4+\alpha)^2} = f_p^{ic}(\alpha) > f \tag{27}$$

where $f_p^{ic}(\alpha)$ is difference of gross profits of firm $M$ under FDI and export. Equation (27) indicates that if $f_p^{ic}(\alpha)$ is greater than $f$, FDI is better than export and firm $M$ chooses to enter the market by undertaking FDI.

Like section 4, we find that the incentive for FDI is positively related to the higher degree of privatisation (see *Appendix A*), and this is noted in the following proposition.

***Proposition 5****: Under the incentive contracts, a higher degree of privatisation increases the foreign firm's incentive for FDI.*

*5.2. Privatisation and the host country welfare*

Let us now consider the relationship between privatisation and the host country welfare under the incentive contracts. The expression below describes the host country welfare for a given degree of privatisation:

$$w_p^{ic} = \frac{2\left(a\alpha - 2c_p + 2c_m - \alpha c_p\right)\left(2a - 3c_p - a\alpha + c_m\alpha + c_m\right) + 2\left(2a - c_p - c_m\right)^2}{\left(4+\alpha\right)^2} \qquad (28)$$

where $c_m = \{0, c_x\}$.

***Proposition 7****: Consider* $0 = c_f < c_X \leq c_p$*, and incentive delegations in both the public and the foreign firms.*

*(i) If the foreign firm always undertakes FDI irrespective of the degree of privatisation (i.e.,* $f < f_p^{ic}(0)$*), the optimal strategy of the host country government is to do partial privatisation for any cost difference between the firms.*

*(ii)* If *the foreign firm always exports irrespective of the degree of privatisation (i.e.,* $f > f_p^{ic}(1)$*), the optimal strategy of the host country government is to undertake partial privatisation for any cost differences between the firms. However, if the public and the foreign firms share the same cost, full nationalisation is the optimal policy.*

*(iii)* If $f_p^{ic}(1) > f > f_p^{ic}(0)$, *FDI does not occur under complete nationalisation while it may occur under privatisation. In this situation, partial privatisation is the optimal strategy of the host country government, though it is ambiguous whether the host country will privatise up to the point that induces the foreign firm to undertake FDI. If sufficiently high degree of privatisation is required to attract FDI, such privatisation may not be profitable and the host country government privatises up to the point that does not attract FDI and provides maximum possible host country welfare under exporting. Otherwise, the host country government privatises up to the point that provides maximum possible host country welfare conditional on FDI by the foreign firm.*

Since the proofs of the above results are similar to the results shown in section 4, we show the formal calculations for Propositions 7(i) and 7(ii) in *Appendix B*. The proof of Proposition 7(iii) is similar to the analysis of subsection 4.2.3, and we skip this analysis here to avoid repetition.

It is worth mentioning that our results suggest that the main conclusion of Barros (1995), which says that in presence of the incentive contracts the government should not privatise the public firm, might not hold in an open economy with foreign competition. We are aware that the framework of the present paper and that of Barros (1995) are different. Our analysis suggests that the conclusion of Barros (1995) is

very much dependent on the economic scenario. Therefore, a consideration of policy prescriptions from Barros (1995) must be interpreted with caution.

*5.3. Comparing the outcomes under the incentive contracts and the no incentive contract*

Let us now compare the effects of privatisation on the incentive for FDI and the host country welfare under the incentive scheme and the no incentive scheme. Also, we assume that $c_p < \frac{a}{3}$, which always ensures duopoly market structure under both incentive contracts and the no incentive contract.

The comparison of $f_p(\alpha)$ and $f_p^{ic}(\alpha)$ leads to the following proposition.

***Proposition 8****: Given that the duopoly market structure always exists under both incentive contracts and the no incentive contract, at any given $\alpha$ , the FDI incentive is higher under the incentive contracts than under the no incentive contract.*

The incentive contracts regime helps the foreign firm to gain higher market share compared to the situation with the no incentive scheme. However, this benefit from higher output is higher under FDI since it helps to reduce the distortion from a higher cost associated with exporting. Therefore, the firm has higher incentive to undertake FDI under the incentive contracts regime than under the no incentive contract.

Looking at the welfare analysis under the incentive scheme and the no incentive regime, we find that, although both the regimes provide the same qualitative conclusions, for a given $\alpha$, the host country welfare is higher under the incentive

contracts than under the no incentive contract. Hence, the degree of partial privatisation that maximises the host country welfare may differ between these two regimes.

***Proposition 9****: Given that the duopoly market structure always exists under both the incentive contracts and the no incentive contract, at any given* $c_p$*, the optimal degree of privatisation is higher under the incentive contracts than under the no incentive contract if the degree of privatisation does not affect the foreign firm's mode of production.*

See *Appendix C* for the proof.

The effect of incentive contracts on the degree of privatisation in comparison to the situation of no incentive contract is not so straightforward. Given that the duopoly market structure always exists under both the incentive contracts and the no incentive contract, Proposition 8 shows that the incentive for FDI is higher under the incentive contracts than under the no incentive contract. This clearly implies that, in this situation, the degree of privatisation that attracts FDI under the no incentive contract also attracts FDI under the incentive contracts. If the situation under the no incentive contract is W(X,F) and the optimal degree of privatisation is the degree of privatisation that maximises the host country welfare corresponding to either FDI or exporting by the foreign firm (i.e., corresponding to $\alpha_f^*$ and $\alpha_x^*$ in Figures 4 and 6, respectively), it is clear that the degree of privatisation under the incentive contracts is higher than under the no incentive contract. This is because, irrespective of whether the foreign firm undertakes FDI or export, the maximum welfare under the incentive contracts are always higher than under the no incentive contract.

However, if the situation under the no incentive contract is such that the optimal degree of privatisation is beyond the degree of privatisation that maximises the host country welfare under FDI by the foreign firm, i.e., similar to Figure 5 where $\alpha_{f1} > \alpha_f^*$, the optimal degree of privatisation under the incentive contracts may be lower than under the no incentive contract ($\alpha_{f1,IC} < \alpha_{f1}$). This possibility is shown in Figure 7.

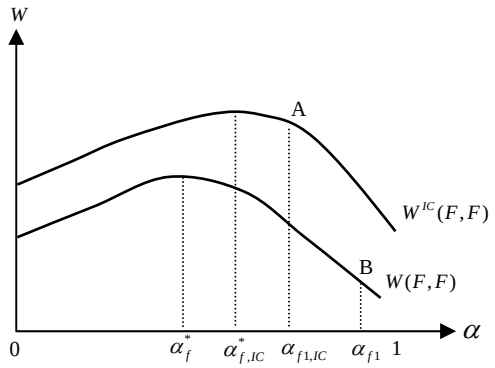


Figure 7: Comparison of the optimal degree of privatisation under the incentive contracts and no incentive contract

Since, under the incentive contracts, the government needs a lower amount of privatisation than $\alpha_{f1}$ to attract FDI, the optimal degree of privatisation under the incentive contracts regime may be up to $\alpha_{f1,IC}$ and the corresponding host country welfare equals to *A*.[13] Hence, in this situation, the optimal degree of privatisation under the incentive contracts is lower than that of under the no incentive contract. It is important to note that our argument for privatising up to *A* under the incentive contracts assumes that, under the incentive contracts, the host country welfare at *A* is greater than the host country welfare under exporting by the foreign firm. Under the incentive contracts, if the host country welfare under exporting by the foreign firm is greater than the host country welfare at *A*, the degree of privatisation under the

[13] We do not draw $W^{IC}(X,X)$ in Figure 7 to keep it simple.

incentive contracts will be lower than *A*, thus strengthening our argument for lower degree of privatisation under the incentive contracts than under the no incentive contract.

## 6. Conclusion

Though privatisation and the inflow of FDI are two important developments in many developing and transitional economies, the existing theoretical literature has failed to capture both these aspects together. We take up this issue in this paper, and show the interaction between privatisation and FDI.

We show that privatisation increases the incentive for FDI. However, whether a country would prefer to privatise up to a point that attracts FDI is ambiguous. If the degree of privatisation that is required to attract FDI is sufficiently high, the host country may not find it beneficial to attract FDI through privatisation. Instead, it will privatise up to the point at which the host country welfare is maximised under export by the foreign firm. We show that whether or not the degree of privatisation affects the mode of production of the foreign firm, partial privatisation is the optimal strategy of the host country. The cost difference between the domestic public firm and the foreign private firm is also important to determine the degree of privatisation. So, the cost difference between the firms as well as the effect of privatisation on the foreign firm's production strategy, both play important roles in determining the privatisation policy. Our main conclusions are robust with respect to the incentive delegation within firms.

There is, however, an important remark that needs to be made. So far, we have focused on the effect of privatisation on the foreign firm's production strategy but abstracted our analysis from entry of the host country firms. Privatisation may attract

new entry of the host country firms by reducing the output of the public firm, thus leaving more residual market to the potential domestic firms. Higher competition in the host country market due to the domestic firms' entry reduces the residual demand for the foreign firm and may adversely affect the foreign firm's incentive to undertake FDI. Hence, the effects of entry of the domestic firms on the incentive to undertake FDI due to privatisation and the corresponding welfare implications will be similar to the effects of cost reduction in the public firm, which has been discussed in subsection 4.3.

Another extension of the present paper is to consider foreign acquisition of the public firm can also be another area for further research. Acquiring the public firm by the foreign firm can be viewed as the firm's strategy to eliminate competition in the domestic market. Since the market becomes more attractive for investment after privatisation, the foreign firm may have higher incentive for FDI compared to the situation where an acquisition by the foreign firm is prohibited in a privatisation policy. We intend to take up this and the related issues in our future research.

# Appendix

## A. The incentive for FDI

If $f_p^{ic}(\alpha)$ increases when $\alpha$ increases, the incentive for FDI increases with privatisation. We find that:

$$C = \frac{\partial f_p^{ic}(\alpha)}{\partial \alpha} = \frac{4\left(2ac_x + 2a\alpha c_x + 2c_p c_x - 2c_x^2 - \alpha c_x^2\right)}{8\alpha + \alpha^2 + 16} + \frac{4\left(4c_x^2 - 8c_p c_x - 4\alpha c_p c_x - 4a\alpha c_x + 4\alpha c_x^2 - 2a\alpha^2 c_x + \alpha^2 c_x^2\right)}{48\alpha + 12\alpha^2 + \alpha^3 + 64}$$

(A.1)

Let us now consider the relationship between *C* and $c_p$. We obtain:

$$\frac{\partial C}{\partial c_p} = \frac{8c_x}{8\alpha + \alpha^2 + 16} - \frac{16c_x\left(2+\alpha\right)}{48\alpha + 12\alpha^2 + \alpha^3 + 64} < 0 \qquad \text{(A.2)}$$

The derivative suggests that *C* is negatively related to $c_p$, irrespective of $\alpha$. Furthermore, *C* is greater than zero at $c_p = \frac{a}{3}$, which is the maximum $c_p$ that always ensures duopoly market structure under the incentive contracts regime. This means that *C* is always positive at every value of $c_p$. Since *C* represents $\frac{\partial f_p^{ic}(\alpha)}{\partial \alpha}$ and it is always positive, this consequently suggests that $f_p^{ic}(\alpha)$ is positively related to $\alpha$.

## B. The calculations for Propositions 7(i) and 7(ii)

**7(i)** The following expression describes welfare of the host country when firm *M* always conduct FDI irrespective of privatisation.

$$w_p^{f,ic}(\alpha) = \frac{2\left(a\alpha - 2c_p - \alpha c_p\right)\left(2a - 3c_p - a\alpha\right) + 2\left(2a - c_p\right)^2}{\left(4+\alpha\right)^2} \qquad \text{(B.1)}$$

We find that:

$$D = \frac{\partial w_p^f(\alpha)}{\partial \alpha} = \left( \frac{4a\alpha c_p - 6ac_p + 4a^2 - 4a^2\alpha + 6c_p^2}{8\alpha + \alpha^2 + 16} \right) + 4\left( \frac{8ac_p + 3a\alpha c_p - 4a^2 - 2a^2\alpha - 7c_p^2 - 3\alpha c_p^2 - a\alpha^2 c_p + a^2\alpha^2}{48\alpha + 12\alpha^2 + \alpha^3 + 64} \right) \quad \text{(B.2)}$$

We also find that:

$$\frac{\partial D}{\partial c_p} = \frac{2\left(2a\alpha - 3a + 6c_p\right)}{8\alpha + \alpha^2 + 16} + \frac{4\left(8a + 3a\alpha - 14c_p - 6\alpha c_p - a\alpha^2\right)}{48\alpha + 12\alpha^2 + \alpha^3 + 64} > 0 \quad \text{(B.3)}$$

and $\frac{\partial^2 D}{\partial c_p^2} < 0$. The derivation shows that at any value of $\alpha$, the relationship between D and $c_p$ is concave. However, the value of $c_p$ that maximises *D* is greater than $\frac{a}{3}$, suggesting that *D* is positively sloped for $0 < c_p < \frac{a}{3}$. We also find that at $c_p = 0$, *D* <0 for any degree of privatisation. Furthermore, for $0 < c_p < \frac{a}{3}$, *D* >0 if and only if $\alpha < \alpha_i^{*,ic}$; *D* <0, otherwise. The following figure illustrates how *D* changes with $c_p$. The optimal degree of privatisation for a given cost of the public firm is now clear from the figure below.

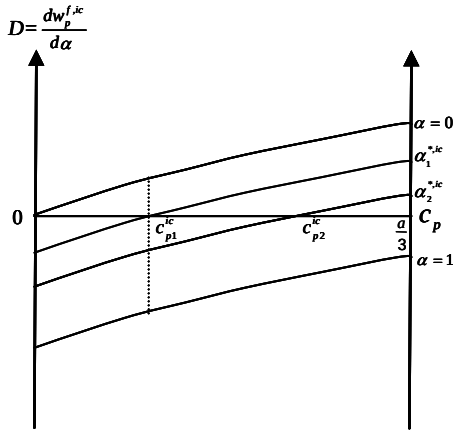


Figure B.1: The effect of privatisation on welfare with FDI under the incentive contracts

**7(ii)** The following expression describes welfare of the host country when firm *M* always undertakes FDI irrespective of the degree of privatisation. We find that:

$$w_p^{x,ic}(\alpha) = \frac{2\left(a\alpha - 2c_p + 2c_x - \alpha c_p\right)\left(2a - 3c_p - a\alpha + \alpha c_x + c_x\right) + 2\left(2a - c_p - c_x\right)^2}{\left(4+\alpha\right)^2} \qquad \text{(B.4)}$$

and

$$\begin{aligned} E = \frac{\partial w_p^{x,ic}(\alpha)}{\partial \alpha} &= 2\left(\frac{2a\alpha c_p - ac_x - 3ac_p + 2a\alpha c_x - 3c_p c_x - 2\alpha c_p c_x + 2a^2 - 2a^2\alpha + 3c_p^2 + 2c_x^2}{8\alpha + \alpha^2 + 16}\right) \\ &+4\left(\frac{8ac_p + 3a\alpha c_p + a\alpha c_x + 6c_p c_x + 3\alpha c_p c_x - 4a^2 - 2a^2\alpha - 7c_p^2}{48\alpha + 12\alpha^2 + \alpha^3 + 64}\right) \\ &+4\left(\frac{\alpha^2 c_p c_x - a\alpha^2 c_p - 3c_x^2 - 3\alpha c_p^2 - 2\alpha c_x^2 - a\alpha^2 c_x + a^2\alpha^2}{48\alpha + 12\alpha^2 + \alpha^3 + 64}\right) \end{aligned} \qquad \text{(B.5)}$$

We also find that:

$$\begin{aligned} \frac{\partial E}{\partial c_p} &= 2\left(\frac{2a\alpha - 3a + 6c_p - 3c_x - 2\alpha c_x}{8\alpha + \alpha^2 + 16}\right) \\ &+4\left(\frac{8a + 3a\alpha - 14c_p + 6c_x - 6\alpha c_p + 3\alpha c_x - a\alpha^2 + \alpha^2 c_x}{48\alpha + 12\alpha^2 + \alpha^3 + 64}\right) > 0 \end{aligned} \qquad \text{(B.6)}$$

Equation (B.6) is greater than zero. In addition, we get that $\frac{\partial^2 E}{\partial c_p^{\,2}} < 0$.

However, the value of $c_p$ which maximises *E* is greater than $\frac{a}{3}$, suggesting that *E* shows a positive slope for $c_p \in \left(c_x, \frac{a}{3}\right)$. Figure B.2 shows the relationship between *E* and $c_p$, and the optimal degree of privatisation for a given cost of the public firm is now clear from the following figure.

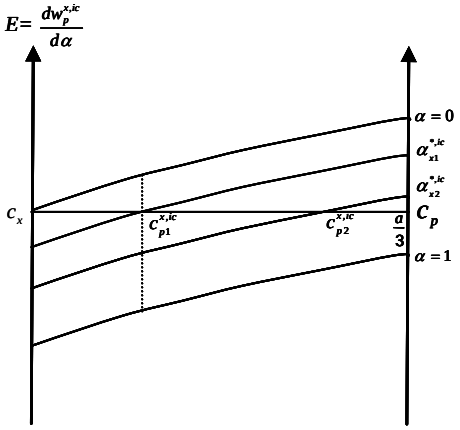


Figure B.2: The effect of privatisation on welfare export under the incentive contracts

**C. Comparing the optimal degree of privatisation under incentive scheme and the no incentive scheme**

Let us consider that $c_p < \frac{a}{3}$, which always ensures duopoly market structure both under incentive scheme and the no incentive scheme. Now, consider the situation of W(F,F). Given $c_p$, the host country welfare is maximised at $\alpha_f^* = \frac{c_p}{3a - 2c_p}$ and $\alpha_{f,IC}^* = \frac{2c_p}{5a - 3c_p}$ under the no incentive scheme and under the incentive scheme respectively. The comparison of these values shows that $\alpha_{f,IC}^* > \alpha_f^*$.

For W(X,X), given any $c_p$, the host country welfare is maximised at $\alpha_x^* = \frac{c_p - c_x}{3a - 2c_p - c_x}$ and $\alpha_{x,IC}^* = \frac{2(c_p - c_x)}{5a - 3c_p - 2c_x}$ under the no incentive scheme and under the incentive scheme respectively. Hence, $\alpha_{x,IC}^* > \alpha_x^*$.

## References

**Anderson, S. P., A. d. Palma and J-F. Thisse**, (1997), 'Privatisation and efficiency in a differentiated industry', *European Economic Review*, **41**: 1635 – 54.

**Baer, W.**, (1994), 'Privatisation in Latin America', *The World Economy*, **17**: 509 – 28.

**Barros, F.**, (1995), 'Incentive schemes as strategic variables: an application to a mixed duopoly', *International Journal of Industrial Organisation*, **13**: 373-86.

**Beato, P. and A. Mas-Colell**, (1984), 'The marginal cost pricing as a regulation mechanism in mixed markets', in: Merchand, M., P. Pestieau and H. Tulkens (eds.), *The performance of public enterprises*, North-Holland, Amsterdam.

**Cremer, H., M. Marchand and J-F. Thisse**, (1989), 'The public firm as an instrument for regulating an oligopolistic market', *Oxford Economic Papers*, **41**: 283-301.

**De Fraja, G. and F. Delbono**, (1989), 'Game theoretic models of mixed oligopoly', *Journal of Economic Surveys*, **4**: 1 – 17.

**Fershtman, C.**, (1990), 'The interdependence between ownership status and market structure: The case of privatisation', *Economica*, **57**: 319 – 28.

**Fershtman, C. and K. L. Judd**, (1987), 'Equilibrium incentives in oligopoly', *The American Economic Review*, **77**: 927 – 40.

**Fjell, K. and J. S. Heywood**, (2002), 'Public Stackelberg leadership in a mixed oligopoly with foreign firms', *Australian Economic Papers*, **41**: 267 – 81.

**Fujiwara, K.**, (2006), 'Trade patterns in a mixed oligopoly', *Economics Bulletin*, **6**: 1 – 7.

**Harris, R.G., and E.G. Wiens**, (1980), 'Government enterprise: an instrument for the internal regulation of industry', *Canadian Journal of Economics*, **13**: 125-32.

**Isibashi, I., T. Matsumura and N. Matsushima**, (2005), 'Privatisation and efficiency in a differentiated industry revisited, *Mimeo*, Faculty of Economics, Shinshu University.

**Kalotay, K. and G. Hunya**, 2000, 'Privatisation and FDI in Central and Eastern Europe', *Transnational Corporations*, **9**: 39 – 66.

**Kikeri, S. and A. F. Kolo**, (2005), 'Privatisation: trends and recent developments', *World Bank Policy Research Working Paper, No. 3765*.

**Matsumura, T.,** (1998), 'Partial privatisation in mixed duopoly', *Journal of Public Economics*, **70**: 473 – 83.

**Maw, J.**, (2002), 'Partial privatisation in transition economies', *Economic Systems*, **26**: 271 – 82.

**Megginson, W. L. and J. M. Netter**, (2001), 'From state to market: a survey of empirical studies on privatisation', *Journal of Economic Literature*, **39**: 321 – 89.

**Merlevede, B. and K. Schoors**, (2005), 'How to catch foreign fish? FDI and accession countries', *Working Paper, No. 785*, William Davidson Institute.

**Mukherjee, A. and U. B. Sinha**, (2006), 'Welfare-reducing domestic cost reduction', *Review of International Economics*, Forthcoming.

**Norbäck, P. J. and L. Persson**, (2004), 'Privatisation and foreign competition', *Journal of International Economics*, **62**: 409 – 16.

**Norbäck, P. J. and L. Persson**, (2005), 'Privatisation policy in an international oligopoly', *Economica*, **72**: 635 – 53.

**Ohori, S.**, (2004), 'Environmental tax, trade, and privatisation', *The Kyoto Economic Review*, **73**: 109 – 20.

**Ohori, S.**, (2006), 'Optimal environmental tax and level of privatisation in an international duopoly', *Journal of Regulatory Economics*, **29**: 225 – 33.

**Pack, H. and K. Saggi**, (1997), 'Inflows of foreign technology and indigenous technological development', *Review of Development Economics*, **1**: 81 – 98.

**Pal, D. and M. D. White,** (1998), 'Mixed oligopoly, privatisation, and strategic trade poly', *Southern Economic Journal*, **65**: 264 – 81.

**Rees, R.**, (1984), *Public enterprise economics*, Weinfeld and Nicolson, London, 2d Ed.

**Saggi, K.**, (2002), 'Trade, foreign direct investment, and international technology transfer: a survey," *World Bank Research Observer*, **17**: 191 – 235.

**Saha, B. and R. Sensarma,** (2003), 'Divestment and bank competition', *Journal of Economics (Zeitschrift für Nationalökonomie)*, **3**: 223 – 47.

**Schmidt, K. M. and M. Schnitzer**, (1997), 'Methods of privatization: auctions, bargaining and give-aways', *CEPR Discussion Paper, No. 1541*.

**UNCTAD**, (2000), *World investment report*, United Nations, New York and Geneva.

**UNCTAD**, (2001), *World investment report*, United Nations, New York and Geneva.

**UNCTAD**, (2002), *World Investment Report*, United Nations, New York and Geneva.

**UNCTAD**, (2006), *World Investment Report*, United Nations, New York and Geneva.

**Vickers, J. and G. Yarrow**, (1991), 'Economic perspectives on privatisation', *Journal of Economic Perspectives*, **5**: 111 – 32.