Taxes and Entry Mode Decision in Multinationals: Export and FDI with and without Decentralization*

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Abstract

We use a duopoly model to simultaneously consider both foreign direct investment (FDI) and decentralization decisions, featuring transfer pricing. To investigate the relationship between corporate taxes and the optimal entry mode for the foreign market, we examine and compare firms' profit in each of three entry modes: export, FDI with decentralization, and FDI with centralization. We find that, even when a host country does not have any advantage, FDI can be undertaken because of a strategic incentive. We also find that trade liberalization promotes decentralization of multinationals and that a tougher regulation of transfer pricing may expand the region of no centralization.

Keywords: decentralization; foreign direct investment; transfer pricing

JEL Classification: F21, F23, H25

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1 Introduction

Transfer pricing is one of the profit-shifting instruments for multinationals. In addition to the profit-shifting role, transfer pricing may have other roles[1]. In oligopoly settings, multinationals have an incentive to manipulate their intra-firm prices for affecting competition that their subsidiaries are facing. This manipulation of intra-firm price is denoted the strategic role of transfer pricing.

The strategic role of transfer pricing is widely known after Schjelderup and Sørgard (1997). The motivation of their research is as follows: "In the IO-literature on MNE behaviour both delegation of authority to local affiliates and strategic interaction are discussed. [t]he focal point in the IO literature on MNEs, however, is on foreign direct investments, not on profit shifting through transfer pricing (Schjelderup and Sørgard, 1997, pp.278)"[2]. With this motivation, Schjelderup and Sørgard (1997) find this new role of transfer pricing. However, foreign direct investments (FDI) is taken as a given in their analysis. Therefore, in this paper, we consider both of FDI decision and profit shifting, focusing on the strategic motive of transfer pricing.

Decentralization is the key of the strategic role of transfer pricing. In the model of Schjelderup and Sørgard (1997), in addition to FDI, decentralization is also taken as a given. Although Nielsen et al. (2008) examine decentralization decisions, that is, they investigate whether multinationals decentralize or not, FDI is taken as a given even in their analysis. Therefore, in this paper, we simultaneously consider both FDI and decentralization decisions of multinationals, featuring transfer pricing.

In the literature, Porter (2012) analyzes effects of a corporate tax on choices between FDI and export. In a duopoly setting, taking firms' choices between export and FDI into account, Porter (2012) shows the possibility that an increase in the host country's corporate tax can create its desirable situation where the more efficient firm undertakes FDI and the less efficient firm does not. Although, as far as we know, Porter (2012) is one of the rare papers that focus on effects of corporate tax on choices between export and FDI, she does not consider profit shifting and transfer pricing.

Amerighi and Peralta (2010) investigate choices of modes for serving two countries. A firm has two alternatives in their model. One is to have a plant in one country and to serve both the local and foreign markets from the plant. The other alternative is to have two plants and to serve markets from the local plants. They combine the proximity-consentration trade-off with a tax-saving incentive. Although, as far as we know, Amerighi and Peralta (2010) is the first paper that shows the relationship between the profit shifting and FDI incentive, they do not focus on strategic incentives for undertaking FDI because they use a monopoly model.

In our paper, we first examine multinationals' profit in each of three entry modes into a foreign market: export, FDI with decentralization, and FDI with centralization (without decentralization). Second, to investigate FDI incentives in decentralization and centralization cases and a

[1] See for, example, Göx and Schiller (2007).

[2] See, for example, Horstmann and Markusen (1992) and Motta (1992).

decentralization incentive, we compare after-tax profit between entry modes. Finally, we show the relationship between corporate tax rates and the optimal entry mode for the foreign market by simultaneously considering FDI and decentralization decisions.

First, we find that, even when a host country does not have any advantage, that is, even when there is no difference in marginal production cost between the home and host countries, there is no tax difference, and trade costs are not incurred on export, FDI can be undertaken due to a strategic incentive. Second, we also show that centralized multinationals do not appear in free trade at least in our current setting and that trade liberalization promotes decentralization of multinationals. And finally, we find that a tougher regulation of transfer pricing may expand the region of no centralization.

Section 2 introduces our model and shows profits and welfare in each of the three modes and Section 3 investigates FDI incentives in decentralization and centralization cases and a decentralization incentive. Section 4 shows the relationship between corporate tax rates and the optimal entry mode for the foreign market. Section 5 discusses effects of trade cost and Section 7 discusses that of transfer pricing cost. Section 7 offers conclusions.

2 The Model

In this section, we introduce our model. There are two countries (home and foreign) and two firms (firm 1 and firm 2). Only firm 1 serves the home market and both firms serve the foreign market. The two firms compete in *Cournot* fashion. The output levels of firm 1 in the home and foreign markets are, respectively, q_1 and Q_1, and the output level of firm 2 in the foreign market is Q_2. We use linear demand functions, $p = a - bq$ in the home market and $P = A - BQ$ in the foreign market, where $q \equiv q_1$ and $Q \equiv Q_1 + Q_2$. p and P are, respectively, the market prices in the home and foreign markets. Marginal costs for production of the two firms are c_1 and c_2. We assume $c_1 = c_2 = 0$ for simplification. Firm 1 has three entry modes for serving the foreign market: Export, FDI with decentralization, and FDI with centralization. The following subsections show each of the three modes.

2.1 Export Case

In this mode, firm 1 is an exporting firm and it competes with the rival (firm 2) in the foreign market. Governments in the home and foreign countries tax locally earned profit at t_h and t_f, respectively. After-tax profits of firm 1 and firm 2 are, respectively,

$$\begin{aligned}\Pi_1 &= (1-t_h)\left[(a-bq_1)q_1 + (A - BQ_1 - BQ_2)Q_1 - \tau Q_1\right],\\ \Pi_2 &= (1-t_f)\left[(A - BQ_1 - BQ_2)Q_2\right],\end{aligned}$$

where τ is a trade cost. We find

$$q_1 = \frac{a}{2b}, Q_1 = \frac{A-2\tau}{3B}, Q_2 = \frac{A+\tau}{3B}$$

in the equilibrium. The after-tax profits are

$$\begin{aligned}\Pi_1 &= (1-t_h)\left[\frac{a^2}{4b}+\frac{(A-2\tau)^2}{9B}\right], \quad (1)\\ \Pi_2 &= (1-t_f)\frac{(A+\tau)^2}{9B}.\end{aligned}$$

By assuming $\tau = 0$, we have

$$\Pi_1 = (1-t_h)\left(\frac{a^2}{4b}+\frac{A^2}{9B}\right), \quad (2)$$

and define (2) as Π_1^{EX} in the following part[3].

2.2 FDI with decentralization

In this mode, firm 1 is a decentralized MNE[4]. Before-tax profits from production and sales on the part of firm 1 in the home and foreign countries and firm 2 are, respectively,

$$\begin{aligned}\pi_{h1} &= (a-bq_1)q_1+mQ_1,\\ \pi_{f1} &= (A-BQ_1-BQ_2)Q_1-mQ_1,\\ \pi_{f2} &= (A-BQ_1-BQ_2)Q_2,\end{aligned}$$

where, m is a intra-firm price (transfer price). The transfer price m can deviate from the marginal production cost (of zero). If it is set different from zero, the company is assumed to incur transfer pricing cost. After-tax profits of firm 1 and firm 2 are, respectively,

$$\begin{aligned}\Pi_1 &= (1-t_h)\pi_{h1}+(1-t_f)\pi_{f1}-\frac{u}{2}m^2-F,\\ \Pi_2 &= (1-t_f)\pi_{f2}.\end{aligned}$$

The third and fourth terms of Π_1 are the transfer pricing cost and the FDI fixed cost. The parameter u governs the change in transfer pricing cost, if the deviation from zero is enlarged. In this case, the headquarters of firm 1 sets the transfer price before its subsidiary and firm 2 choose their output levels. We solve this model using backward induction. In the second stage, we have

$$q_1=\frac{a}{2b}, Q_1=\frac{A-2m}{3B}, Q_2=\frac{A+m}{3B}.$$

In the first stage,

$$\begin{aligned}\frac{d\Pi_1}{dm} &= \frac{1}{9B}\left[A(4t_f-3t_h-1)-4m\left(2t_f-3t_h+1+\frac{9}{4}Bu\right)\right],\\ \frac{d}{dm}\left(\frac{d\Pi_1}{dm}\right) &= -\frac{4}{9B}\left(2t_f-3t_h+1+\frac{9}{4}Bu\right)<0.\end{aligned}$$

[3] We relax this assumption in section 5.

[4] In this subsection, we assume $4t_f-5t_h+1+3Bu>0$ for obtaining non-negative output levels of both firms. If $Bu>\frac{4}{3}$, we can obtain non-negative output levels.

The second order condition holds with the assumption of $4t_f - 5t_h + 1 + 3Bu > 0$. In equilibrium, the level of the transfer price is

$$m = \frac{A(4t_f - 3t_h - 1)}{4\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)}.$$

Given corporate tax rates, the absolute value of the transfer price $|m|$ decreases in u. If tax rates are not vastly different (t_f is not much greater than t_h), m will lie below marginal cost of zero, in that case, the transfer price increases in u. Generally, the more pronounced are transfer pricing costs, the closer m is to zero. If $t_h = t_f = t$,

$$m = -\frac{A}{4} + \frac{9ABu}{16\left(1 - t + \frac{9}{4}Bu\right)} > -\frac{A}{4}.$$

Although this equation shows the existence of the strategic motive of transfer pricing, the strategic motive is muted because of the transfer pricing cost[5]. And the transfer pricing costs are present, even though there is no tax rate difference.

Equilibrium outputs are

$$\begin{aligned}
Q_1 &= \frac{A\left[2(1 - t_h) + 3Bu\right]}{4B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)} \\
&= \frac{A}{2B} - \frac{A\left[8(t_f - t_h) + 3Bu\right]}{8B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)}, \\
Q_2 &= \frac{A(4t_f - 5t_h + 1 + 3Bu)}{4B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)} \\
&= \frac{A}{4B} + \frac{A\left[8(t_f - t_h) + 3Bu\right]}{16B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)}
\end{aligned}$$

and the after-tax profits are

$$\begin{aligned}
\Pi_1 &= \frac{(1 - t_h)a^2}{4b} + \frac{A^2\left[(1 - t_h)^2 + 2Bu(1 - t_f)\right]}{8B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)} - F, \qquad (3) \\
\Pi_2 &= \frac{(1 - t_f)A^2(4t_f - 5t_h + 1 + 3Bu)^2}{16B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)^2} > 0.
\end{aligned}$$

If $t_h = t_f = t$,

$$\Pi_1 = (1 - t)\left[\frac{a^2}{4b} + \frac{A^2(1 - t + 2Bu)}{8B\left(1 - t + \frac{9}{4}Bu\right)}\right] - F. \qquad (4)$$

We define (3) as Π_1^{DC} in the following part.

2.3 FDI with centralization

In this mode, firm 1 is a centralized MNE[6]. Before-tax profits of firm 1 in the home and foreign countries and firm 2 and after-tax profits of the two firms are the same as those in the decentralization case. Unlike in the previous case, the headquarter of firm 1 chooses both its transfer price and output level, and firm 2 chooses its output level simultaneously.

[5] When $m = -\frac{A}{4}$, Q_1 is equal to the output level of the Stackelberg leader.

[6] In this subsection, we assume $-(t_f - t_h)^2 + Bu(1 - t_f) > 0$, for non-negative output levels of both firms.

We have

$$
\begin{aligned}
\frac{\partial \Pi_1}{\partial m} &= (t_f - t_h) Q_1 - mu, \\
\frac{\partial \Pi_1}{\partial Q_1} &= (1 - t_f)(A - 2BQ_1 - BQ_2) + m(t_f - t_h), \\
\frac{\partial \Pi_2}{\partial Q_2} &= (1 - t_f)(A - BQ_1 - 2BQ_2),
\end{aligned}
$$

and

$$
\begin{aligned}
\frac{\partial}{\partial Q_1}\left(\frac{\partial \Pi_1}{\partial Q_1}\right) &= -2B(1 - t_f) < 0, \\
\left(\frac{\partial^2 \Pi_1}{\partial m \partial m}\right)\left(\frac{\partial^2 \Pi_1}{\partial Q_1 \partial Q_1}\right) - \left(\frac{\partial^2 \Pi_1}{\partial m \partial Q_1}\right)^2 &= -(t_f - t_h)^2 + 2Bu(1 - t_f) > 0, \\
\frac{\partial}{\partial Q_2}\left(\frac{\partial \Pi_2}{\partial Q_2}\right) &= -2B(1 - t_f) < 0.
\end{aligned}
$$

$-(t_f - t_h)^2 + 2Bu(1 - t_f) > 0$ holds with the assumption of $-(t_f - t_h)^2 + Bu(1 - t_f) > 0$.

From F.O.C., we have

$$
\begin{aligned}
m &= \frac{(t_f - t_h) Q_1}{u}, \\
Q_1 &= \frac{(1 - t_f)(A - BQ_2) + m(t_f - t_h)}{2B(1 - t_f)}, \\
Q_2 &= \frac{A - BQ_1}{2B}.
\end{aligned}
$$

Thus, in the equilibrium, transfer price and outputs are, respectively,

$$
\begin{aligned}
m &= \frac{A(t_f - t_h)(1 - t_f)}{-2(t_f - t_h)^2 + 3Bu(1 - t_f)}, \\
Q_1 &= \frac{Au(1 - t_f)}{-2(t_f - t_h)^2 + 3Bu(1 - t_f)} \\
&= \frac{A}{3B} + \frac{2A(t_f - t_h)^2}{3B\left[-2(t_f - t_h)^2 + 3Bu(1 - t_f)\right]}, \\
Q_2 &= \frac{A\left[-(t_f - t_h)^2 + Bu(1 - t_f)\right]}{B\left[-2(t_f - t_h)^2 + 3Bu(1 - t_f)\right]} \\
&= \frac{A}{3B} - \frac{A(t_f - t_h)^2}{3B\left[-2(t_f - t_h)^2 + 3Bu(1 - t_f)\right]}.
\end{aligned}
$$

As already mentioned in Nielsen (2014), the output of firm 1 is consist of two parts. If $t_h = t_f = t$, because $m = 0$, the output of each firm equals a Cournot output level. And we also have $q_1 = \frac{a}{2b}$.

The after-tax profits are

$$\Pi_1 = \frac{(1-t_h)\,a^2}{4b} + \frac{A^2 u\,(1-t_f)^2\left[-(t_f-t_h)^2 + 2Bu\,(1-t_f)\right]}{2\left[-2\,(t_f-t_h)^2 + 3Bu\,(1-t_f)\right]^2} - F, \tag{5}$$

$$\Pi_2 = \frac{(1-t_f)\,A^2\left[-(t_f-t_h)^2 + Bu\,(1-t_f)\right]^2}{B\left[-2\,(t_f-t_h)^2 + 3Bu\,(1-t_f)\right]^2} > 0,$$

If $t_h = t_f = t$,

$$\Pi_1 = (1-t)\left(\frac{a^2}{4b} + \frac{A^2}{9B}\right) - F. \tag{6}$$

We define (5) as Π_1^C in the following part.

3 Comparison of three modes

In this section, we investigate FDI incentives in each of the two FDI modes and decentralization incentives of multinationals.

3.1 Export and FDI with decentralization

In this subsection, we compare Π_1^{EX} and Π_1^{DC} for investigating the FDI incentive for decentralization case. The condition for FDI is

$$\begin{aligned} \Pi_1^{DC} &> \Pi_1^{EX} \\ &\Leftrightarrow \frac{\left[-(1-t_h)(16t_f - 15t_h - 1) - 18Bu\,(t_f - t_h)\right]}{72\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)} > \frac{F}{(A^2/B)}. \end{aligned}$$

If $-(1-t_h)(16t_f - 15t_h - 1) - 18Bu\,(t_f - t_h) < 0$, that is, $t_f - t_h > \frac{(1-t_h)^2}{2[8(1-t_h)+9Bu]}$, firm 1 chooses Export. This means that firm 1 chooses Export when t_f is sufficiently high relative to t_h. If $t_f - t_h < \frac{(1-t_h)^2}{2[8(1-t_h)+9Bu]} = \left(\frac{1-t_h}{16}\right)\left(\frac{1-t_h}{1-t_h+\frac{9}{8}Bu}\right) < \frac{1-t_h}{16}$, whether firm 1 chooses FDI or not depends on the relative size of the fixed cost, $\frac{F}{A^2/B}$. When F is low enough, when A is high enough, and/or when B is low enough, a firm 1 chooses to be a decentralized multinational firm[7]. Otherwise, firm 1 chooses Export. If $t_h = t_f = t$, from (2) and (4),

$$\begin{aligned} \Pi_1^{DC} &> \Pi_1^{EX} \\ &\Leftrightarrow \frac{A^2}{8B}\left[\frac{(1-t+2Bu)}{\left(1-t+\frac{9}{4}Bu\right)} - \frac{8}{9}\right] > F \\ &\Leftrightarrow \frac{A^2\,(1-t)}{72B\left(1-t+\frac{9}{4}Bu\right)} > F. \end{aligned}$$

This means that firm 1 chooses FDI when F is low enough and in particular when $F = 0$.

[7] Because we use $P = A - BX$ for the demand function in the foreign market, $A \cdot (A/B)$ governs profit opportunities in that market.

When $A = B = 1$, $F = 0$, $u = 1$, and $t_h = 0.3$, the condition for FDI ($\Pi_1^{DC} > \Pi_1^{EX}$) is

$$\frac{185 - 584t_f}{72\,(47 + 40t_f)} > 0.$$

Below, Figures 1 has been drawn using these values for A, B, F, u, and t_h.

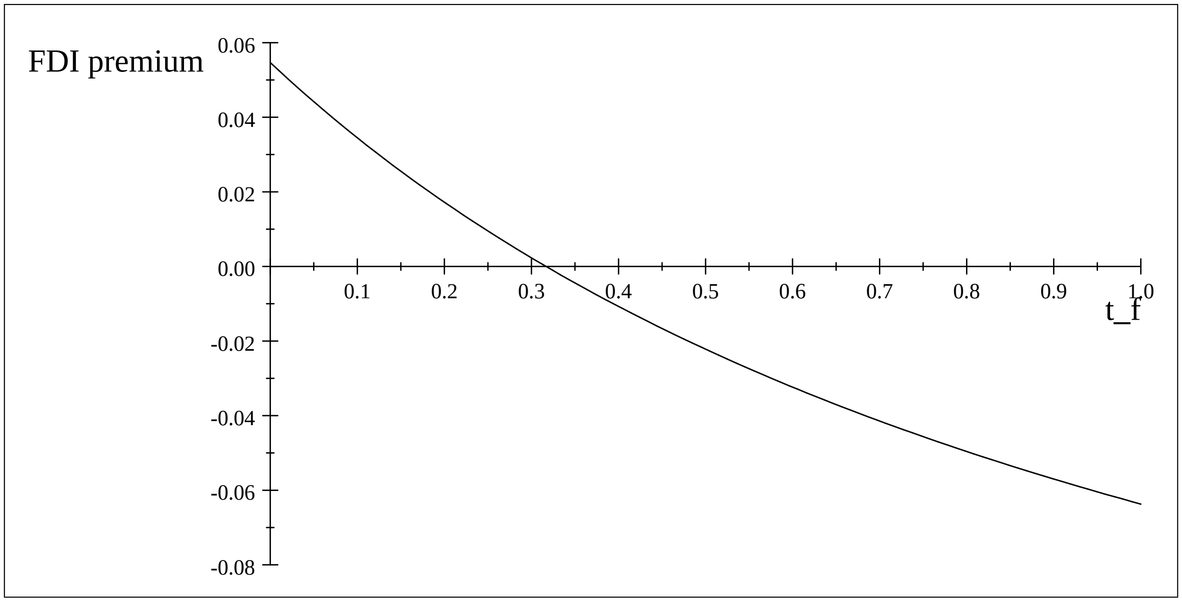

Figure 1. Additional profit of FDI with decentralization ($t_h = 0.3$)

In Figure 1, firm 1 chooses FDI when $t_f < \widetilde{t_f} \equiv \frac{185}{584} \simeq 0.31678$. Because we assume $t_h = 0.3$, we can find that, even when $t_f > t_h$, can firm 1 chooses FDI.

Proposition 1 *Even in a case without the foreign country's production cost and tax advantages and trade cost, FDI may take place. Even when the tax rate in the foreign country is higher than that in the home country, FDI can be superior to export because of a (purely) strategic incentive, if the tax difference is small.*

When$t_f > t_h$, there is no FDI incentive coming from tax-saving incentive. However, in the above figures, firm 1 chooses FDI if the tax difference is small. Although Amerighi and Pelarta (2010) shows a tax-saving FDI incentive, they do not consider this strategic incentive for FDI.

3.2 Export and FDI with centralization

In this subsection, we compare Π_1^{EX} and Π_1^{C} to investigate the FDI incentive for the centralization case. The condition for FDI is

$$\begin{aligned} \Pi_1^{C} &> \Pi_1^{EX} \\ \Leftrightarrow &\quad \frac{A^2\,(t_f - t_h)\left\{-8\,(1-t_h)\,(t_f-t_h)^3 + 3Bu\,(1-t_f)\left[(3t_f - 8t_h + 5)\,(t_f - t_h) - 6Bu\,(1-t_f)\right]\right\}}{18B\left[-2\,(t_f-t_h)^2 + 3Bu\,(1-t_f)\right]^2} > F. \end{aligned}$$

If $t_h = t_f$ and $F > 0$, from (2) and (6), firm 1 does not prefer FDI with centralization to Export because $\Pi_1^C = \Pi_1^{EX} - F$.

When $A = B = 1$, $F = 0$, $u = 1$, and $t_h = 0.3$, the condition for FDI ($\Pi_1^C > \Pi_1^{EX}$) is

$$-\frac{(10t_f - 3)\left(-52410t_f + 11325t_f^2 + 18250t_f^3 + 25236\right)}{90\left(90t_f + 100t_f^2 - 141\right)^2} > 0.$$

Figure 2 has been drawn using these values. Because, with our parameters, $t_f \in [0, 0.77468)$ meets the assumption of $-(t_f - t_h)^2 + Bu(1 - t_f) > 0$, we cut off the rage above $t_f = 0.7$ from the figure.

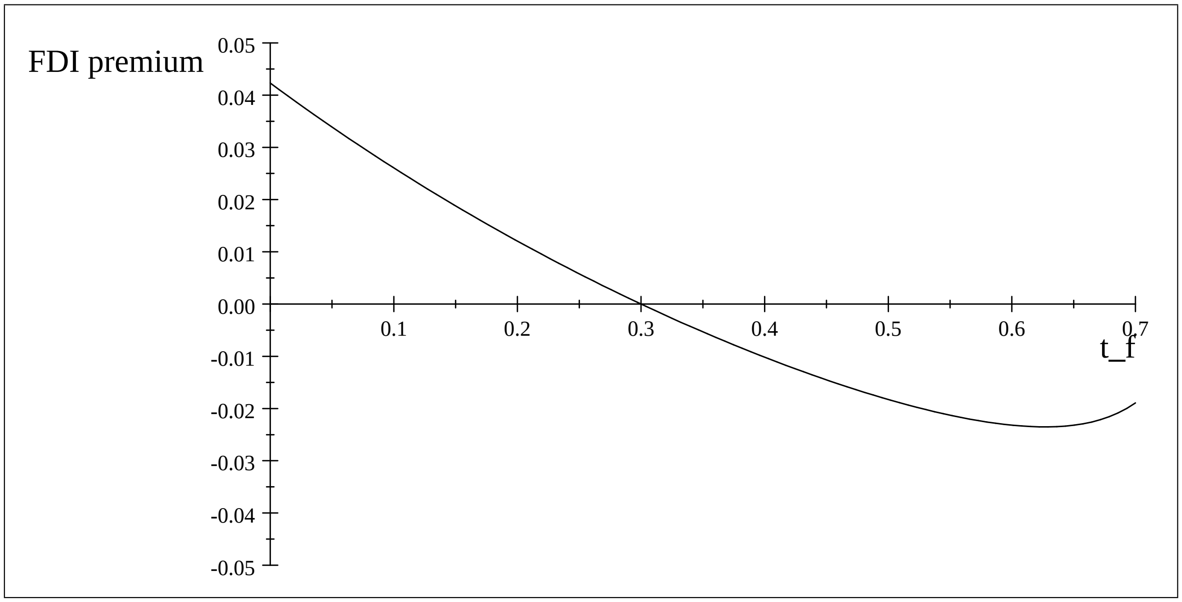

Figure 2. Additional profit of FDI with centralization ($t_h = 0.3$)

In Figure 2, when $t_h = t_f$, $\Pi_1^C = \Pi_1^{DC}$ because of $F = 0$. And FDI with centralization is better than Export only in the case where the tax rate in the host country is lower than that in the home country ($t_f < t_h$).

3.3 FDI with decentralization and FDI with centralization

In this subsection, we compare Π_1^{DC} and Π_1^C for investigating the decentralization incentive[8]. The condition for decentralization is

$$\begin{aligned} \Pi_1^{DC} &> \Pi_1^C \\ \Leftrightarrow & \frac{A^2\left[4(1-t_h)^2(t_f-t_h)^4 - Bu(1-t_f)\Omega\right]}{8B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)\left[-2(t_f-t_h)^2 + 3Bu(1-t_f)\right]^2} > 0, \end{aligned}$$

[8] This subsection is based on Nielsen et al. (2008).

where $\Omega \equiv 4(1-t_h)(-t_f-t_h+2)(t_f-t_h)^2 - Bu(1-t_f)\left(-8t_f+6t_h+t_f^2-6t_h^2+6t_ft_h+1\right)$. As Nielsen (2008) showed, decentralization is preferable to centralization when the two countries have the same tax level. If $t_h = t_f = t$, from (4) and (6),

$$\begin{aligned} & \Pi_1^{DC} - \Pi_1^C \\ = \; & \frac{A^2}{8B}\left[\frac{(1-t+2Bu)}{\left(1-t+\frac{9}{4}Bu\right)} - \frac{8}{9}\right] \\ = \; & \frac{A^2(1-t)}{72B\left(1-t+\frac{9}{4}Bu\right)} > 0. \end{aligned}$$

Thus, FDI with decentralization is preferred to FDI with centralization when the two countries have the same tax level.

When $A = B = 1$, $F = 0$, $u = 1$, and $t_h = 0.3$, the condition for decentralization ($\Pi_1^{DC} > \Pi_1^C$) is

$$\frac{-184880t_f + 179260t_f^2 - 32800t_f^3 + 4000t_f^4 + 46187}{40(40t_f+47)\left(90t_f+100t_f^2-141\right)^2} > 0.$$

Figure 3 illustrate the additional profit from decentralization, using the parameter values above.

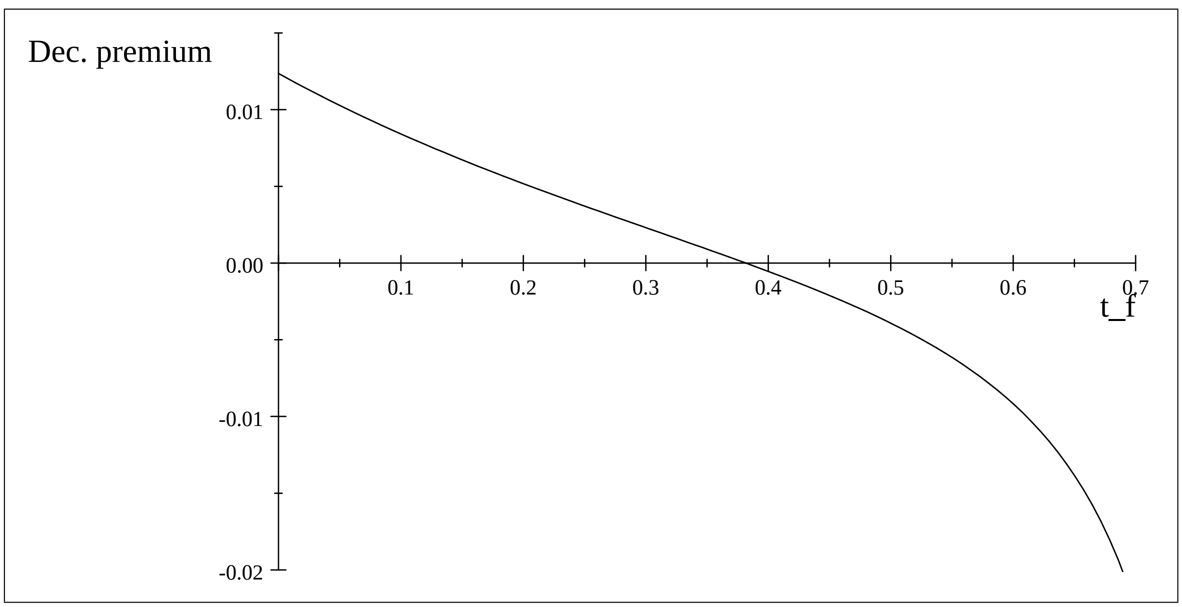

Figure 3. Additional profit of decentralization ($t_h = 0.3$)

In Figure 3, firm 1 chooses FDI with decentralization when $t_f < t_f^* \simeq 0.38163$

4 Optimal entry mode for the foreign market

In this section we explore the optimal entry mode of firm 1. We directly compare the following three profits,

$$\begin{aligned}
\Pi_1^{EX} &= \frac{(1-t_h)\,a^2}{4b} + \frac{(1-t_h)\,A^2}{9B}, \\
\Pi_1^{DC} &= \frac{(1-t_h)\,a^2}{4b} + \frac{A^2\left[(1-t_h)^2 + 2Bu\,(1-t_f)\right]}{8B\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)} - F, \\
\Pi_1^{C} &= \frac{(1-t_h)\,a^2}{4b} + \frac{A^2 u\,(1-t_f)^2\left[-(t_f-t_h)^2 + 2Bu\,(1-t_f)\right]}{2\left[-2\,(t_f-t_h)^2 + 3Bu\,(1-t_f)\right]^2} - F,
\end{aligned}$$

when $a = 2$, $b = 1$, $A = B = 1$, $F = 0$, $u = 1$, and $t_h = 0.3$ in this section. We have

$$\begin{aligned}
\Pi_1^{EX} &= 0.77778, \\
\Pi_1^{DC} &= \frac{184t_f + 313}{8\,(40t_f + 47)}, \\
\Pi_1^{C} &= \frac{-48582t_f - 18865t_f^2 + 26700t_f^3 + 11500t_f^4 + 32608}{2\left(90t_f + 100t_f^2 - 141\right)^2}.
\end{aligned}$$

Figure 4 shows these profits (Π_1^{EX} is black thin straight line, Π_1^{DC} is red thin line, and Π_1^{C} is blue bold line).

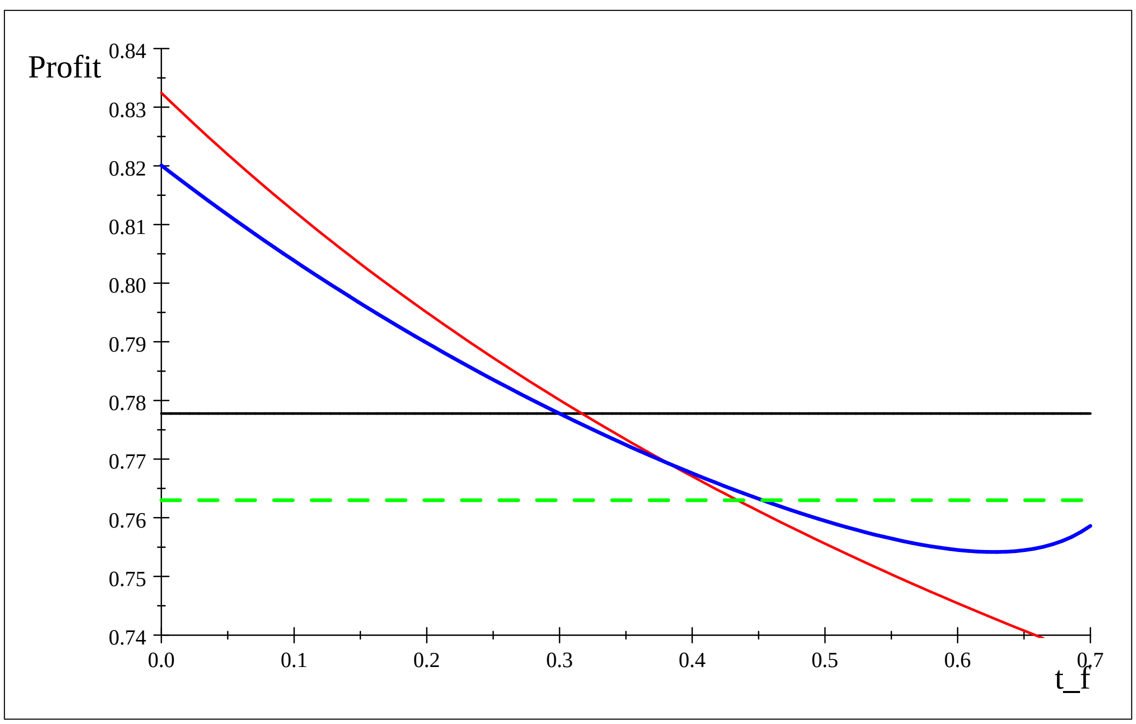

Figure 4. Comparison of profit in the three modes ($t_h = 0.3$)

Firm 1 prefers decentralized FDI to centralized FDI when $t_f < t_f^* \simeq 0.38163$, prefers decentralized FDI to Export when $t_f < \widetilde{t_f} = \frac{185}{584} \simeq 0.316\,78$, and prefers centralized FDI to Export when $t_f < \widehat{t_h} = 0.3$. The order of the three profits are $\Pi_1^{EX} > \Pi_1^{C} > \Pi_1^{DC}$ for $t_f > 0.38163$, $\Pi_1^{EX} > \Pi_1^{DC} > \Pi_1^{C}$ for $\frac{185}{584} < t_f < 0.38163$, $\Pi_1^{DC} > \Pi_1^{EX} > \Pi_1^{C}$ for $0.3 < t_f < \frac{185}{584}$, and $\Pi_1^{DC} > \Pi_1^{C} > \Pi_1^{EX}$ for $t_f < 0.3$. Thus, we have the following proposition.

Proposition 2 *Given the parameter values, in the case of no foreign country's advantage and no trade cost, when the firm chooses FDI, the firm also implements decentralization.*

This proposition implies no centralized multinationals appear in free trade. Because the FDI fixed cost decreases Π_1^{DC} and Π_1^{C} (shifts the red thin line and blue bold line downward) and it does not affect the decentralization incentive, this proposition would remain valid even when $F \neq 0$.

5 Trade cost

In this section, we relax the assumption, $\tau = 0$. For checking and enforcing robustness, we investigate how and to what extent trade costs affect the result in the previous section[9]. When $\tau \neq 0$, from (1), the after-tax profit of firm 1 is

$$\Pi_1^{EX} = (1 - t_h)\left[\frac{a^2}{4b} + \frac{(A - 2\tau)^2}{9B}\right].$$

With our parameters,

$$\Pi_1^{EX} = \frac{7}{45}\left(-2\tau + 2\tau^2 + 5\right).$$

When $\tau = 0.05$, we have $\Pi_1^{EX} = 0.763$. In Figure 4, the green bold straight dotted line shows this profit. Although, in this case, the trade cost does not affect the decentralization decision, the cost affects FDI decisions. Firm 1 prefers decentralized FDI to Export when $t_f < \widetilde{t_f} = \frac{102}{235} \simeq 0.43404$ and prefers centralized FDI to Export when $t_f < \widehat{t_f} \simeq 0.45327$. The order of the three profits are $\Pi_1^{EX} > \Pi_1^{C} > \Pi_1^{DC}$ for $t_f > 0.45327$, $\Pi_1^{C} > \Pi_1^{EX} > \Pi_1^{DC}$ for $\frac{102}{235} < t_f < 0.45327$, $\Pi_1^{C} > \Pi_1^{DC} > \Pi_1^{EX}$ for $0.38163 < t_f < \frac{102}{235}$, and $\Pi_1^{DC} > \Pi_1^{C} > \Pi_1^{EX}$ for $t_f < 0.38163$. Thus, as the corporate tax in the foreign country increases, firm 1's entry mode to the foreign market shifts from FDI with decentralization to FDI with centralization, to Export. This implies FDI with centralization is feasible when the trade cost is sufficiently high. By comparing the results in the previous and current sections, we can find that trade liberalization accelerates decentralization[10].

At $t_f^* \simeq 0.38163$, $\Pi_1^{DC}\big|_{t_f^*} = \Pi_1^{C}\big|_{t_f^*} \simeq 0.76933$. We call the trade cost τ^*, at which

$$(1 - t_h)\left[\frac{a^2}{4b} + \frac{(A - 2\tau^*)^2}{9B}\right] = \Pi_1^{DC}\big|_{t_f^*} = \Pi_1^{C}\big|_{t_f^*}.$$

[9] In this section, we consider a case where the trade cost is specific. We will show an ad valorem case in our future research. We will also consider the case where firm 1 incurs trade costs even in FDI cases.

[10] In our future research, we will discuss a relationship between trade costs and decision lights with anecdotal evidence.

And we obtain $\tau^* \simeq 0.027934$. When $\tau < \tau^*$, the relationship between the optimal entry mode and the foreign country's tax rate is the same as the case of $\tau = 0$ (in the previous section). When $\tau > \tau^*$, the relationship is the same as the case of $\tau = 0.05$.

We can consider the possibility that firm 1 has a domestic subsidiary and delegates an output decision to the subsidiary and the subsidiary competes with the local rival. If $F = 0$, the net profit of firm 1 with this domestic decentralization overcomes the profit in Export case. However, even when we replace the normal Export profit by this decentralized export profit, the replacement only makes the critical trade cost rate higher ($\tau' \simeq 0.054932 > \tau^* \simeq 0.027934$) and our results do not change[11].

6 Transfer pricing cost

We examine the effect of u on the optimal entry mode. It could be considered that the higher u is related to the tougher transfer pricing regulation. Before that, we consider how u affect the transfer price. We find that an increase in u affects the transfer prices in both cases as follows,

$$\begin{aligned} \frac{dm^{dc}}{du} &= -\frac{9B}{4\left(2t_f - 3t_h + 1 + \frac{9}{4}Bu\right)} m^{dc}, \\ \frac{dm^{c}}{du} &= -\frac{3B\left(1 - t_f\right)}{-2\left(t_f - t_h\right)^2 + 3Bu\left(1 - t_f\right)} m^{c}. \end{aligned}$$

This means $\frac{dm^{dc}}{du} \lesseqgtr 0$ when $m^{dc} \gtreqless 0$ and $\frac{dm^{c}}{du} \lesseqgtr 0$ when $m^{c} \gtreqless 0$. Figure 5 shows the transfer prices of decentralized MNEs and centralized MNEs using our parameters. The solid lines show the case of $u = 1$ and the dotted lines the case of $u = 1.2$. The red thin lines show the decentralized cases and the blue bold the centralized case. A change of u has no effect on the transfer price of decentralized MNEs when $t_f = 0.475$, that is, when $m^{dc} = 0$ and no effect on that of centralized MNEs when $t_f = 0.3$, that is, when $m^c = 0$.

[11] We do not use any transfer pricing cost in the domestic decentralization case.

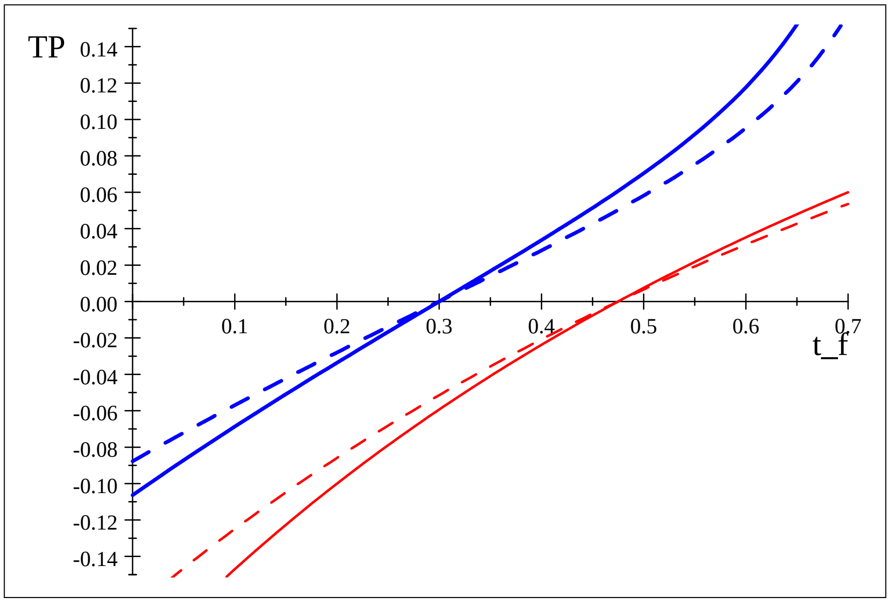

Figure 5. Effect of u on transfer price

We find that an increase in u decreases Π_1^{DC} and Π_1^{C} as follows,

$$
\begin{aligned}
\frac{d\Pi_1^{DC}}{du} &= -\frac{(4t_f-3t_h-1)^2 A^2}{2\,(8t_f-12t_h+9Bu+4)^2} \leq 0, \\
\frac{d\Pi_1^{C}}{du} &= -\frac{1}{2}A^2 (t_f-t_h)^2 (1-t_f)^2 \frac{-2\,(t_f-t_h)^2+5Bu\,(1-t_f)}{\left(-2\,(t_f-t_h)^2+3Bu\,(1-t_f)\right)^3} \leq 0.
\end{aligned}
$$

Although a tougher regulation (an increase in u) reduces the FDI profit in both cases, when $t_f = \frac{1+3t_h}{4}$, because decentralized MNEs always set $m = 0$, a change of u has no effect on the profit of the firm and when $t_f = t_h$, because centralized MNEs always set $m = 0$, a change of u has no effect on the profit of the firm.

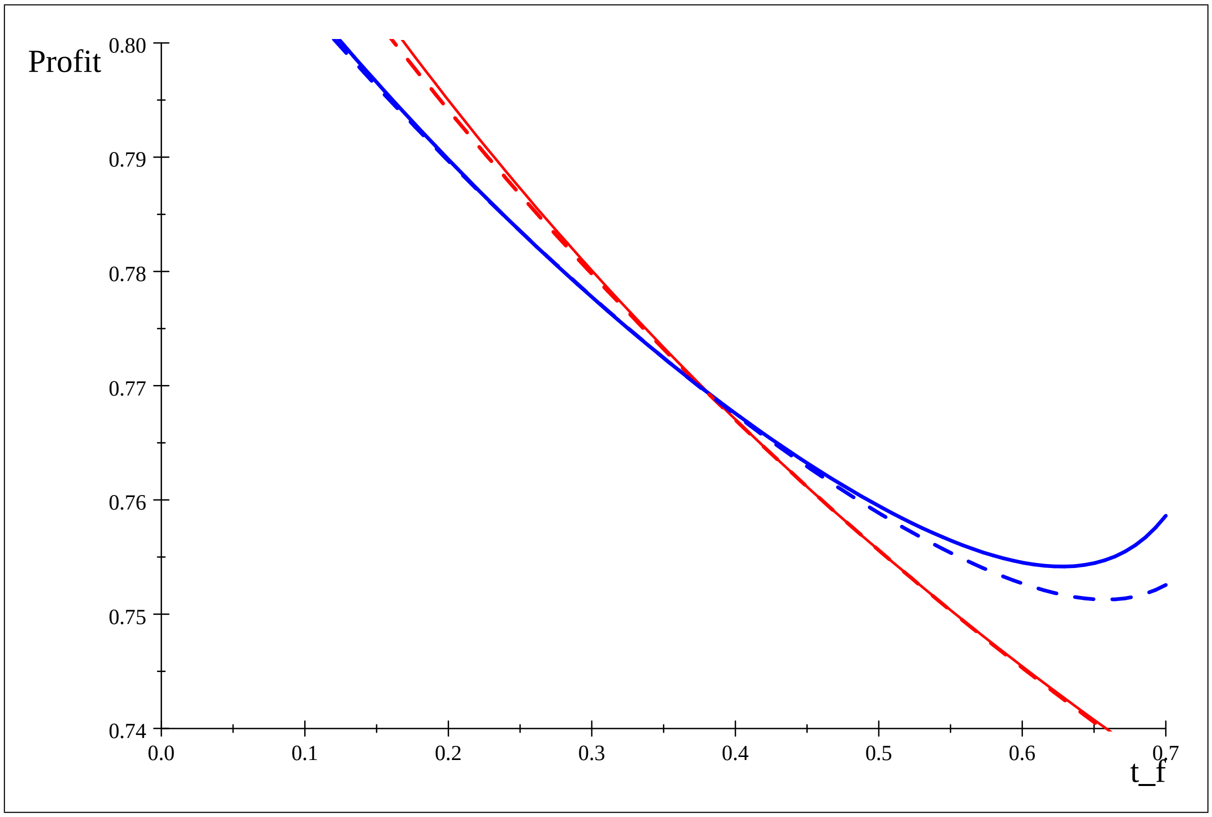

Figure 6. Effect of u on profit

When $a = 2$, $b = 1$, $A = B = 1$, $F = 0$, $u = 1.2$, $t_h = 0.3$, at $t_f^{**} \simeq 0.38267$, $\Pi_1^{DC}\big|_{t_f^{**}} = \Pi_1^{C}\big|_{t_f^{**}} \simeq 0.76912$. The critical trade cost rate is $\tau^{**} \simeq 0.028649 > \tau^*$. This implies that a tougher regulation (an increase in u) may expand the region of no centralization.

7 Conclusion

We investigated FDI incentives, taking into account the strategic role of transfer pricing and decentralization. It has been found that, even when a host country has neither production cost advantage nor tax advantage, FDI can be undertaken by a (purely) strategic incentive. We also found that trade liberalization and a tougher transfer pricing regulation boost decentralization of multinationals.

For checking and enforcing robustness, we should examine how and to what extent an ad valorem trade cost affect our findings and also consider the case where firm 1 incurs trade costs even in FDI cases. We leave those investigations to future work. In the model, we assume a quadratic form of transfer pricing cost. This cost implicitly reflects transfer pricing regulation implemented by governments. Investigating more specifically the effects of transfer pricing regulation on FDI incentives is also left to future work.

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