Online Appendix for "Attractive Target for Tax Avoidance: Trade Liberalization and Entry Mode"

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Online Appendix 1: n local firms

In this appendix, let us consider the case that $n(\geq 2)$ local firms operate in a host country. As the objective functions of firms are the same as in the main text, the same optimal transfer price as in the main text, $\widehat{r} = c + \tau - \frac{T-t}{\delta}$. Then, $c_M^G = c_M^A = c + \tau - \frac{(T-t)^2}{2\delta(1-t)}$ holds and we can derive the following equilibrium outputs of firms:

$$
\begin{aligned}
q_M^E &= \frac{\alpha - (n+1)\tau}{n+2}, && \text{and} \quad q_L^E = \frac{\alpha+\tau}{n+2}, \\
q_M^G &= \frac{\alpha - (n+1)\tau}{n+2} + \frac{(n+1)(T-t)^2}{2\delta(n+2)(1-t)}, && \text{and} \quad q_L^G = \frac{\alpha+\tau}{n+2} - \frac{(T-t)^2}{2\delta(n+2)(1-t)}, \\
q_M^A &= \frac{\alpha - n\tau}{n+1} + \frac{n(T-t)^2}{2\delta(n+1)(1-t)}, && \text{and} \quad q_L^A = \frac{\alpha+\tau}{n+1} - \frac{(T-t)^2}{2\delta(n+1)(1-t)},
\end{aligned}
$$

and these yield the following profits of firms

$$
\begin{aligned}
\Pi_M^E &= (1-T)\left[\overline{\pi} + (q_M^E)^2\right], && \text{and} \quad \Pi_L^E = (1-t)\left(q_L^E\right)^2, \\
\Pi_M^G &= (1-T)\left[\overline{\pi}\right] + (1-t)\left(q_M^G\right)^2 - F, && \text{and} \quad \Pi_L^G = (1-t)\left(q_L^G\right)^2, \\
\Pi_M^A &= (1-T)\left[\overline{\pi}\right] + (1-t)\left(q_M^A\right)^2 - V, && \text{and} \quad \Pi_L^A = (1-t)\left(q_L^A\right)^2.
\end{aligned}
$$

First, consider firm M's choice between export and GFDI. Formally,

$$
\begin{aligned}
&\Pi_M^E - \left(\Pi_M^G - F\right) \gtreqless 0 \\
\iff\ & F \gtreqless \underline{F}^E \equiv (T-t)\left[(q_M^E)^2 + \left(\frac{n+1}{n+2}\right)\left(\frac{T-t}{2\delta}\right) q_M^E + \left(\frac{n+1}{n+2}\right)^2 \left(\frac{(T-t)^3}{4\delta^2(1-t)}\right)\right]
\end{aligned}
$$

is obtained. Therefore, as in the main analysis, firm M chooses GFDI when $F < \underline{F}^E$ holds whereas it chooses exports otherwise.

If the fixed costs of GFDI is smaller than the threshold, the alternative scheme is GFDI and the bid for a local firm is the local firm's profits under GFDI, $V = \Pi_L^G$. Given the bid, firm M prefers CM&A when the following inequality holds,

$$\Pi_M^A - \Pi_L^G - \left(\Pi_M^G - F\right) \gtreqless 0 \iff F \gtreqless \underline{F}^A \equiv \frac{(1-t)F_1^A}{(n+1)^2(n+2)^2}$$

where $F_1^A \equiv \left[(\alpha+\tau)\{(n^2-2)\alpha+(3n^2+6n+2)\tau\} - \frac{\{n(2n+3)\alpha+(3n^2+6n+2)\tau\}(T-t)^2}{\delta(1-t)} + \frac{(3n^2+6n+2)(T-t)^4}{4\delta^2(1-t)^2}\right]$.

Alternatively, if the fixed costs of GFDI is larger than $\underline{F}^E$, the bid for a local firm is the profits of the local firm under exports, $V = \Pi_L^E$. Similar to the comparison between GFDI and CM&A, we identify a unique threshold above that firm M prefers CM&A to export as follows;

$$\Pi_M^A - \Pi_L^E - \Pi_M^E \gtreqless 0 \iff \frac{\{-4\xi - 2n(n+2)^2(T-t)^2(\alpha-n\tau)\delta - n^2(n+2)^2(T-t)^4\}}{(n+1)^2(n+2)^2\delta^2}$$

where $\xi \equiv (1-t)(n+2)^2(\alpha-n\tau)^2 - (1-t)(n+1)^2(\alpha+\tau)^2 - (1-T)\{\alpha-(n+1)\tau\}(n+1)^2$

and thus CM&A is profitable over exports if $\xi > 0$ holds or $\xi < 0$ and $\delta < \underline{\delta}^E \equiv \frac{2n(n+2)(T-t)}{-8(1-t)\xi}\{(n+2)(T-t)(\alpha-n\tau)+\sqrt{\Theta}\}$ where $\Theta \equiv (n+2)^2(T-t)^2(\alpha-n\tau) - 4(1-t)\xi$ hold.

By taking the first derivative of $\underline{F}^E$ with respect to δ, $\frac{\partial \underline{F}^E}{\partial \delta} = -\frac{(T-t)^2(n+1)}{2\delta^2(n+2)}\left(q_M^E + \frac{(T-t)^2(n+1)}{\delta(n+2)}\right) < 0$ holds. Furthermore, note that $\xi \le 0$ holds if and only if $\frac{(3n^2+6n+2)(T-t)^2}{2(1-t)\{n(2n+3)\alpha+(3n^2+6n+2)\tau\}} \equiv \delta_{\underline{F}_\delta^A} \le \delta$ holds, and by evaluating at $\xi = 0$, we have,

$$\begin{aligned}\underline{F}^A\Big|_{\delta=\delta_{\underline{F}_\delta^A}} &= -2\alpha^2(2n^4+6n^3+4n^2+1) \\ &\quad - 2n(6n^3+21n^2+20n+3)\alpha\tau - (3n^2+6n+2)(3n^2+6n+1)\tau^2 < 0.\end{aligned}$$

Therefore, $\frac{\partial \underline{F}^A}{\partial \delta} > 0$ holds under the range of δ where $\underline{F}^A > 0$ holds. Hence, we have qualitatively the same thresholds of $\underline{F}^E$, $\underline{F}^A$, and $\underline{\delta}^E$, and proposition 1 still holds.

Now, we turn our attention to the effect of trade liberalization on the three thresholds. First, we obtain,

$$\frac{\partial \underline{F}^E}{\partial \tau} = (T-t)\left[2q_M^E + \left(\frac{(T-t)(n+2)}{2\delta(n+2)}\right)\right]\left(\frac{\partial q_M^E}{\partial \tau}\right) < 0,$$

which means trade liberalization increases $\underline{F}^E$.

Next, regarding the threshold of $\underline{F}^A$, we compute the first derivative with respect to τ as

$$\frac{\partial \underline{F}^A}{\partial \tau} = \frac{2(1-t)}{(n+1)^2(n+2)^2}\left[n(2n+3)\alpha + (3n^2+6n+2)\tau - \frac{(3n^2+6n+2)(T-t)^2}{2\delta(1-t)}\right] \gtreqless 0,$$
$$\iff \delta \gtreqless \delta_{\underline{F}^A_\tau} \equiv \frac{(T-t)^2(3n^2+6n+2)}{2(1-t)\left\{n(2n+3)\alpha + (3n^2+6n+2)\tau\right\}}.$$

Again, by substitute $\delta_{\underline{F}^A_\tau}$ into $\underline{F}^A$,

$$\underline{F}^A\Big|_{\delta_{\underline{F}^A_\tau}} = -\frac{(1-t)(n+1)^2(n+2)^2}{3n^2+6n+2} < 0,$$

is obtained, which means $\frac{\partial \underline{F}^A}{\partial \tau} > 0$ holds under the range of δ where $\underline{F}^A > 0$ holds. Therefore, a reduction in τ decreases $\underline{F}^A$.

Finally, we take the first derivative of $\underline{\delta}^E$ with respect to τ, which showing,

$$\frac{\partial \underline{\delta}^E}{\partial \tau} = \frac{2n(n+2)(T-t)\delta_1^E}{\{-8(1-t)\xi\}^2}$$
$$\text{where } \delta_1^E \equiv 4n(n+2)(1-t)(T-t)\left\{2 + \frac{(n+2)(T-t)}{\Theta}\right\}\xi + 8(1-t)\delta_2^E\left(\frac{\partial \xi}{\partial \tau}\right),$$
$$\text{and } \quad \delta_2^E \equiv (n+1)(T-t)(\alpha - n\tau) + \sqrt{\Theta} + \frac{2(1-t)\xi}{\sqrt{\Theta}}.$$

Note that

$$\begin{aligned}
&(n+1)(T-t)(\alpha-n\tau) + \sqrt{\Theta} \gtreqless -\frac{2(1-t)\xi}{\sqrt{\Theta}} \\
\iff\; &(n+1)(T-t)(\alpha-n\tau)\sqrt{\Theta} \gtreqless -\Theta - 2(1-t)\xi \\
&\qquad\qquad\qquad\qquad = 2(1-t)\xi - (n+2)^2(T-t)^2(\alpha-n\tau) < 0 \quad (\because \xi < 0)
\end{aligned}$$

is obtained and thus $\delta_2^E < 0$ holds. Furthremore, we have

$$\frac{\partial \xi}{\partial \tau} = -2n(1-t)(n+2)^2(\alpha-n\tau) - (1-t)(n+1)^2(2\alpha-(n-1)\tau) - (T-t)(n+1)^3\tau < 0.$$

Therefore, the above concludes $\frac{\partial \underline{\delta}^E}{\partial \tau} < 0$, which implies that a lower τ increases $\underline{\delta}^E$. Thus, we confirm qualitatively the same property of proposition 2.

Online Appendix 2: Details calculation on Appendix C (Heterogeneous firms over their marginal costs)

Let us modify the setting of homogeneous production costs among firms, which is assumed in the main analysis. In line with empirical finding from the literature on firms' productivity, we assume firm M has the most superior technology and the lowest marginal cost which we normalize to zero, $c_M = 0$. We also introduce different marginal cost between the local firms and suppose firm 1 is a productive local firm and firm 2 is a less productive firm. Specifically, we formulate the marginal costs as $c_1 = \gamma c \leq c = c_2$ where γ is a parameter capturing the proportional technological gap between the local firms.

By solving the same game as in the main text, we obtain the set of optimal levels of firms' outputs and firm M's optimal transfer price summarized in Table 1.

	Export	GFDI	CM&A w/ firm 1	CM&A w/ firm 2
Firm M	$q_M^E = \frac{a+c(1+\gamma)-3\tau}{4}$	$q_M^G = q_M^E + \frac{3(T-t)}{8(1-t)\delta}$	$q_{M1}^A = \frac{a+c-2\tau}{3} + \frac{(T-t)^2}{3(1-t)\delta}$	$q_{M2}^A = \frac{a+\gamma c-2\tau}{3} + \frac{(T-t)^2}{3(1-t)\delta}$
Firm 1	$q_1^E = \frac{a+c-3\gamma c+\tau}{4}$	$q_1^G = q_1^E - \frac{(T-t)^2}{8(1-t)\delta}$	—	$q_1^A = \frac{a-2\gamma c+\tau}{3} - \frac{(T-t)^2}{6(1-t)\delta}$
Firm 2	$q_2^E = \frac{a-3c+\gamma c+\tau}{4}$	$q_2^G = q_2^E - \frac{(T-t)^2}{8(1-t)\delta}$	$q_2^A = \frac{a-2c+\tau}{3} - \frac{(T-t)^2}{6(1-t)\delta}$	—
Transfer price		$\widehat{r} = \tau - \frac{T-t}{\delta}$		

Table 1: Optimal quantities and transfer price

With the set of outputs, we can derive the threshold $\underline{F}^E$ satisfying $\Pi_M^E = \Pi_M^G$ as follows,

$$\Pi_M^E \gtreqless \Pi_M^G \iff F \gtreqless \underline{F}^E \equiv \frac{9(T-t)^4}{64(1-t)\delta^2} + \frac{3(T-t)^2\{a+c(1+\gamma)-3\tau\}}{16\delta} + \frac{(T-t)\{a+c(1+\gamma)-3\tau\}^2}{16}.$$

This yields $\frac{\partial \underline{F}^E}{\partial \delta} < 0$ and $\frac{\partial \underline{F}^E}{\partial \tau} < 0$ as in the benchmark analysis.

When $F < \underline{F}^E$ holds, the alternative scheme is GFDI. Note that whether firm M merges with firm 1 or firm 2 is ambiguous. Let Π_{Mi}^A and Π_i^A be firm M's post-tax profits under CM&A with firm $i \in \{1,2\}$ and non-target local firm i's post-tax profits. Then, firm M's decision on the target firm depends on the following comparison,

$$\left(\Pi_{M1}^A - \Pi_1^G\right) - \left(\Pi_{M2}^A - \Pi_2^G\right) = \frac{c(1-\gamma)}{36\delta}\left[17(T-t)^2 - 2(1-t)\{5a - 11c(1+\gamma) + 17\tau\}\delta\right] \gtreqless 0.$$

If $\frac{5a+17\tau}{11} < c(1+\gamma)$ holds, $\{5a - 11c(1+\gamma) + 17\tau\} < 0$ and $\left(\Pi_{M1}^A - \Pi_1^G\right) > \left(\Pi_{M2}^A - \Pi_2^G\right)$ always hold, which implies firm M merges with firm 1. However, if $c(1+\gamma) < \frac{5a+17\tau}{11}$ holds, the second parenthesis is positive if $(\underline{\delta}^{min}) < \delta < \delta_{12}^{G} \equiv \frac{17(T-t)^2}{2(1-t)\{5a-11c(1+\gamma)+17\tau\}}$ holds, whereas $\delta_{12}^{G} < \delta$ leads to the parenthesis is negative. Thus, if the transfer pricing regulation is loosely (strictly) enforced, firm M merges with firm 1 (firm 2).

Given the above discussion on the target firm, firm M's decision to choose either GFDI or CM&A with firm 1 is based on,

$$\left(\Pi_{M1}^{A} - \Pi_{1}^{G}\right) - \left(\Pi_{M}^{G} - F\right) \gtreqless 0 \iff F \gtreqless \underline{F}_{1}^{A} \equiv \frac{\{(T-t)^2 - 2(1-t)(a+c-3c\gamma+\tau)\delta\}}{288(1-t)\delta^2} F_{1}^{A}$$

where $F_{1}^{A} \equiv \{13(T-t)^2 - 2(1-t)(a+c-15c\gamma+13\tau)\delta\} \gtreqless 0.$

Note that the first term of $\underline{F}_{1}^{A}$ is negative due to $\underline{\delta}^{min} < \delta$, and $F_{1}^{A} > F_{1}^{A}\big|_{\delta=\delta_{12}^{G}} = \frac{16(T-t)^2(3a-10c+7c\gamma)}{5a-11c(1+\gamma)+17\tau} \geq 0$ holds if and only if $\frac{3a}{10-7\gamma} \geq c$ holds. Therefore, under $\frac{3a}{10-7\gamma} \geq c$, $\underline{F}_{1}^{A}$ is negative and $\left(\Pi_{M1}^{A} - \Pi_{1}^{G}\right) > \left(\Pi_{M}^{G} - F\right)$ holds. Otherwise, $\delta \lesseqgtr \frac{13(T-t)^2}{2(1-t)(a+c-15c\gamma+13\tau)} \equiv \delta_{F_1^A}$ results in $F_{1}^{A} \gtreqless 0$. Subsequently, under $\frac{3a}{10-7\gamma} < c$ and $\delta > \delta_{F_1^A}$, $F \gtreqless \underline{F}_{1}^{A}$ are equivalent to $\left(\Pi_{M1}^{A} - \Pi_{1}^{G}\right) \gtreqless \left(\Pi_{M}^{G} - F\right)$.

Similarly, firm M's choice on GFDI or CM&A with firm 2 is based on

$$\left(\Pi_{M2}^{A} - \Pi_{2}^{G}\right) - \left(\Pi_{M}^{G} - F\right) \gtreqless 0 \iff F \gtreqless \underline{F}_{2}^{A} \equiv \frac{\{(T-t)^2 - 2(1-t)(a-3c+c\gamma+\tau)\delta\}}{288(1-t)\delta^2} F_{2}^{A}$$

where $F_{2}^{A} \equiv \{13(T-t)^2 - 2(1-t)(a-15c+c\gamma+13\tau)\delta\} \gtreqless 0$

$$\iff \delta \lesseqgtr \frac{13(T-t)^2}{2(1-t)(a-15c+c\gamma+13\tau)} \equiv \delta_{F_2^A}.$$

The numerator of the first parenthesis of $\underline{F}_{2}^{A}$ is positive under $\underline{\delta}^{min} < \delta < \frac{(T-t)^2}{2(1-t)(a-3c+c\gamma+\tau)} \left(< \delta_{F_2^A}\right)$ and negative otherwise. Note that $\delta_{12}^{G} \gtreqless \frac{(T-t)^2}{2(1-t)(a-3c+c\gamma+\tau)}$ if and only if $\frac{3a}{10-7\gamma} \gtreqless c$. Thus, if $\frac{3a}{10-7\gamma} > c$ holds, the numerator of the first parenthesis of $\underline{F}_{2}^{A}$ is negative and thus $\left(\Pi_{M2}^{A} - \Pi_{2}^{G}\right) > \left(\Pi_{M}^{G} - F\right)$ holds if $\delta_{F_2^A} < \delta$. Alternatively, if $\frac{3a}{10-7\gamma} < c$ holds, both the numerator of the first parenthesis of $\underline{F}_{2}^{A}$ and F_{2}^{A} are positive under $\delta_{12}^{G} < \delta < \frac{(T-t)^2}{2(1-t)(a-3c+c\gamma+\tau)}$ and they are negative under $\delta_{F_2^A} < \delta$, which both cases mean $\left(\Pi_{M2}^{A} - \Pi_{2}^{G}\right) \gtreqless \left(\Pi_{M}^{G} - F\right)$ is equivalent to $F \gtreqless \underline{F}_{2}^{A}$. Alternatively, if $\frac{(T-t)^2}{2(1-t)(a-3c+c\gamma+\tau)} < \delta < \delta_{F_2^A}$ holds, $\left(\Pi_{M2}^{A} - \Pi_{2}^{G}\right) > \left(\Pi_{M}^{G} - F\right)$ holds.

Furthermore, we confirm

$$\frac{\partial \underline{F}_{1}^{A}}{\partial \delta} = \frac{(T-t)^2\{2(1-t)(7a+7c-27c\gamma+13\tau)\delta - 13(T-t)^2\}}{144(1-t)\delta^3},$$
$$\frac{\partial \underline{F}_{2}^{A}}{\partial \delta} = \frac{(T-t)^2\{2(1-t)(7a-27c+7c\gamma+13\tau)\delta - 13(T-t)^2\}}{144(1-t)\delta^3}.$$

In addition, $\delta_{F_1^A} - \frac{13(T-t)^2}{2(1-t)(7a+7c-27c\gamma+13\tau)} = \frac{39(T-t)^2(a+c-2c\gamma)}{(1-t)(7a+7c-27c\gamma+13\tau)(a+c-15c\gamma+13\tau)} > 0$ and $\delta_{F_2^A} - \frac{13(T-t)^2}{2(1-t)(7a-27c+7c\gamma+13\tau)} = \frac{39(T-t)^2(a-2c+c\gamma)}{(1-t)(7a-27c+7c\gamma+13\tau)(a-15c+c\gamma+13\tau)} > 0$ means $\frac{\partial \underline{F}_i^A}{\partial \delta} > 0$ for any $\delta > \delta_{F_i^A}$ as in the benchmark model. Regarding trade liberalization, we have,

$$\frac{\partial \underline{F}_1^A}{\partial \tau} = \frac{(T-t)^2\{2(1-t)(7a+7c-27c\gamma+13\tau)\delta - 13(T-t)^2\}}{72\delta},$$
$$\frac{\partial \underline{F}_2^A}{\partial \delta} = \frac{(T-t)^2\{2(1-t)(7a-27c+7c\gamma+13\tau)\delta - 13(T-t)^2\}}{72\delta},$$

which has the same criterion as $\frac{\partial \underline{F}_i^A}{\partial \delta}$. Therefore, under the range of $\delta > \delta_{F_i^A}$, $\frac{\partial \underline{F}_i^A}{\partial \tau} > 0$ holds.

Finally, we investigate the comparison between CM&A and export. Similar to GFDI, whether firm M merges with firm 1 or firm 2 depends on

$$\left(\Pi_{M1}^A - \Pi_1^E\right) - \left(\Pi_{M2}^A - \Pi_2^E\right) = \frac{c(1-\gamma)}{18\delta}\left[4(T-t)^2 - 2(1-t)\{5a - 11c(1+\gamma) + 17\tau\}\delta\right] \gtreqless 0.$$

Again, if $\frac{5a+17\tau}{11(1+\gamma)} < c$ holds, $\left(\Pi_{M1}^A - \Pi_1^E\right) > \left(\Pi_{M2}^A - \Pi_2^E\right)$ holds. Contrary, if $c < \frac{5a+17\tau}{11(1+\gamma)}$ holds, $\left(\Pi_{M1}^A - \Pi_1^E\right) \gtreqless \left(\Pi_{M2}^A - \Pi_2^E\right)$ is equivalent to $\delta \lesseqgtr \delta_{12}^E \equiv \frac{4(T-t)^2}{2(1-t)\{5a-11c(1+\gamma)+17\tau\}}$. Therefore, under $c < \frac{5a+17\tau}{11(1+\gamma)}$, firm M chooses firm 2 when transfer pricing regulation is strict whereas it merges with firm 1 when transfer pricing regulation is loose. Notably, $\underline{\delta}^{min} \gtreqless \delta_{12}^E$ holds if and only if $0 \gtreqless 3a - 5c + 11c\gamma - 9\tau$ holds.

Given firm i is the target, firm M's preference between CM&A and exports are,

$$\left(\Pi_{M1}^A - \Pi_1^E\right) - \Pi_M^E = \frac{1}{144}\left[-\xi_1 + \frac{32(T-t)^2(a+c-2\tau)}{\delta} + \frac{16(T-t)^4}{(1-t)\delta^2}\right],$$
$$\left(\Pi_{M2}^A - \Pi_2^E\right) - \Pi_M^E = \frac{1}{144}\left[-\xi_2 + \frac{32(T-t)^2(a+c\gamma-2\tau)}{\delta} + \frac{16(T-t)^4}{(1-t)\delta^2}\right],$$
$$\text{where} \quad \xi_1 \equiv 2(1-t)(a+c-3c\gamma+\tau)(a+c-15c\gamma+13\tau) - 9(T-t)(a+c+c\gamma-3\tau)^2,$$
$$\text{where} \quad \xi_2 \equiv 2(1-t)(a-3c+c\gamma+\tau)(a-15c+c\gamma+13\tau) - 9(T-t)(a+c+c\gamma-3\tau)^2,$$

which yield similar thresholds of $\underline{\delta}^E$ as follow,

$$\left(\Pi_{M1}^A - \Pi_1^E\right) \geq \Pi_M^E \iff \delta \leq \underline{\delta}_1^E \equiv \frac{4(T-t)^2\{4(1-t)(a+c-2\tau) + \sqrt{\Theta_1}\}}{(1-t)\xi_1}$$
$$\left(\Pi_{M2}^A - \Pi_2^E\right) \geq \Pi_M^E \iff \delta \leq \underline{\delta}_2^E \equiv \frac{4(T-t)^2\{4(1-t)(a+c\gamma-2\tau) + \sqrt{\Theta_2}\}}{(1-t)\xi_2}$$
$$\text{where} \quad \Theta_1 \equiv (1-t)\{16(1-t)(a+c-2\tau)^2 + \xi_1\}$$
$$\text{where} \quad \Theta_2 \equiv (1-t)\{16(1-t)(a+c\gamma-2\tau)^2 + \xi_2\}.$$

Furthermore, by differentiating these thresholds with respect to trade costs, we have,

$$
\begin{aligned}
\frac{\partial \underline{\delta}_1^E}{\partial \tau} &= \left(\frac{4(T-t)^2}{(1-t)\xi_1^2}\right)\left[-8(1-t)\xi_1\left\{1+\frac{4(a+c-2\tau)}{\sqrt{\Theta_1}}\right\}-\frac{(1-t)\theta_1}{2\sqrt{\Theta_1}}\xi_1'\right] \\
\frac{\partial \underline{\delta}_2^E}{\partial \tau} & \left(\frac{4(T-t)^2}{(1-t)\xi_2^2}\right)\left[-8(1-t)\xi_1\left\{1+\frac{4(a+c\gamma-2\tau)}{\sqrt{\Theta_2}}\right\}-\frac{(1-t)\theta_2}{2\sqrt{\Theta_2}}\xi_2'\right] \\
\text{where} \quad & \theta_1 \equiv (1-t)\left\{\xi_1+8(a+c-2\tau)\sqrt{\Theta_1}+32(1-t)(a+c-2\tau)^2\right\}>0 \\
\text{where} \quad & \theta_2 \equiv (1-t)\left\{\xi_2+8(a+c\gamma-2\tau)\sqrt{\Theta_1}+32(1-t)(a+c\gamma-2\tau)^2\right\}>0
\end{aligned}
$$

Note that,

$$
\begin{aligned}
\xi_1' &\equiv \frac{\partial \xi_1}{\partial \tau} = 4(1-t)\{7(a+c-3c\gamma+\tau)+6(\tau-c\gamma)\}+54(T-t)(a+c+c\gamma-3\tau) \\
\xi_2' &\equiv \frac{\partial \xi_2}{\partial \tau} = 4(1-t)\{7(a-3c+c\gamma+\tau)+6(\tau-c)\}+54(T-t)(a+c+c\gamma-3\tau)
\end{aligned}
$$

hold. Therefore, if $\xi_1' > 0$ and $\xi_2' > 0$ are satisfied, $\frac{\partial \underline{\delta}_1^E}{\partial \tau} < 0$ and $\frac{\partial \underline{\delta}_2^E}{\partial \tau} < 0$ also hold. Namely, $c < \tau$ is the sufficient condition for the positive sign of ξ_1' and ξ_2'.

Finally, by taking a first derivative of δ_{12}^G and δ_{12}^E with respect to τ, we have,

$$
\begin{aligned}
\frac{\partial \delta_{12}^G}{\partial \tau} &= -\frac{17^2(T-t)^2}{2(1-t)\{5a-11c(1+\gamma)+17\tau\}^2} < 0 \\
\frac{\partial \delta_{12}^E}{\partial \tau} &= -\frac{68(T-t)^2}{2(1-t)\{5a-11c(1+\gamma)+17\tau\}^2} < 0.
\end{aligned}
$$

This clearly means that trade liberalization increases the likelihood that a productive firm 1 be the target for firm M's CM&A offer.

The above discussion is drawn in Fig.1.[1] The left figure is illustrated with three different curves. As in the main text, the equilibrium entry modes are based on the solid curves. In the left figure, the two vertical doted lines capture the thresholds of δ_{12}^E and δ_{12}^G, and firm M prefers merging with less productive firm 2 under the right range of δ_{12}^s given the alternative scheme is $s = \{E, G\}$. Finally, the dashed curves shows the thresholds of $\underline{\delta}_1^E$ and $\underline{F}_1^A$ and we can ignore these threshold in equilibrium because firm 2 is firm M's merger target. Thus, as the doted lines show, firm M chooses productive firm 1 as a merger target only when transfer pricing regulation is loose. Moreover, the right figure shows the impact of trade liberalizatoin on the thresholds. With each curve, the solid one is the case of a large trade cost $\tau = 0.5$

[1]We use the following parameter values: $a = 1.5$, $c = 0.25$, $\gamma = 0.8$, $T = 0.25$, $t = 0.1$.

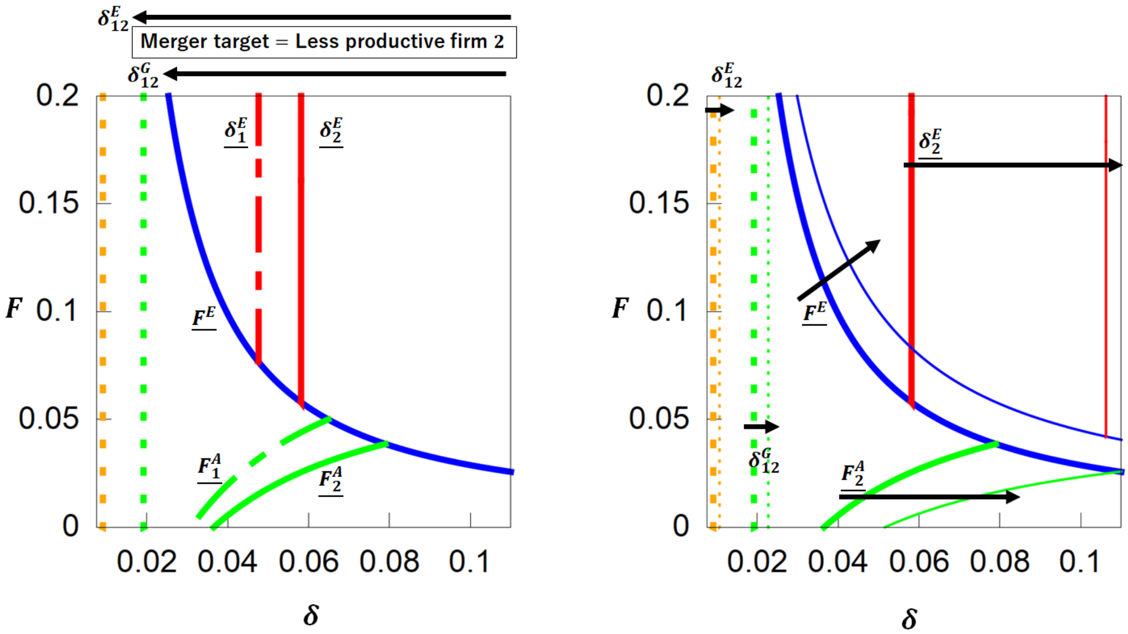

Figure 1: Heterogeneous firms and trade liberalization

whereas the thin one represents that with a low trade cost $\tau = 0.4$. As argued above, the right figure shows the same patterns of the effects on the equilibrium entry modes and that trade liberalization induce firm M to merge with productive firm 1 more likely.