The impacts of market integration on foreign direct investment and tax competition among countries with asymmetric market size

Abstract: This paper examines the impacts of market integration on tax competition for foreign direct investment and its welfare implications. Considering the market asymmetries of integrating countries, this paper demonstrates that when a free trade agreement (FTA) is arranged, i) the market access motivation for a multinational firm is increased, and ii) FTA-member country’s bargaining power for tax competition is increased and iii) the welfare of FTA-member countries is always better off than the welfare of the external country regardless of the location of the firm within the integrated markets. Moreover, surprisingly, the intensified tax competition among the FTA member countries results in a reduced bargaining power of a member country with relatively large market size with respect to member countries with small market size.

1. Introduction

The main purpose of this paper is to analyze how international trade regimes (the level of market integration) affect tax competition between countries competing for foreign direct investment. I found that different types of market integration result in different outcomes for tax competition and the location choice of foreign investor. First, under non-cooperative trade regime (NTR), the lowest level of the integration, many symmetric outcomes between small countries are observed with regards to tax bargaining strategy for FDI. In contrast, asymmetric outcomes are resulted from the formation of FTA. The preferential trade agreement strengthens “bigger market preference” of the firm and increases the tax bargaining power of member countries. Moreover, FTA elevates the degree of tax competition between member countries while it reduces the competitiveness between members and the external. In terms of welfare of country, FTA creates a welfare gap between small countries with the identical market size. The member-small country gains a higher welfare than the external small country. On the other side, the external small country is worse off relative to the member small country with regards to firm location choice, tax competition and welfare. In sum, FTA brings a major reorganization of this regional economy. This paper introduces trade
liberalization (TL) as the highest form of market integration. TL transforms most asymmetric outcomes (under FTA) back to the state of symmetry. As a result of the elimination of optimal tariffs and with no additional trade cost assumptions, prices and welfare among countries are equalized. However, countries experience downward equalization in welfare thus the enhancement of regional welfare is not guaranteed. By contrast, the foreign monopoly firm enjoys improved benefits by capturing rents which would be transferred to countries as optimal tariff revenue.

In this paper, FTA plays an important role for comparing and contrasting with the other two regimes. Thus, this paper mainly focuses on analyzing FTA which has been the most concerned trade issues for both developing and developed countries. Moreover this paper examines a tendency for bigger market preference: small open economies favor large market access chance with the expectation of FDI inflows and multinational firms can also maximize their market access by entering a larger market. This tendency has been observed in East Asian countries such as South Korea and Taiwan. These two countries share very similar economic traits; manufacturing oriented market structure and export oriented trade structure. As trade data shows, ongoing negotiations related to East Asia are over 48% of all ongoing negotiation related to FTA. In addition, all ongoing trade negotiations over 65% are with large countries such as U.S, E.U and China. Thus these data reflects the strong desire of small economies to go forward and make trade agreements with large countries. On the other side, it could be damaging for a country if it fails to join free trade agreement. For example, political and economic interest groups in Taiwan have been concerned about being left out from the preferential market access chances and decreasing FDI inflows, right after South Korea and U.S made free trade agreement. In contrast South Korea expects to enjoy market enlargement effect and enormous FDI inflows. To describe this situation, I introduce three-country model with one large and two small countries which compete with tax to attract FDI. The economic model in this paper is heavily drawn from Haufler and Wooton (1999), who analyze how tax instruments affects tax competition between two countries with asymmetric market size for FDI. There is a main difference from Haufler and Wooton (1999). This paper employ three-country model which allows us to analyze various international trade regimes while a two-country model cannot make any distinction between trade regimes. With a three-country model, we can investigate the advantage of preferential market access chance for the member countries and the disadvantage for the external small country.

The literature examining the link between international trade regimes and FDI is quite small as

1 See details at www.wto.org or www.bilaterals.org
compared to the bunch of literature that study FTA and FDI independently. According to Markusen (1992), high tariff barrier can induce the firm to access the market via FDI. This claim may concur with the fact that the firm invests directly to avoid high transaction cost. Therefore the recent sharp decrease in the international transaction costs is likely to encourage exports not foreign direct investment. However, over the last couple of decades foreign direct investment has been dramatically rising contradicting Markusen (1992). It has been widely agreed that the formation of FTA usually attract FDI, although there is no generalized theory proving how FTA stimulate FDI. For instance, after the formation of NAFTA there has been a sharp increase in FDI inflows into Mexico. Similar effects were observed in the case of India-Sri Lanka FTA of 1998 that stimulated FDI in a number of sectors in Sri-Lanka. There are also considerable empirical studies showing how economic integration in Europe has attracted enormous FDI inflows (Yannopouls, 1990). With empirical data, Alexander Monge-Naranjo (2002) has argued that NAFTA gave a significant advantage on flows of foreign direct investment to Mexico with respect to all the other Central American countries except but Costa Rica. In this context, the present paper explains a location decision process of the foreign firm under FTA. Horst Raff (2004) analyzes how a preferential trade agreement affects the member countries’ tax and subsidies on FDI and welfare. The present paper also begins with the same question that Raff (2004) argued but suggests more specified answers for the impact of regime change (NTR, FTA and TL) on tax competition among countries. Haufler and Wooton (1999) argued that imposing a higher tariff can still induce FDI within a country if the country has a larger market size. However they do not consider the role of trade regime changes. Tax competition results in downward harmonization since countries are undercutting their tax rate to attract FDI. Wilson (1999) called this “race to the bottom”. Haaland and Wooton (1999) argued in general equilibrium tax competition that income is transferred to the foreign multinational firm as a result of subsidy competition. In other words, trade agreements allow multinational firms more freedom to pursue their interests but this may have negative impact on global welfare. In this present paper TL also enforces “race to the bottom” by invalidating optimal tariff policy and hurts regional welfare. Davies and Ellis (2007) emphasis the use of locally and federally set performance requirements (PRs) for FDI as an alternative for tax coordination to lower the bid or increase tax to increase national welfare. For FDI and FTA, more specifically, Kim (2007) analyzed how regional economic integration affects industrial relocation via FDI in East Asia by considering the asymmetry in marginal cost and market size among countries.

The remainder of this paper is organized as follows: Section 2 introduces the basic model. In section 3 each government competes with its profit tax under noncooperative regime. In section 4
tax competition among countries occurs non-cooperatively in terms of profit taxes and optimal tariffs. Section 5 examines the impacts of FTA. Section 6 concludes.

2. The model

2.1 The household

This current model draws heavily from H-W’s (1999) work to explain tax competition between two countries. I assume three countries in this model with identical preferences. Preferences are the form of quadratic and quasi-linear preferences as follows:

\[ u_i = \alpha x_i - \frac{1}{2} \beta x_i^2 + z_i \quad \forall \quad i \in \{l, s_1, s_2\} \]  

(1)

where \( x_i \) is monopoly good and \( z_i \) is numeraire good supplied from competitive market. There are two small countries \( s_1 \) and \( s_2 \) with the same market size. Number of households in these countries normalized to one while number of households in a large country \( l \) is larger than one. This region consists of three countries.

Household receives a wage of \( w \) supplying one unit of labor. All tax revenues are equally distributed with lump-sum fashion. Let \( T_i \) be per capita tax revenues. Thus with this income of \( w + T_i \) a household consume \( x_i \) and \( z_i \). The budget constraint of a household is defined as follows:

\[ w + T_i = z_i + q_i x_i \quad \forall \quad i \in \{l, s_1, s_2\} \]  

(2)

where \( q_i \) is the consumer price of good \( x \) in country \( i \). Solving (1) with respect to (2) yields the representative household’s inverse demand curve for good \( x \):

\[ \alpha = \beta x_i = q_i \quad \forall \quad i \in \{l, s_1, s_2\} \]

The aggregated demand curves of three countries \( \{l, s_1, s_2\} \) are defined respectively as follows:
\[ X_{nu} = n x_{nu} = \frac{n(\alpha - q_{nu})}{\beta}, \quad X_{si} = x_{si} = \frac{(\alpha - q_{si})}{\beta}, \quad X_{s_{i'}} = x_{s_{i'}} = \frac{(\alpha - q_{s_{i'}})}{\beta} \]  

\[ (3) \]

2.2 The firm

A foreign owned monopolist aims to establish production facilities to serve the regional markets for good \( x \). When firm level specific set-up cost is sufficiently low and plant level specific cost are high (Haufler and Wooton, 2006), the firm chooses to enter a market by FDI and then serves the other markets by exporting good. The firm charges the same producer price \( p \) among markets. By adding trade cost to producer price, the firm sets a price on each market. Hence the consumer prices (post trade cost prices) of good \( x \) are equal to the producer prices \( p \) plus the trade cost \( \tau_i \) when output produced in \( i \) is consumed in \( j \). For \( x \) the consumer prices are \( q_{ij} = p_i + \tau_{ij} \). All consumer prices in each country are described as the following price relations:

\[ q_{ij}^l = p_i^l, \quad q_{ij}^s = p_i^s + \tau_{ij}^s, \quad q_{ij}^2 = p_i^2 + \tau_{ij}^2, \quad \text{for FDI in } l \]

\[ q_{ij}^l = p_i^l, \quad q_{ij}^s = p_i^s + \tau_{ij}^s, \quad q_{ij}^2 = p_i^2 + \tau_{ij}^2, \quad \text{for FDI in } s_1 \]

\[ q_{ij}^l = p_i^l, \quad q_{ij}^s = p_i^s + \tau_{ij}^s, \quad q_{ij}^2 = p_i^2 + \tau_{ij}^2, \quad \text{for FDI in } s_2 \]  

\[ (4) \]

Marginal cost of the production is the wage rate, \( w \). The wage rate is assumed to be equal among countries. A lump-sum tax (subsidy) is imposed by the host country and tariffs are imposed by importing countries when the firm sets up a plant in the host country. There is not additional trade cost since three countries are close to each other geographically. Hence the firm should consider tariff \( \tau_i \) and profit tax \( t_i \) on pure profits. Based on the location choice, the firm considers profit functions as follows:

\[ \Pi_i = (P_i - w)(X_i(q_{ij}^l) + X_{si}(q_{ij}^s) + X_{s_2}(q_{ij}^2)) - F - t_i, \quad \text{for FDI in } l \]

\[ \Pi_i = (P_i - w)(X_i(q_{ij}^l) + X_{si}(q_{ij}^s) + X_{s_2}(q_{ij}^2)) - F - t_i, \quad \text{for FDI in } s_1 \]
\[ \Pi_{s_i} = (P_{s_i} - w)(X_i(q_{s_i}^i) + X_{-i}(q_{s_i}^i)) - F - t_{s_i} \]  
for FDI in \( s_2 \).

where \( q_{s_i}^i \) which denotes price when output produced in \( i \) is consumed in \( j \).

When profit maximization problem is solved with respect to price, we obtain optimal price rules using aggregate demand curves (3) and price relations (4):

\[
\begin{align*}
\bar{p}_l &= \frac{1}{2}\left[ (\alpha + w) - \frac{\tau_{s_l}^l + \tau_{l}^l}{n + 2} \right] \quad \text{for FDI in } l \\
\bar{p}_{s_i} &= \frac{1}{2}\left[ (\alpha + w) - \frac{n\tau_{s_i}^i + \tau_{l}^i}{n + 2} \right] \quad \text{for FDI in } s_i \\
\bar{p}_{s_2} &= \frac{1}{2}\left[ (\alpha + w) - \frac{n\tau_{s_2}^i + \tau_{s_2}^i}{n + 2} \right] \quad \text{for FDI in } s_2 
\end{align*}
\]

(5)

Optimal price function is decreasing in tariffs and market size of the large country. Since the market size is bigger than one, price in \( l \) is higher than price in \( s_1 \) and \( s_2 \). Therefore the firm sets a higher price in a larger market relative to \( s_1 \) and \( s_2 \). Substituting optimal price rules (5) into profit function gives indirect profit functions:

\[
\Pi_{s_i} = \frac{[(\alpha - w)(n + 2) - \tau_{s_i}^i - \tau_{s_2}^i]^2}{4\beta(n + 2)} - F - t_{s_i} \quad \text{for FDI in } l \\
\Pi_{s_1} = \frac{[(\alpha - w)(n + 2) - n\tau_{s_1}^i - \tau_{s_2}^i]^2}{4\beta(n + 2)} - F - t_{s_1} \quad \text{for FDI in } s_1 \\
\Pi_{s_2} = \frac{[(\alpha - w)(n + 2) - n\tau_{s_2}^i - \tau_{s_2}^i]^2}{4\beta(n + 2)} - F - t_{s_2} \quad \text{for FDI in } s_2 .
\]

(6)

If the profits are equal between two countries (\( \Pi_i = \Pi_j \)), the firm is indifferent to locating at any countries. Rearranging \( \Pi_i = \Pi_j \) in terms of tax difference \( (t_i - t_j) \) yields the profit tax difference between two countries. Positive tax difference means that the firm is willing to pay a higher profit tax to country \( i \). Therefore tax difference is a measure of the firm’s preference of country \( i \) to country \( j \). Hauffler and Wooton (1999) defined this as tax premium. Tax premium can be described as follows:
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\[ \Gamma_{i-n} = t_i - t_n = \frac{[2(\alpha - w)(n+2) - n\tau_i - r_i' - r_i - r_i'] [n\tau_i + r_i - r_i']}{4\beta(n+2)} \]

\[ \Gamma_{i-s} = t_i - t_s = \frac{[2(\alpha - w)(n+2) - n\tau_i - r_i' - r_i - r_i'] [n\tau_i + r_i - r_i']}{4\beta(n+2)} \]

\[ \Gamma_{s-n} = t_s - t_n = \frac{[2(\alpha - w)(n+2) - n\tau_i - r_i' - r_i - r_i'] [n\tau_i + r_i - r_i']}{4\beta(n+2)} \] (7)

Tax premium largely depends on tariffs rate \( \tau \) and market size of the large country \( n \). Tax premium is increasing in the market size and tariff rate of large country. (Fig.1) This result is a direct consequence of the firm avoiding tariffs by entering the large country and thereby earning high profits.

Fig. 1. Larger market and higher tariff results in a higher tax premium.

The regime changes from noncooperative trade regime to trade liberalization will affect tax premium. In noncooperative regime, tax premiums between a large country and each small country are equal \( \Gamma_{i-n} = \Gamma_{i-s} \) and tax premiums between small countries are equal \( \Gamma_{i-s} = \Gamma_{s-n} \). Identical market size of small countries yields many symmetric solutions for tax premium of the firm and tax offer of countries.

3. Noncooperative trade regime: Bargaining power for tax competition and welfare analysis

Tax competition among countries affects the location choice of the firm. Each country sets optimal tariff when importing good from the firm and imposes profit tax when attracting FDI. The strategic interaction between \( t, s_1, s_2 \) and the firm can be described by a sequential game with the following order of move:
Stage 1  \( l \), \( s_1 \) and \( s_2 \) decide profit tax rates \( t_i \).

Stage 2  The firm observes profit the tax rates and chooses the location.

Stage 3  The importing country chooses optimal tariff \( \tau_i \) noncooperatively and simultaneously.

The subgame perfect equilibrium of this game can be characterized by using backward induction. When a country attracts FDI or imports good, an individual consumer has tax revenue included in her budget constraint. The tax revenues for individual consumers are defined respectively:

\[
T_i = t_i / n , \quad T_{s_1} = \tau_{s_1} \cdot x_{s_1} , \quad T_{s_2} = \tau_{s_2} \cdot x_{s_2} \quad \text{for FDI in } l
\]

\[
T_i = \tau_{i} \cdot x_{i} , \quad T_{s_1} = t_{s_1} , \quad T_{s_2} = \tau_{s_2} \cdot x_{s_2} \quad \text{for FDI in } s_i
\]

\[
T_i = \tau_{i} \cdot x_{i} , \quad T_{s_1} = \tau_{s_1} \cdot x_{s_1} , \quad T_{s_2} = t_{s_2} \quad \text{for FDI in } s_2
\]

For example, when the firm locates in country \( l \), an individual consumer in country \( l \) has profit tax revenue \( (T_{i}/n) \) included in her budget constraint. While consumers in country \( s_1 \) and \( s_2 \) have optimal tariff revenue included in their budget constraint \( (\tau_{s_1} x_{s_1}) \). The individual utility can be obtained by substituting the budget constraint \( (w + T_i = z_i + q_i x_i) \) into the utility function \( (u_i = \alpha x_i - (1/2) \beta x_i^2 + z_i) \). Then substituting (3), (4) and (5) into the utility function we obtain the individual utility in country \( l \).

\[
u_i^l = \frac{1}{2 \beta} \left[ \frac{(n + 2)(\alpha - w) + \tau_{s_1} + \tau_{s_2}}{2(n + 2)} \right] + \frac{t_i}{n} + w \quad \text{for FDI in } l
\]

\[
u_i^s_1 = \frac{1}{2 \beta} \left[ \frac{(n + 2)(\alpha - w) + n \tau_{s_1}}{2(n + 2)} \right] - \frac{1}{2 \beta} (\tau_{s_1})^2 + w \quad \text{for FDI in } s_1
\]

\[
u_i^s_2 = \frac{1}{2 \beta} \left[ \frac{(n + 2)(\alpha - w) + n \tau_{s_2}}{2(n + 2)} \right] - \frac{1}{2 \beta} (\tau_{s_2})^2 + w \quad \text{for FDI in } s_2
\]

Similarly, we derive individual utility of country \( s_1 \) and \( s_2 \). When the firm invests in a certain country, optimal tariffs imposed by the other countries are derived from the following first order conditions of their welfare maximization problem:

\[
\frac{\partial \nu_i^l}{\partial \tau_{s_1}} = 0 \Leftrightarrow \frac{\partial \nu_i^l}{\partial \tau_{s_2}} = 0 \quad \text{for FDI in } l
\]
\[ \frac{\partial u_{i}^{s_1}}{\partial \tau_{i}} = 0 \Leftrightarrow \frac{\partial u_{i}^{s_2}}{\partial \tau_{i}} = 0 \quad \text{for FDI in } s_1 \]
\[ \frac{\partial u_{i}^{s_1}}{\partial \tau_{i}} = 0 \Leftrightarrow \frac{\partial u_{i}^{s_2}}{\partial \tau_{i}} = 0 \quad \text{for FDI in } s_2 \]

Solving the best responses for individual case, the optimal tariffs are as follows:

\[ \tau_{i}^{s_1} = \frac{(n + 2)(\alpha - w)}{(2n + 3)(2n + 5) - 1}, \quad \tau_{i}^{s_2} = \frac{(n + 2)(\alpha - w)}{(2n + 3)(2n + 5) - 1} \quad \text{for FDI in } l \]
\[ \tau_{i}^{s_1} = \frac{4n(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2}, \quad \tau_{i}^{s_2} = \frac{4n(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2} \quad \text{for FDI in } s_1 \]
\[ \tau_{i}^{s_1} = \frac{4n(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2}, \quad \tau_{i}^{s_2} = \frac{4n(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2} \quad \text{for FDI in } s_2 \]  \hspace{1cm} (10)

The above results show that country \( l \) sets optimal tariffs at a higher level relative to \( s_1 \) and \( s_2 \). The optimal rates imposed on \( s_1 \) and \( s_2 \) are the same. The optimal tariffs levied by \( s_1 \) and \( s_2 \) are equivalent. This is because \( s_1 \) and \( s_2 \) have identical market size and the market size of \( l \) is larger than \( s_1 \) and \( s_2 \). Substituting optimal tariffs (10) into tax premiums (7) yields an indirect form of tax premium among countries as follows:

\[ \Gamma_{s_1 - s_1} = t_i - t_s = \frac{(n - 1)(n + 1)^2(n + 2)^2(5n^2 + 47n^2 + 126n + 94)(\alpha - w)}{\psi \phi \beta} > 0 \quad k = 1, 2 \]
\[ \Gamma_{s_1 - s_2} = t_i - t_s = 0 \]

Where \( \psi = (2n^2 + 8n + 7)^2 \) and \( \phi = (3n^2 + 16n + 15)^2 \)

Tax premiums between \( l \) and \( s_k \) \( (k = 1, 2) \) are positive, that is, the firm prefers to enter country \( l \). Tax premium between \( s_1 \) and \( s_2 \) are zero, thus the firm is indifferent between small countries. This fact reflects bigger market preference for the firm.

Now consider equilibrium tax policy. Let \( u_{i}^{j} \) denote a household’s utility when output produced in country \( i \) is consumed in country \( j \). Inserting (10) into (9) gives the utility in country \( l \) as follows:
$$u_i' = \frac{(n+2)^2(\alpha - w)^2}{2\psi} + \frac{t_i}{n} + w$$ for FDI in $l$, $$u_i'' = \frac{(n+2)^3(3n^2 + 16n + 16)(\alpha - w)^2}{2\phi\beta} + w$$ for FDI in $s_k$, $k = 1, 2$ \hspace{1cm} (11)

Where $\psi = (2n^2 + 8n + 7)^2$ and $\phi = (3n^2 + 16n + 15)^2$

When $u_i' = u_i''$, country (government) $l$ will be indifferent between being the host and importing the good. These equations determine the lowest tax (highest subsidy) offer. Country $l$ is willing to offer the lowest tax to attract the firm when competing with $s_k$. For country $l$, tax offer denotes $t_{l(s_k)}$ as follows:

$$t_{l(s_k)} = \frac{n(n+2)^2(3n^6 + 28n^5 + 86n^4 + 72n^3 - 118n^2 - 244n - 116)(\alpha - w)^2}{2\psi\phi\beta} > 0 \hspace{1cm} k = 1, 2$$

If the market size of country $l$ is larger than 1.38, it offers the tax not the subsidy. When its own market size is large, country $l$ will increase profit tax level.

However country $s_1$ should offer a subsidy in order to draw the firm when competing with $l$ and $s_2$:

$$t_{s_1(l)} = -\frac{(n+2)^2(28n^6 + 240n^5 + 721n^4 + 832n^3 + 70n^2 - 496n - 239)(\alpha - w)^2}{8\psi\phi\beta} < 0$$

$$t_{s_1(s_2)} = -\frac{(n+2)^2(\alpha - w)^2}{2\phi\beta} < 0$$

Analogously, $s_2$ should grant subsidy for attracting FDI as follows:

$$t_{s_2(l)} = -\frac{(n+2)^2(28n^6 + 240n^5 + 721n^4 + 832n^3 + 70n^2 - 496n - 239)(\alpha - w)^2}{8\psi\phi\beta} < 0$$

$^3$ In order to attract the firm, the country has to subsidize as much as it can while it has to tax as little as it can. Therefore subsidy is given at the highest level and the tax is imposed at the lowest level. Haufler and Wooton (1999) described them as the minimum tax and maximum subsidy respectively
\[ t_{l(j)} = -\frac{(n+2)^2(\alpha - w)^2}{2\phi\beta} < 0 \]

Under non-cooperative trade regime, tax level in country \( l \) is the same as in \( s_1 \) and \( s_2 \). By comparison, both \( s_1 \) and \( s_2 \) offer the same rate of subsidy to attract the firm. The identical market size yields symmetric outcome for small countries. Remarkably the large country bid less than the small countries when competing for FDI. This represents the stronger bargaining power of the large country.

Each country considers the lowest tax offer or the highest subsidy offer. The difference of these offers is defined as \( \Delta_{i,j} = \tau_{i(l)} - \tau_{j(l)} \) respectively:

\[ \Delta_{1,s_1} = \frac{(n+2)^2(12n^7 + 140n^5 + 584n^3 + 1009n^2 - 906n - 960)(\alpha-w)^2}{8\psi\beta} > 0 \quad k = 1, 2 \]
\[ \Delta_{1,s_2} = \Delta_{2,s_1} = 0 \]

The offer difference between \( l \) and \( s_k \) is positive while the difference between \( s_1 \) and \( s_2 \) is zero. Why we should consider the best offer difference? This is because tax premium is the ‘willingness to pay’ for the firm, while ‘tax offer’ difference will be the actual payment difference for the firm. It follows that when the ‘willingness to pay’ surpasses actual payment, the firm enters country \( l \):

\[ \Gamma - \Delta_{1,s_k} > 0 \quad k = 1, 2 \]

Therefore the firm enters the large country since \( \Gamma - \Delta_{1,s_k} \) is positive.

4. The impacts of FTA formation: bargaining power and welfare in tax competition

Suppose that \( l \) and \( s_k \) agree to form free trade area. This formation removes trade barriers between two countries and optimal tariffs between members will be zero. How will FTA impact on tax premium of the firm, tax competition and welfare of member countries? Sequence of this game

\[ \Gamma - \Delta_{1,s_k} = \frac{(28n^7 + 356n^5 + 1592n^3 + 3023n^2 + 1696n - 2118n^2 - 3312n - 1265)(\alpha-w)^2}{32\psi\beta} > 0 \quad k = 1, 2 \]
is very similar with non-cooperative trade situation. After \( i \) and country \( s_i \) form FTA at stage 0, then the sequence of the game is as follows:

Stage 1 \( i, s_i \) and \( s_2 \) decide profit tax rates \( \tau_i \).
Stage 2 The firm observe profit tax rates and choose the location.
Stage 3 The importing country chooses optimal tariff \( \tau_i \) but member countries \( i \) and \( s_i \) set tariffs against the outside country \( s_2 \) simultaneously and independently.

The subgame perfect Nash equilibrium can be characterized by using the backward induction.

4.1 The impacts of FTA formation on tax premium.

To describe FTA formation, I simply assume that tariffs between members are equal to zero. In this case, optimal tariffs can be written as follows:

\[
\begin{align*}
\tau_i^0 &= 0, \quad \tau_i^1 = \frac{(n + 2)(\alpha - w)}{(2n + 3)(2n + 5) - 1} \quad \text{for FDI in} \ i \\
\tau_i^0 &= 0, \quad \tau_i^1 = \frac{4(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2} \quad \text{for FDI in} \ s_i \\
\tau_i^1 &= \frac{4n(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2}, \quad \tau_i^1 = \frac{4(n + 2)^2(\alpha - w)}{(3n + 4)(n + 4)(2n + 3)(2n + 5) - n^2} \quad \text{for FDI in} \ s_2
\end{align*}
\]

Substituting the above optimal tariffs into (7) yields the values of tax premiums after the formation of FTA as follows:

\[
\begin{align*}
\Gamma_{t-i} &= \frac{(\alpha - w)^2(24n^2 + 224n^3 + 709n^2 + 896n + 391)(n^2 - 1)(n + 2)}{16\psi \phi \beta} > 0 \\
\Gamma_{t-s_i} &= \frac{(\alpha - w)^2(20n^2 + 208n^3 + 695n + 896n + 391)(4n^2 + 16n^3 + 15n^2 - 1)(n + 2)}{16\psi \phi \beta} > 0 \\
\Gamma_{s_i-s_2} &= \frac{(\alpha - w)^2(5n^2 + 32n + 28)n^2(n + 2)}{4\phi \beta} > 0
\end{align*}
\]

The above results indicate that both tax premiums are positive which are different from (8). A
consequence of FTA generates tax premium between small countries. What explains the result? Even though two countries are symmetric in terms of market size, the firm prefers to enter country $s_i$ than to enter country $s_j$. This is because country $i$ will not impose any tariff on the firm since country $s_i$ is FTA-member whereas if the firm locates in the external $s_j$, its good will be subject to optimal tariff from country $i$. Therefore tax premiums between large country and each small country are not equivalent any more thus tax premium between $i$ and $s_i$ is smaller than that between $i$ and $s_j$. The change of tax premium will affect the location choice of foreign investor. Therefore FTA transforms significantly the nature of the relation of two small countries from the symmetry to the asymmetry in term of tax premium even though market sizes are identical. This idea is simply suggested by subtracting each tax premium under FTA from that under noncooperative regime:

$$
\Gamma_{s_i}^{FTA} - \Gamma_{s_i} = \frac{(\alpha - w)^2 (80n^6 + 1152n^5 + 6392n^4 + 17696n^3 + 25947n^2 + 19200n + 5625)(n^7 - 1)(n + 2)}{16\psi\phi\beta} < 0
$$

$$
\Gamma_{s_i}^{FTA} - \Gamma_{s_i} = \frac{(8n^2 + 48n^2 + 89n + 50)}{16\psi\beta} > 0
$$

$$
\Gamma_{s_j}^{FTA} - \Gamma_{s_j} = \frac{n^2 (5n^2 + 32n + 28)(n + 2)(\alpha - w)^2}{4\phi\beta} > 0
$$

After the formation of the FTA, tax premium between members ($i$ and $s_i$) decreases whereas tax premium between each member and the external increases. The intuition behind this result is that when market is integrated through FTA, the firm has a higher incentive to enter free trade area than non free trade area. Therefore FTA strengthens “bigger market preference” of the firm.

**Proposition 1.** Since tax premium decreases between member countries while it increases between nonmember and member country, FTA strengthens “bigger market preference” of the firm.

### 4.2 The impacts of FTA formation on bargaining power of countries and degree of tax competition

#### 4.2.1 Bargaining power of country $i$ and competitiveness for attracting the firm
With newly calculated optimal tariff after the formation, substituting (12) into (9) yields the utility functions as follows.

\[
\begin{align*}
    u'_l &= \frac{(2n+3)^2(2n+5)^2(\alpha - w)^2}{32\psi \beta} + w + \frac{t_l}{n},  \\
    u''_l &= \frac{(3n^3 + 22n^2 + 48n + 32)^2(\alpha - w)^2}{8(n+2)^2 \phi \beta} + w,  \\
    u''_s &= \frac{(n+2)^2(3n^2 + 16n + 16)(\alpha - w)^2}{2\phi \beta} + w,
\end{align*}
\]

for FDI in \( l \), for FDI in \( s_i \), for FDI in \( s_2 \) \((13)\)

As derived in none-cooperative regime, profit tax offer for country \( l \) can be obtained as follows:

\[
\begin{align*}
    t'_{l(s_i)} &= \frac{n(24n^4 + 224n^3 + 723n^2 + 960n + 449)(n^2-1)(\alpha - w)^2}{32\psi \phi \beta} \approx 0^5,  \\
    t'_{l(s_i)} &= \frac{n(48n^4 + 640n^3 + 3432n^2 + 9504n + 14343n^4 + 11040n^1 + 2862n^2 - 960n - 449)(\alpha - w)^2}{32\psi \phi \beta} > 0,  \\
    t'_{l(s_i)} - t'_{l(s_2)} &= -\frac{n(3n^2 + 16n + 16)(\alpha - w)^2}{8\phi \beta} < 0
\end{align*}
\]

Above results show that country \( l \) sets lower tax rate in relation to country \( s_i \) than country \( s_2 \), even though \( s_i \) and \( s_2 \) have the same market size. If the market size of country \( l \) is not larger relative to member \( s_i \), country \( l \) is likely to offer subsidy instead of tax. The intuition behind this results is that removing trade barrier in free trade area affects the location choice of the firm and then the firm anticipates not to be imposed by optimal tariff from country \( l \) when it enters country \( s_i \). Since market size difference does not play an important role in free trade area thereby country \( l \) should bid more when competing with member country \( s_i \) for attracting FDI.

---

5 Numerical solution is close to zero regardless of \( n \) which is market size of country \( l \)
Fig. 2. The locus changes of tax offer by the large country to small countries.

The profit tax rate $t_{i(l)}^{FTA}$ under FTA is contrasted with the tax rate $t_{i(s)}^{non}$ under non-cooperative regime:

$$t_{i(l)}^{FTA} - t_{i(s)}^{non} = \frac{n(48n^3 + 640n^2 + 3336n + 8224n^2 + 7525n^3 - 7584n^2 - 24750n^2 - 6975)(\alpha - w)^2}{32\varphi\beta} < 0$$

$$t_{i(l)}^{FTA} - t_{i(s)}^{non} = \frac{n(31 + 32n + 8n^2)(\alpha - w)^2}{32\varphi\beta} > 0$$

Under non-cooperative trade regime, tax rates of country $l$ relative to small countries were equivalent. After the formation of FTA, the tax rate of country $l$ relative to the nonmember $s_2$ goes up while the tax rates relative to member $s_1$ not only goes down but also numerically is close to around zero. This result is shown by figure 2. Even though country $l$ raises the tax rate after the formation of FTA, it may still attract the firm at this higher level of tax. By contrast, it may fail to attract the firm unless it lowers tax rate relative to country $s_1$. This follows from the fact that the degree of tax competition between member countries increases whereas the degree of tax competition between the member and the nonmember weakens.

**Proposition 2.** FTA significantly raises up the competitiveness for tax competition between member countries and makes bargaining power of the large country stronger (weaker) to the external country (the member country).
4.2.2 Bargaining power of country $s_i$ and competitiveness for attracting the firm

As derived for country $l$, profit tax rates for country $s_i$ can be obtained as follows:

$$t^{FTA}_{s_i(l)} = -\frac{(24n^4 + 224n^3 + 723n^2 + 960n + 449)(n^2 - 1)(\alpha - w)^2}{32\psi\phi\beta} < 0$$

$$t^{FTA}_{s_i(s_i)} = \frac{(7n^4 + 32n^3 + 28n^2 - 16n - 16)(\alpha - w)^2}{8\phi\beta} > 0$$

Country $s_i$ considers the subsidy when competing with member country $l$ and the tax when competing with the outsider $s_2$. After forming the FTA, country $s_i$ offers the minimal tax not the maximum subsidy when competing with $s_2$. What we should observe here is how FTA affects the degree of tax competition between member countries. By comparing $t^{FTA}_{s_i(l)}$ with $t^{FTA}_{s_i(s_i)}$:

$$t^{FTA}_{s_i(l)} - t^{FTA}_{s_i(s_i)} > 0$$

It is shown that the bargaining power of member $s_i$ increases relative to both the $l$ and $s_2$ after formation the FTA. Country $s_i$ still offers the subsidy but at a lower rate when competing with member country $l$ after the formation of FTA. The degree of tax competition between member countries increases because there is a reduction in the highest subsidy after the formation of FTA. This result is consistent with proposition 2. When the market size of member countries are alike, country $s_i$ may attract the firm, even proposing the tax. Under non-cooperative trade regime $s_i$ offers subsidy to attract the firm ($t^{FTA}_{s_i(s_i)} < 0$) whereas under FTA country $s_i$ proposes tax. When the firm enters member country $s_i$, it will not suffer any loss because tariffs between member countries are zero. Therefore FTA provides market amplification effect and tax competition advantage for the member country $s_i$ (Fig. 3).

**Proposition 3.** FTA brings an increase of bargaining power and market amplification effect of the inside small country.

---

6 $t^{FTA}_{s_i(l)} - t^{FTA}_{s_i(s_i)} = \frac{(48n^4 + 752n^3 + 4774n^2 + 15372n + 26005n^4 + 16845n^4 - 13038n^2 - 29578n^2 - 17775n - 3375)(\alpha - w)^2}{32\psi\phi\beta} > 0$
4.2.3 Bargaining power of country $s_1$ and competitiveness for attracting the firm

In the same way, for country $s_2$, profit tax rates can be obtained as follows:

$$t^{FTA}_{s_2(s_1)} = \frac{(\alpha - w)^2 (112n^4 + 1408n^3 + 7244n^2 + 19760n + 31247 + 30336n + 20114 + 10320n + 3151)n}{32\psi\phi\beta} < 0$$

$$t^{FTA}_{s_1(s_2)} = -\frac{(7n^4 + 32n^3 + 36n^2 + 8n + 16)(\alpha - w)^2}{8\phi\beta} < 0$$

Country $s_2$ considers the maximum subsidy when competing with member countries and the tax rates are defined as $t^{FTA}_{s_2(s_1)}$ and $t^{FTA}_{s_1(s_2)}$ respectively. The numerical difference of these subsidies is close to zero. In other words amounts of two subsidies for tax competition are equivalent. Country $s_2$ has to set subsidy when competing with country $s_1$, thus $s_2$ treats country $s_1$ as if it is a large country. This tendency becomes pronounced when the market size of country $t$ is large (Fig. 3).

To examine how FTA changes bargaining power of $s_2$, consider the following expressions below:

$$t^{FTA}_{s_1(t)} - t^{FTA}_{s_2(s_2)} = -\frac{(8n^2 + 32n + 31)(\alpha - w)^2}{32\phi\beta} < 0$$
Both cases are negative. The bargaining power of country $s_2$ falls with the formation of FTA. In other words, FTA increases the subsidy offer of the external country $s_2$. Thus FTA undermines the external country’s bargaining power. Moreover, the larger the market size of country $l$, the greater the fall in the bargaining power of $s_2$ (Fig. 3).

**Proposition 3.** FTA undermines the bargaining power of the external country.

Each country will consider the best offer. The difference of best offers is defined as

$$\Delta_{i,j}^{FTA} = t_{i,i}^{FTA} - t_{j,j}^{FTA}.$$ By comparing tax premium with the difference of best offers ($\Gamma - \Delta$), we can predict the location of the firm. If tax premium surpasses the difference of best offers, the firm definitely enters large country:

$$0 \leq \Gamma_{l,k}^{FTA} - \Delta_{l,k}^{FTA} < \Gamma_{l,s}^{FTA} - \Delta_{l,s}^{FTA} < \Gamma_{l,s}^{FTA} - \Delta_{l,s}^{FTA}$$

The firm is willing to pay this amount of tax premium $\Gamma_{l,k}^{FTA}$ in order to locate in country $l$ and $\Delta_{l,s}^{FTA}$ is the best offer difference between $l$ and $s_1$. The firm enters the large country if and only if $\Gamma_{l,k}^{FTA} - \Delta_{l,k}^{FTA} > 0$ holds. After the formation of FTA, this difference between members is weakly positive $H$ while the difference is strictly positive between country $l$ and $s_2$ (Fig.3). When competing with member $s_1$, country $l$ does not always attract the firm under the formation of FTA. In contrast, when competing with the external $s_2$, country $l$ always get the firm regardless of forming FTA. FTA brings the asymmetric outcome in the location choice of the firm between two small countries.

---

$\gamma_{l,k}^{FTA} - \Delta_{l,k}^{FTA} = (24n^2 + 296n^4 + 1367n^5 + 2945n^7 + 2957n + 1115)(\alpha - w)^2 > 0$

$\gamma_{l,s}^{FTA} - \Delta_{l,s}^{FTA} = (160n^2 + 2512n^4 + 15992n^6 + 53812n^8 + 103447n^{10} + 112213n^{12} + 58230n^{14} - 226n^2 - 14237n - 4715)(\alpha - w)^2 > 0$
4.3 The impacts of FTA formation on the welfare changes of two symmetric countries.

In this section I will show how the formation of FTA influences the welfare of two small countries. Due to 1) the identical preference of consumer 2) all tax revenues equally redistributed to consumers 3) the assumption that the monopoly firm transfers all profits to the outside world, we can measure the welfare change of each country by examining the utility change of the individual consumer. This character is based on quadratic quasi-linear utility function. For the welfare analysis, consider three cases: (i) the firm locates in $l$, (ii) it locates in $s_1$ and (iii) it locates in $s_2$.

4.3.1 The case of (i)

In the absence of FTA, the welfare of the household of $s_1$ and $s_2$ are exactly the same due to market size symmetry. FTA creates a welfare gap between $s_1$ and $s_2$. The welfare of the member $s_1$ is larger than the welfare of the external $s_2$. Let $dW_{h-i_1}$ and $dW_{h-i_2}$ define the welfare difference between $s_1$ and $s_2$ under non-cooperative trade regime and under FTA respectively:

\[
\begin{align*}
\Delta W_{i_1-i_2} &= \Gamma_{i_1-i_2} - \Delta_{i_1-i_2} \\
\Delta W_{j_1-j_2} &= \Gamma_{j_1-j_2} - \Delta_{j_1-j_2} \\
\Delta W_{i_2-j_1} &= \Gamma_{i_2-j_1} - \Delta_{i_2-j_1}
\end{align*}
\]

\[
\begin{align*}
dW_{h-i_1} &= 0, \quad dW_{h-i_2} = \frac{(n+2)\alpha^2}{8\psi\beta} > 0, \\
dW_{h-i_1} - dW_{h-i_2} &= \frac{(n+2)\alpha^2}{8\psi\beta} > 0.
\end{align*}
\]
The identical welfare of two countries was a result of identical market size. After the formation of FTA, two small countries experience the welfare gap.

4.3.2 The case of (ii)

If the firm locates in country \( s_1 \), the welfare of country \( s_1 \) is higher than the welfare of \( s_2 \) after the formation of FTA. The welfare differences are as below:

\[
\begin{align*}
dW_{s_1 \rightarrow s_1} &= 0, \\
dW_{s_1 \rightarrow s_2} &= \frac{n^2(7n^2 + 32n + 32)(\alpha - w)^2}{8\phi \beta} > 0, \\
dW_{s_2 \rightarrow s_1} - dW_{s_2 \rightarrow s_2} &= \frac{n^2(7n^2 + 32n + 32)(\alpha - w)^2}{8\phi \beta} > 0
\end{align*}
\]

We can confirm that FTA makes the welfare gap of two countries.

4.3.3. The case of (iii)

If the firm locates in \( s_2 \), the welfare of \( s_1 \) is higher. The welfare differences are as below:

\[
\begin{align*}
dW_{s_2 \rightarrow s_2} &= 0, \\
dW_{s_2 \rightarrow s_1} &= \frac{n^2(7n^2 + 32n + 32)(\alpha - w)^2}{8\phi \beta} > 0, \\
dW_{s_1 \rightarrow s_2} - dW_{s_1 \rightarrow s_1} &= \frac{n^2(7n^2 + 32n + 32)(\alpha - w)^2}{8\phi \beta} > 0
\end{align*}
\]

If country \( s_2 \) is host to the firm, it cannot achieve a higher welfare than country \( s_1 \). This is because country \( s_2 \) has to offer subsidy to attract the firm. Therefore being a host country is not beneficial to country \( s_2 \). The firm anticipates that it will be faced with the optimal tariffs from member countries if it invests in country \( s_2 \). Therefore for the firm to optimally choose to locate in \( s_2 \) it must be subsidized. This subsidy lowers the welfare of country \( s_2 \).

In conclusion, there are two common findings. First, formation of FTA drives a wedge between the welfare of the two small countries. Second, the welfare of the member country is always better off than the nonmember small country.
**Proposition 4.** When a small country joins in FTA with a large country, the welfare of the member small country is always better than the nonmember small country regardless of the choice of the location by the firm.

5. Extensions: Trade Liberalization

Krugman (1979) argues that trade can induce pro-competitive effects with monopolistic competition. Melitz (2003) shows that exposure of firms to trade liberalization will cause the least productive firm to exit the market with heterogeneous firms. Melitz (2006) considers the relationship between various kind of trade liberalization and the firm heterogeneity. Many trade model like the above shed light on the study of monopolistic competition model or the firm heterogeneity model. However, there are very few models to explain the impact of trade liberalization on the firm’s choice of location, tax competition and welfare. This model is an attempt in this direction.

The sequence of the game is the same as before but inter-country tariffs are absent. Consequently the firm is not concerned with the location since it will make the same profit regardless of its choice of location. Note that there are no additional trade costs except optimal tariffs. Thus trade liberalization will do away with tax premium as follows:

\[ \Gamma_{j-x_{i}} = \Gamma_{i-x_{j}} = \Gamma_{x_{j}-x_{i}} = 0 \]

**Proposition 5.** When all countries go for trade liberalization, tax premium does not exist between countries due to the abolition of inter country tariffs. Therefore the firm is indifferent to the choice of location.

5.1 The impact of trade liberalization on tax competition.

How does trade liberalization affect tax policy? Notice that countries will not use tax policy unless it makes an additional welfare gain. After trade liberalization, countries will be faced with homogeneous price for the monopoly good due to assumptions of no additional trade costs:

\[ P_{i} = P_{i}^L = P_{s_{1}} = \frac{1}{2}(\alpha + w) \]
Under one price, individual welfare of countries will be equalized independent of the firm’s choice of location. For country $l$, tax offer denotes $t_{l(x)}$ as follows:

$$u^l_i = \frac{(\alpha-w)^2}{8\beta} + \frac{t_l}{n} + w, \quad \text{for FDI in } l$$

$$u^s_k = \frac{(\alpha-w)^2}{8\beta} + w, \quad \text{for FDI in } s_k, \quad k = 1, 2$$

(15)

The above two equations yield tax or subsidy offer by country $l$. Country $l$ is indifferent between hosting the firm and importing the good. Therefore tax offer rate is equal to zero ($t_{l(x)} = 0$). The same holds true for the small countries. As a result all countries have equivalent individual welfare given by the following expression.

$$u^l_i = u^s_i = u^l_s = u^s_s = \frac{(\alpha-w)^2}{8\beta} + w \quad k = 1, 2$$

Trade liberalization nullifies market size effect in the determination of welfare of the small countries. In some sense trade liberalization takes these countries back to the state of symmetry.

5.2 The impact of the trade liberalization on welfare analysis.

Trade liberalization with no optimal tariff results in zero tax premium and zero tax competition. This equalizes the welfare of the participating countries. The welfare equalizing result though significant in itself is not the goal of the exercise. The main point of interest is whether there is enhancement of welfare due to trade liberalization. The comparison of total welfare between FTA and TL checks for regional welfare gain. Regional welfare changes are as follows:

$$\Delta W_{FTA-TL}^\text{region} = \frac{(12n^6 + 112n^5 + 413n^4 + 992n^3 + 1982n^2 + 2384n + 1109)(\alpha-w)}{16\phi\beta} < 0 \quad \text{for FDI in } l$$

$$\Delta W_{FTA-TL}^\text{region} = \frac{(7n^4 + 48n^3 + 58n^2 + 64n + 61)(\alpha-w)}{8\phi\beta} < 0 \quad \text{for FDI in } s_1$$

$$\Delta W_{FTA-TL}^\text{region} = \frac{(10n^4 + 48n^3 + 58n^2 + 64n + 61)(\alpha-w)}{8\phi\beta} < 0 \quad \text{for FDI in } s_2$$
The most interesting finding about welfare change is that total welfare of the regional economy will fall irrespective of the firm’s choice of location. The reason for this finding can be suggested by examining the profit of the monopoly firm. The shrinking of regional welfare is due to the absence of optimal tariff and tax policy. It is shown that trade liberalization nullifies optimal tariff and tax policy. Therefore rent which would be captured by countries under FTA is now transferred to the international monopoly firm. The firm’s profit under TL is always higher than the profit under FTA as shown below. From (6), we can compare profit functions as follows:

\[
\Pi_i(FTA) = \frac{[(\alpha - w)(n + 2) - \tau^*_{i, n} - \tau^*_{i, n}]}{4\beta(n + 2)} - F - t_i \quad \Pi_i(TL) = \frac{[(\alpha - w)(n + 2)]^2}{4\beta(n + 2)} - F
\]

This tax competition model suggests that trade liberalization might not be the right policy tool to improve welfare. However it ensures higher profits for the international monopoly firm. The decline in the bargaining power of countries due to the absence of optimal tariffs and tax policy causes the international monopoly firm to appropriate the entire rent thereby lowering regional welfare. I will not go on further about trade liberalization issues but if regional countries act cooperatively in terms of tax policy it would be possible for countries to improve welfare by capturing a portion of the rent accruing to the international monopoly firm.

6. Conclusions

This paper examined the impact of trade regime change on the location choice of the firm, tax competition and welfare. Location strategy of the firm and tax bargaining strategy of countries vary with international trade regimes. The firm considers tax premium and tax offers when entering a country. Tax premium is a willingness to pay profit tax of the firm while tax offer is an actual tax payment set by countries. If tax premium is bigger than the difference of tax offer, the firm enters a certain country. Countries compete with tax (subsidy) policy in order to attract firm. Under noncooperative trade regime (NTR), the firm prefers to enter the large country. Tax offers and welfares are symmetric between small countries and asymmetric between the large and each small country. All results for tax premium, tax competition and welfare between two small countries are exactly the same. The formation of FTA between a large and a small country brings many changes thus one small country becomes a member country and another is a nonmember country. First, this
preferential trade agreement strengthens “bigger market preference” of the firm. Moreover the member small country becomes stronger than nonmember country in terms of tax competition for attracting FDI. With regards to the welfare of the country, the member small country enjoys a higher welfare than the nonmember small country. On the other side, the external small country has been in the disadvantage positions in terms of the location choice of firm, tax competition and the welfare. Therefore FTA brings a major shift on two small countries. Moreover this paper introduces trade liberalization (TL) as the highest market integration. After trade liberalization, countries can achieve the welfare equalization by which two small countries are back to the state of symmetry in welfare. However all countries experience downward equalization like ‘a race to bottom’ due to rent shifting from countries to the international monopoly firm. The firm enjoys benefits greatly by eliminating all trade barriers while countries fail to improve welfare of countries. This paper shows that invalidating inter-country tariff deteriorates welfare of countries.

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