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Abstract

Incorporating recent evidence that FDI firms are more efficient than exporters into a general oligopolistic equilibrium model, this paper examines the welfare effects of trade and FDI liberalization. We find that trade liberalization alone is beneficial if the difference in marginal cost between the exporting and FDI industries is small enough while FDI liberalization unambiguously improves welfare. Combining these results, we further show that simultaneous liberalization of trade and FDI necessarily turns out welfare-improving.

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Keywords: Trade liberalization, FDI liberalization, General oligopolistic equilibrium, Welfare.

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1 Introduction

The volume of foreign direct investment (FDI) has increased over the last two decades. According to the latest World Investment Report of UNCTAD (2015), global FDI inflows are $1.23 in 2013, which are nearly three times as large as those in 1995 ($0.4). This report also forecasts that global FDI inflows will grow further due to several factors including 'continued investment liberalization and promotion measures.' (p. 2) Given this trend of global FDI, it is more and more inevitable to take into account the effects of trade policies on FDI. While there are many topics on FDI, 'export versus FDI' has received much attention in literature. A related question is how liberalization of trade and/or FDI affects the choice between these entry modes and welfare.

This paper examines the welfare effects of liberalization of trade and FDI.[1] For this purpose, we develop a two-country general oligopolistic equilibrium (GOLE) model pioneered by Neary (2016).[2] And, we incorporate recent evidence that FDI firms are more efficient than exporting firms into this model.[3] Assuming a continuum of industries engaging in either exporting or FDI depending on the cost parameters, we show that trade liberalization modeled by a tariff reduction improves welfare if either the initial tariff is high enough or the difference in marginal cost between exporting and FDI is sufficiently small. In contrast, FDI liberalization proves necessarily welfare-improving. Combining these results, we finally establish that welfare necessarily improves if trade and FDI are simultaneously liberalized. A straightforward implication of these results is that trade liberalization alone may be welfare-reducing, but that it becomes welfare-improving if FDI liberalization is accompanied.

[1] This paper focuses only on greenfield FDI as an FDI instrument.

[2] The first version of Neary (2016) was released in 2002.

[3] Helpman et al. (2004) find this evidence for the United States while the same is found by Girma et al. (2004) for Ireland, Girma et al. (2005) for the United Kingdom, and Head and Ries (2003), Tomiura (2007) and Wakasugi et al. (2014) for Japan.

This finding has both theoretical and practical relevance in the sense that the same result is demonstrated in a different setting, e.g. Ishikawa et al. (2010) and Eggar and Etzel (2014).

There is a large literature on the choice between exporting and FDI. By applying Brander and Krugman's (1983) reciprocal market model, Dei (1990), Horstmann and Markusen (1992) and Brainard (1997) propose a so-called 'proximity-concentration trade-off' between these two entry modes. That is, FDI is preferred if trade costs, e.g. a transport cost and/or an import tariff, are high relative to the fixed cost of FDI.[4] Helpman et al. (2004) theoretically and empirically revisit this hypothesis by allowing FDI in a Melitz (2003) model of firm heterogeneity. Their notable result is that FDI is chosen rather than exporting if firms are sufficiently efficient. Chor (2009) and Ahn (2014) examine FDI policies and FDI liberalization in an extended model of Helpman et al. (2004), respectively.

While the literature published after Helpman et al. (2004) mainly uses a monopolistic competition model, this paper employs an oligopoly model developed by Neary (2016).[5] Neary (2003a, b) combines his model with a Dornbusch-Fischer-Samuelson (1977) model, and examines how the comparative advantage (cost difference) and competitive advantage (difference in the number of oligopolistic firms) interact to determine trade patterns. Neary (2007) discusses the determinant and consequence of cross-border merger, showing that trade liberalization leads to more mergers. Dividing the whole economy into a set of trading industries and a set of non-traded industries, Kreickemeier and Meland (2013) show that a tariff reduction is beneficial whereas Bastos and Straume (2012) find that the welfare effect of trade liberalization is ambiguous in the presence of product differentiation. Our paper

[4]Markusen (1995, 2002) provides a detailed review of the literature on multinational firms in the last century. Antras and Yeaple (2014) offer an updated review, mainly focusing on the literature of firm heterogeneity.

[5]Colaccicco (2015) reviews the basic model of Neary (2016), and some applications to international trade.

is different from the previous studies above in that we allow for FDI.

This paper is organized as follows. Section 2 presents a model. Section 3 investigates the welfare effects of trade and FDI liberalization. Section 4 concludes.

2 Model

Our model is a combination of Brander and Krugman (1983) and Neary (2016). Suppose two identical countries (Home and Foreign) that comprise a continuum of duopolistic industries in a unit interval $[0, 1]$.[6] The utility maximization problem of the Home representative consumer is

$$\max_{c_i} \quad \int_0^1 \left(ac_i - \frac{c_i^2}{2} \right) di \quad \text{subject to} \quad \int_0^1 p_i c_i di = I, \tag{1}$$

which yields the first-order condition $a - c_i = \lambda p_i$, where λ is the Lagrangean multiplier and represents marginal utility of income. In this paper, we assume that all firms are 'large' in their product market, but 'small' in the whole economy. Thus, firms take λ parametrically, and we set $\lambda = 1$ following Neary (2016) and the subsequent literature. Then, the demand function of good i becomes $c_i = a - p_i$, and welfare (indirect utility) is fully measured by

$$W = \frac{a - \sigma_p^2}{2}, \quad \sigma_p^2 \equiv \int_0^1 p_i^2 di, \tag{2}$$

by substituting $c_i = a - p_i$ into the utility function in (1). This expression of welfare helps to facilitate analysis since welfare depends only on the second moment of prices σ_p^2.

The whole economy consists of a set of exporting industries $i \in \left[0, \widetilde{i}\right]$ and a set of FDI industries $j \in \left[\widetilde{i}, 1\right]$.[7] Given the assumption of market

[6] Duopoly is assumed just for simplicity. All the results in this paper hold for an arbitrary number of firms as long as all industries have the same number of firms.

[7] If the non-traded industry is added like Helpman et al. (2004), the analysis becomes so complicated that nothing clear is obtained. We recognize that this assumption is restrictive, but make it, following the existing literature, e.g. Dei (1990), Horstmann and Markusen (1992), Brainard (1997) and Mrazova and Neary (2013).

segmentation, the inverse demand function of good i of Home and Foreign is $p_i = a - x_i - y_i$ and $p_i^* = a - x_i^* - y_i^*$, where x_i and y_i are respectively the output of the Home firm and that of the Foreign firm in the Home market, and x_i^* and y_i^* are counterparts in the Foreign market.

As to the production technology, marginal labor input of exporting industries is α_1 for all $i \in \left[0, \widetilde{i}\right]$ and that of FDI industries is α_2 for all $j \in \left[\widetilde{i}, 1\right]$. And, exporting is subject to a specific trade cost t while a fixed amount of labor f has to be employed for FDI. Furthermore, we assume that Foreign labor is employed in order to produce the good for the Foreign market. Summarizing these assumptions, the profit of a representative exporting firm and an FDI firm is defined by

$$\begin{aligned} \pi_i &\equiv p_i x_i + p_i^* x_i^* - w\alpha_1 (x_i + x_i^*) - t x_i^* \\ \pi_j &\equiv p_j x_j + p_j^* x_j^* - w\alpha_2 x_j - w^* \alpha_2 x_j^* - wf, \end{aligned}$$

where π is a profit, and w is the wage. The Foreign firms' profit is analogously defined. Firms choose outputs in a Cournot fashion to maximize their profit. At this stage, we make:

Assumption. *FDI industries are more efficient than exporting industries, i.e.* $\alpha_1 > \alpha_2$.

The recent empirical studies have commonly confirmed that firms engaging in FDI are more efficient than exporting firms.[8] The above assumption reflects such evidence, and claims that marginal cost of exporting firms is higher than that of FDI firms.

For the exporting industries, the first-order conditions for profit maximization are obtained as

$$a - w\alpha_1 - 2x_i - x_i^* = 0, \quad a - w\alpha_1 - t - x_i - 2x_i^* = 0,$$

[8]See the papers cited in Introduction.

where use is made of the assumption of identical countries; $x_i = y_i^*$ and $x_i^* = y_i$. Solving these equations for x_i and x_i^* yields the Cournot equilibrium outputs:

$$x_i = \frac{a - w\alpha_1 + t}{3}, \quad x_i^* = \frac{a - w\alpha_1 - 2t}{3}. \tag{3}$$

In the same vein, the first-order conditions for profit maximization in the FDI industries are

$$a - w\alpha_2 - 2x_j - x_j^* = 0, \quad a - w\alpha_2 - x_j - 2x_j^* = 0,$$

from which the equilibrium outputs are

$$x_j = x_j^* = \frac{a - w\alpha_2}{3}. \tag{4}$$

In the GOLE model, the wage is endogenously determined so that the labor market in each country clears. By using the equilibrium outputs in Eqs. (3) and (4), the labor market-clearing condition is given by

$$\begin{aligned} l &= \int_0^{\widetilde{i}} \alpha_1 \left(x_i + x_i^*\right) di + \int_{\widetilde{i}}^1 \left[\alpha_2 \left(x_j + x_j^*\right) + f\right] dj \\ &= \int_0^{\widetilde{i}} \alpha_1 \frac{2a - t - 2w\alpha_1}{3} di + \int_{\widetilde{i}}^1 \left(\alpha_2 \frac{2a - 2w\alpha_2}{3} + f\right) dj \\ &= \frac{-2\left[\widetilde{i}\alpha_1^2 + \left(1 - \widetilde{i}\right)\alpha_2^2\right] w + \widetilde{i}(2a - t)\alpha_1 + \left(1 - \widetilde{i}\right)(2a\alpha_2 + 3f)}{3}, \end{aligned}$$

where l is the labor endowment. By solving this equation, the equilibrium wage is explicitly computed as follows.

$$w = \frac{2\left[\widetilde{i}\alpha_1 + \left(1 - \widetilde{i}\right)\alpha_2\right] a - \widetilde{i}\alpha_1 t - 3\left[l - \left(1 - \widetilde{i}\right) f\right]}{2\left[\widetilde{i}\alpha_1^2 + \left(1 - \widetilde{i}\right)\alpha_2^2\right]}. \tag{5}$$

In the rest of this paper, we assume that $l - \left(1 - \widetilde{i}\right) f$ is not very large so as to ensure that the equilibrium wage is strictly positive. From this expression, we immediately find that:

Proposition 1. *Trade liberalization raises the equilibrium wage, and FDI*

liberalization lowers it.

Proof. Differentiating (5) with respect to t and f, we have

$$\begin{aligned}\frac{\partial w}{\partial t} &= -\frac{\widetilde{i}\alpha_1}{2\left[\widetilde{i}\alpha_1^2+\left(1-\widetilde{i}\right)\alpha_2^2\right]}<0\\ \frac{\partial w}{\partial f} &= \frac{3\left(1-\widetilde{i}\right)}{2\left[\widetilde{i}\alpha_1^2+\left(1-\widetilde{i}\right)\alpha_2^2\right]}>0,\end{aligned}$$

which leads to the proposition. ||

The intuitions behind this result are straightforward. When an import tariff is reduced, each exporting firm increases total output $x_i + x_i^*$ while the domestic supply x_i falls and the export x_i^* rises. This increase in $x_i + x_i^*$ puts upward pressure on the equilibrium wage. In contrast, FDI liberalization modeled by a reduction of f decreases country-wide labor demand, thereby resulting in a fall in the equilibrium wage. This difference in the effects of trade and FDI liberalization on the equilibrium wage will play an important role in the welfare effects addressed below.

3 Welfare effects

This section turns to the welfare effects of trade and/or FDI liberalization modeled in the previous section. Since we have assumed that all exporting and FDI industries are identical with respect to their demand and production technology, σ_p^2 in (2) can be simplified to

$$\sigma_p^2 = \int_0^{\widetilde{i}} p_i^2 di + \int_{\widetilde{i}}^1 p_j^2 dj = \widetilde{i}p_i^2 + \left(1-\widetilde{i}\right)p_j^2, \tag{6}$$

where p_i and p_j are

$$p_i = a - x_i - x_i^* = \frac{a+t+2w\alpha_1}{3}$$

$$= \frac{\left[3\widetilde{i}\alpha_1^2 + 2\left(1-\widetilde{i}\right)\alpha_1\alpha_2 + \left(1-\widetilde{i}\right)\alpha_2^2\right]a + \left(1-\widetilde{i}\right)\alpha_2^2 t - 3\alpha_1\left[l - \left(1-\widetilde{i}\right)f\right]}{3\left[\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2\right]} \tag{7}$$

$$\begin{aligned} p_j &= a - x_j - x_j^* = \frac{a + 2w\alpha_2}{3} \\ &= \frac{\left[\widetilde{i}\alpha_1^2 + 2\widetilde{i}\alpha_1\alpha_2 + 3\left(1-\widetilde{i}\right)\alpha_2^2\right]a - \widetilde{i}\alpha_1\alpha_2 t - 3\alpha_2\left[l - \left(1-\widetilde{i}\right)f\right]}{3\left[\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2\right]}. \end{aligned} \tag{8}$$

Differentiating these prices with respect to t and f, the effects of trade and FDI liberalization on the goods prices are

$$\frac{\partial p_i}{\partial t} = \frac{\left(1-\widetilde{i}\right)\alpha_2^2}{3\left[\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2\right]} > 0, \quad \frac{\partial p_j}{\partial t} = -\frac{\widetilde{i}\alpha_1\alpha_2}{3\left[\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2\right]} < 0 \tag{9}$$

$$\frac{\partial p_i}{\partial f} = \frac{\left(1-\widetilde{i}\right)\alpha_1}{\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2} > 0, \quad \frac{\partial p_j}{\partial f} = \frac{\left(1-\widetilde{i}\right)\alpha_2}{\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2} > 0. \tag{10}$$

These effects of trade and FDI liberalization on product prices are intuitively interpreted as follows. When an import tariff is reduced, the exporting firms' marginal cost $w\alpha_1 + t$ also falls as a direct effect. However, as shown in Proposition 1, a tariff reduction raises the equilibrium wage, which tends to raise the marginal cost as a second-order effect. While these effects affect the marginal cost in an opposite way, the direct first-order is stronger than the second-order effect, whereby the tariff reduction leads to a fall in $w\alpha_1 + t$ and the good price. By contrast, the price of the FDI goods rises simply because the FDI firms' marginal cost $w\alpha_2$ rises as a result of tariff reductions.

The price effects of FDI liberalization are much simpler. As Proposition 1 confirms, FDI liberalization leads decreases the equilibrium wage. This induces marginal cost of the exporting and FDI firms to decline, and hence the goods price also declines.

Making use of (9), the welfare effect of trade liberalization is formally stated in:

Proposition 2. *Trade liberalization improves welfare if*

$$t > \frac{(\alpha_1 - \alpha_2)\, a}{\alpha_2}. \tag{11}$$

Proof. Differentiating (6) with respect to t and substituting (9) into the resulting expression yields

$$\frac{\partial \sigma_p^2}{\partial t} = 2\left[\widetilde{i} p_i \frac{\partial p_i}{\partial t} + \left(1 - \widetilde{i}\right) p_j \frac{\partial p_j}{\partial t}\right] = \frac{2\widetilde{i}\left(1 - \widetilde{i}\right)(\alpha_2 p_i - \alpha_1 p_j)}{3\left[\widetilde{i}\alpha_1^2 + \left(1 - \widetilde{i}\right)\alpha_2^2\right]}.$$

In the last line of this equation, $\alpha_2 p_i - \alpha_1 p_j$ is computed as

$$\alpha_2 p_i - \alpha_1 p_j = \frac{\alpha_2 t - (\alpha_1 - \alpha_2)a}{3},$$

by using (7) and (8). Therefore, the effect of tariff on σ_p^2 is finally obtained as follows.

$$\frac{\partial \sigma_p^2}{\partial t} = \frac{2\widetilde{i}\left(1 - \widetilde{i}\right)\alpha_2[\alpha_2 t - (\alpha_1 - \alpha_2)a]}{9\left[\widetilde{i}\alpha_1^2 + \left(1 - \widetilde{i}\right)\alpha_2^2\right]}$$

which is positive under the sufficient condition (11). ||

According to this proposition, a tariff reduction is not always welfare-enhancing. The underlying reason is closely related to Proposition 1. Recalling Proposition 1, a lower tariff induces a rise in p_j (the price of goods under FDI) by raising the equilibrium wage. This rise in p_j has a negative impact on welfare. Meanwhile, p_i (the price of goods under exporting) falls as a result of trade liberalization because the direct price-reducing effect dominates the indirect effect through raising the wage. This decrease in p_i positively affects welfare.

Summing the foregoing arguments up, trade liberalization gives rise to both a positive welfare effect through the decline in p_i and a negative welfare

effect through the rise in p_j. The sufficient condition in (11) ensures that the former effect is larger than the latter effect.

It is worth mentioning that our arguments share some similarity with a well-known finding of Lahiri and Ono (1988); an increase in the share of inefficient firms can reduce welfare. In our context, tariff reductions have the same effect as above by noting that the exporting industries are less efficient than the FDI industries. That is, reduced tariffs crowd out the efficient FDI industries, thereby possibly having a negative effect on welfare.

Condition (11) has a practical relevance. As noted in Introduction, empirical evidence suggests that FDI industries are more efficient than exporting industries, i.e. $\alpha_1 > \alpha_2$. But, the difference between these parameters is quantitatively different, depending on the country and area. For instance, Wakasugi et al. (2014) find evidence that the cost difference of Japan is much smaller than that of Europe. Considering their evidence in our context, the right-hand side in (11) is smaller in Japan than in Europe, which, in turn, implies that trade liberalization is more likely to be welfare-improving in Japan than in Europe.

While we have thus far considered the welfare effects of trade liberalization, we now explore the welfare effect of FDI liberalization, namely, a fall in the fixed cost of FDI. Noticing that FDI liberalization reduces both p_i and p_j as shown in (10), it is obvious that FDI liberalization is necessarily gainful. However, as a preparation for considering simultaneous liberalization of trade and FDI afterwards, we here give a formal proof of gainful FDI liberalization.

Proposition 3. *FDI liberalization improves welfare.*

Proof. Differentiating (6) with respect to f, we have

$$\frac{\partial \sigma_p^2}{\partial f} = 2\left[\widetilde{i} p_i \frac{\partial p_i}{\partial f} + \left(1-\widetilde{i}\right) p_j \frac{\partial p_j}{\partial f}\right] = \frac{2\left(1-\widetilde{i}\right)\left[\widetilde{i}\alpha_1 p_i + \left(1-\widetilde{i}\right)\alpha_2 p_j\right]}{\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2},$$

by substituting (10). Utilizing (7) and (8), the terms in the square brackets on the numerator of the right-hand side are rewritten as

$$\widetilde{i}\alpha_1 p_i + \left(1-\widetilde{i}\right)\alpha_2 p_j = \left[\widetilde{i}\alpha_1 + \left(1-\widetilde{i}\right)\alpha_2\right] a - \left[l - \left(1-\widetilde{i}\right) f\right],$$

which must be always positive. Hence, the effect of a change in f on σ_p^2 becomes

$$\frac{\partial \sigma_p^2}{\partial f} = \frac{2\left(1-\widetilde{i}\right)\left\{\left[\widetilde{i}\alpha_1 + \left(1-\widetilde{i}\right)\alpha_2\right] a - \left[l - \left(1-\widetilde{i}\right) f\right]\right\}}{\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2} > 0,$$

which allows us to establish Proposition 3. ||

This proposition is easy to understand upon invoking Proposition 1. FDI liberalization in the form of a fall in f lowers the equilibrium wage. Hence, the price of both FDI goods and exported goods also declines, from which welfare improves.

Proposition 2 claims that trade liberalization alone may be welfare-worsening while Proposition 3 ensures that FDI liberalization is unambiguously welfare-enhancing. Then, a natural question is whether combined liberalization of trade and FDI increases welfare. The following result provides an affirmative answer to this question.

Proposition 4. *Simultaneous liberalization of trade and FDI improves welfare.*

Proof. Summing the welfare effects of t and f leads to

$$\frac{\partial \sigma_p^2}{\partial t} + \frac{\partial \sigma_p^2}{\partial f} = \frac{2\left(1-\widetilde{i}\right)\left\{\left[9\alpha_2 + (9-\alpha_2)\widetilde{i}(\alpha_1-\alpha_2)\right] a + \widetilde{i}\alpha_2^2 t - 9\left[l - \left(1-\widetilde{i}\right) f\right]\right\}}{9\left[\widetilde{i}\alpha_1^2 + \left(1-\widetilde{i}\right)\alpha_2^2\right]},$$

the sign of which is positive, which, in turn, implies that simultaneous liberalization of trade and FDI is beneficial. ||

According to Proposition 2, trade liberalization alone has a welfare-reducing possibility. However, this proposition tells that trade liberalization can be successful if FDI is simultaneously liberalized. This is because that the positive welfare effects of FDI liberalization overturn the possibly negative welfare associated with trade liberalization. The same finding has already been found in the literature, e.g. Ishikawa et al. (2010). However, the model and environment considered in their papers and this paper are quite different.[9]

Eggar and Etzel (2014) are also closely related to our study. They develop a two-country GOLE model in which world goods markets are fully integrated, capital is footloose and labor unions. As to the welfare effect of trade liberalization, they find that 'welfare is definitely higher in the long-run open economy equilibrium than autarky.'[10] This result is also similar to Proposition 4 above because it claims that trade liberalization with free investment ensures a welfare improvement. In this sense, Proposition 4 as well as the results of Ishikawa et al. (2010) and Eggar and Etzel (2014) implies that the complementary role of trade and FDI liberalization is profoundly confirmed at least at the theoretical level.

4 Concluding remarks

We have applied a GOLE model of Neary (2016) to the choice between exporting and FDI, and explored its welfare implications. It is shown that trade liberalization is beneficial if either the initial tariff level is high relative to the marginal cost difference between the exporting and FDI industries. In addi-

[9]Ishikawa et al. (2010) assume a differentiated Bertrand duopoly in a partial equilibrium model.

[10]The term 'long-run' represents the situation where capital can freely move across countries.

tion, we have commented that this condition is testable just by looking at the data. As noted earlier, Wakasugi et al. (2014) find evidence that the cost gap between exporting and FDI of Japan is much smaller than that of Europe. Relating this finding to our result, it is inferred that trade liberalization is more likely to be beneficial to Japan than Europe.

Then, we have established that in contrast to trade liberalization, FDI liberalization and combined liberalization of trade and FDI unambiguously improve welfare. Thus, the accompanying role of FDI liberalization is a key for successful trade liberalization.

While these results hopefully contribute to literature, they admittedly rest on a number of restrictive assumptions. First, we have assumed that all industries engage in either exporting or FDI. However, it is much more satisfactory to incorporate the non-traded industries as in Helpman et al. (2004). Second, we have confined attention to greenfield FDI, ignoring cross-border mergers. The latest data of UNCTAD (2015) show that cross-border mergers rise (by 28%) from 2013 to 2014 although greenfield FDI declines by 2 %.[11] Considering this reality, the presence of cross-border merger should be properly taken into account.[12] It is our research agenda to relax these assumptions and seek more about the linkage between trade and FDI.

References

[1] Ahn, J., 2014. A welfare analysis of unilateral trade and FDI liberalization. Canadian Journal of Economics 47(3), 758-774.

[2] Antras, P., Yeaple, S. R., 2014. Multinational firms and the structure of international trade. In: Gopinath, G., Helpman, E., Rogoff, K. (Eds.).

[11] Note that from 2003 to 2014, the value of greenfield FDI is larger than the value of cross-border merger except for 2007.

[12] Nocke and Yeaple (2007, 2008) and Neary (2007) examine the implications of cross-border mergers in a monopolistic competition model and a GOLE model, respectively.

Handbook of International Economics, Vol. 4. Amsterdam: Elsevier, 55-130.

[3] Bastos, P., Straume, O. R., 2012. Globalization, product differentiation, and wage inequality. Canadian Journal of Economics 45(3), 857-878.

[4] Brainard, S. L., 1997. An empirical assessment of the proximity-concentration trade-off between multinational sales and trade. American Economic Review 87(4), 520-544.

[5] Brander, J. A., Krugman, P. R., 1983. A 'reciprocal dumping' model of international trade. Journal of International Economics 15(3-4), 313-321.

[6] Chor, D., 2009. Subsidies for FDI: implications from a model with heterogeneous firms. Journal of International Economics 78(1), 113-125.

[7] Colacicco, R., 2015. Ten years of general oligopolistic equilibrium: a survey. Journal of Economic Surveys 29(5), 965-992.

[8] Dei, F., 1990. A note on multinational corporations in a model of reciprocal dumping. Journal of International Economics 29, 161-171

[9] Dornbusch, R., Fischer, S., Samuelson, P. A., 1977. Comparative advantage, trade, and payments in a Ricardian model with a continuum of goods. American Economic Review 67(5), 823-839.

[10] Eggar, H., Etzel, D., 2014. Union wage-setting and international trade with footloose capital. Regional Science and Urban Economics 48, 56-67.

[11] Girma, S., Gorg, H., Strobl, E., 2004. Exports, international investment, and plant performance: evidence from a non-parametric test. Economics Letters 83(3), 317-324.

[12] Girma, S., Kneller, R., Pisu, M., 2005. Exports versus FDI: an empirical test. Review of World Economics 141, 193-218.

[13] Head, K., Ries J., 2003. Heterogeneity and the FDI versus export decision of Japanese manufacturers. Journal of the Japanese and International Economies 17, 448-467.

[14] Helpman, E., Melitz, M. J., Yeaple, S. R., 2004. Export versus FDI with heterogeneous firms. American Economic Review 94(1), 300-316.

[15] Horstmann, I., Markusen, J. R., 1992. Endogenous market structures in international trade (natura facit saltum). Journal of International Economics 32(1-2), 109-129.

[16] Ishikawa, J., Morita, H, Mukunoki, H., 2010. FDI in post-production services and product market competition. Journal of International Economics 82(1), 73-84.

[17] Kreickemeier, U., Meland, F., 2013. Non-traded goods, globalization and union influence. Economica 80(320), 774-792.

[18] Lahiri, S., Ono, Y., 1988. Helping minor firms reduces welfare. Economic Journal 98(393), 1199-1202.

[19] Markusen, J. R., 1995. The boundaries of multinational enterprises and the theory of international trade. Journal of Economic Perspective 9(2), 169-189.

[20] Markusen, J. R., 2002. Multinational Firms and the Theory of International Trade. Cambridge: MIT Press.

[21] Melitz, M. J., 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica. 71(6), 1695-1725.

[22] Mrazova, M., Neary J. P., 2013. Selection effects with heterogeneous firms. University of Oxford, CEPR Discussion Paper No. DP9288.

[23] Neary, J. P., 2003a. Globalization and market structure. Journal of the European Economic Association 1(2-3), 245-271.

[24] Neary, J. P., 2003b. Competitive versus comparative advantage. World Economy 26(4), 457-470.

[25] Neary, J. P., 2007. Cross-border mergers as instruments of comparative advantage. Review of Economic Studies 74(4), 1229-1257.

[26] Neary, J. P., 2016. International trade in general oligopolistic equilibrium. Review of International Economics 24(4), 669-698.

[27] Nocke, V., Yeaple, S. R., 2007. Cross-border mergers and acquisitions vs greenfield foreign direct investment: the role of firm heterogeneity. Journal of International Economics 72(2), 336-365.

[28] Nocke, V., Yeaple, S. R., 2008. An assignment theory of foreign direct investment. Review of Economic Studies 75(2), 529-557.

[29] Tomiura, E., 2007. Foreign outsourcing, exporting, and FDI: a productivity comparison at the firm level. Journal of International Economics 72(1), 113-127.

[30] UNCTAD, 2015. World Investment Report 2015.

[31] Wakasugi, R., Todo, Y., Sato, H., NIshioka, S., Matsuura, T., Ito, B., Tanaka, A., 2014. The internationalization of Japanese firms: new findings based on firm-level data. In: Wakasugi, R., (Ed.). Internationalization of Japanese Firms: Evidence from Firm-level Data. Tokyo: Springer, 15-45.