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From Segmented Markets to Integrated Markets: An Analysis of Economic Integration and Antidumping Legislation*

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RRH: FROM SEGMENTED MARKETS TO INTEGRATED MARKETS
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Abstract

This paper examines how a movement from segmented markets to integrated markets affects the volume of trade, consumer prices, profits and welfare in a monopoly model. The monopolist can initially discriminate consumer prices among markets with trade costs but has to take arbitrage into account as economic integration proceeds. The analysis provides interesting insights into economic integration and antidumping law. It is shown that the extent of arbitrage and the shape of marginal cost curve play crucial roles. Surprisingly, it is possible that neither consumers nor the monopolist gains from economic integration, and that antidumping legislation benefits consumers at the expense of producers.

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1. Introduction

Economic integration entails a movement, through the removal of tariff and non-tariff measures, from segmented national markets towards a single integrated market. An obvious example is the present goal of EU. Thus, in order to analyze economic integration, it is necessary to explicitly examine such a movement which entails the reduction of trade costs. The purpose of this paper is to shed light on the effect of economic integration on markets characterized by imperfect competition. Constructing a monopoly model, we examine the effects of economic integration on the volume of trade, consumer prices, profits and welfare.

The seminal works of Smith and Venables (1988) and Venables (1990) have already pointed out that both the decrease in the extent of market segmentation and the reduction in trade barriers lead to significant effects in economic integration. In their analyses, however, they examine these two effects separately. In contrast, the present study combines both of them. In our model, a reduction of trade barriers affects the extent of price discrimination. This allows us to capture an important aspect pointed out by Baldwin and Venables (1995)[1] that the market structure of integrated markets may have the aspects of both segmented and integrated markets.[2]

The basic structure of our model is as follows. A monopolist controls wholesale and can make direct contracts with domestic and foreign retailers. However, there are many competitive arbitragers that supply parallel imports or re-imports by purchasing in the low price market and selling in the high price market. In the initial equilibrium, the monopolist can freely set prices among the markets because trade costs, such as trade taxes and transport costs, are high enough (i.e., the markets are segmented). As economic integration proceeds through falling trade costs, the costs of arbitrage between markets become also lower. When they become low enough, the monopolist reduces the price differential between markets until all arbitrage opportunities are actually exhausted (i.e., the markets are integrated).

When all trade costs are eliminated (i.e., the markets are *completely* integrated), the monopolist is forced into uniform pricing. Thus, our analysis seems to be closely related to that of third-degree price discrimination. However, the present study is different from the mere analysis of third-price discrimination, because we consider not only a discrete shift from a segmented-market equilibrium to a completely-integrated-market equilibrium, but also the in-between situation (i.e., the equilibrium under *incomplete* market integration).[3] We model economic integration as a gradual reduction of trade costs. As trade costs fall, the market structure endogenously shifts from segmented markets to incompletely integrated markets and then to completely integrated markets. Thus, our study contrasts with other existing literature of economic integration (such as Smith and Venables (1988)) which regards economic integration as a simple switch from a segmented-market equilibrium to a completely-integrated-market equilibrium.

We show that changes in profits and consumer prices are somewhat complicated in the process of economic integration. This is because a reduction of trade costs results in two opposing effects: The trade costs incurred by the monopolist fall, but the extent of the monopolist's price discrimination is reduced. We should emphasize that unless the markets are completely integrated, the monopolist can still price-discriminate to some extent. An interesting case obtained in this study is that the directions of the price changes are reversed during economic integration. Moreover, economic integration could actually harm all consumers in the integrated economies. As is shown later, the decreasing MCs are crucial for this result.[4]

It should be noted that Wright (2003) models economic integration as a reduction of all tariffs to zero in the presence of arbitragers. While all trade costs including transport costs fall in our model, he assumes that economic integration does not affect transport costs at all. Because of this feature, the markets remain segmented or incompletely integrated after the tariffs become zero. His equilibrium after economic integration obviously corresponds to the case where trade costs are not completely eliminated in our model.[5]

While a monopoly model cannot take account for strategic interactions among firms, it does lead to more clear-cut results or implications due to its simplicity.[6] In fact, there are a number of studies that analyze various aspects of economic integration in the monopoly framework. To investigate the effect of EC market integration on the pharmaceutical industry, Klepper (1992) specifically introduces an arbitrage function and price controls into a monopoly model. His main focus is on the relationship between the price controls and arbitrage. Davidson et al. (1989) examine the welfare effects of anti-price-discrimination regulations in the EC car market. They are particularly concerned with the comparison between two different regulations. Anderson and Ginsburgh (1999) examine the effects of the arbitrage costs of consumers on both the pricing behavior of a monopolist and welfare when consumers are heterogeneous.[7]

Our viewpoint of economic integration can also be applied to the analysis of antidumping law. The traditional view of dumping is basically monopolistic price discrimination among different markets (Viner, 1923); dumping exists when the domestic monopolist sets a lower price in the foreign country than in the domestic country. If the foreign country introduces an antidumping law with severe punishment, the monopolist will set a single price across markets. That is, the monopolist regards the two markets as a single integrated market in the presence of the antidumping law.[8] A surprising result from our analysis is that the antidumping legislation may benefit consumers at the expense of producers.

2. The Model

The Basic Structure

There are two countries called country 1 and country 2. In country 1, there exists a monopolist that supplies its product to both countries. The demand function in country i ($i = 1, 2$)

is given by

$$x_i = D_i(p_i); \quad D_i' < 0, \tag{1}$$

where x_i and p_i are, respectively, the demand and consumer price of the good in country i. We define the elasticity of the slope of the inverse demand function for the following analysis:

$$\epsilon_i \equiv \frac{D_i D_i''}{(D_i')^2}. \tag{2}$$

The (inverse) demand curve is concave if $\epsilon_i \leq 0$ and convex if $\epsilon_i \geq 0$.

There exist costs (i.e., trade taxes and/or transport costs) associated with trade between the countries. Letting t_{ji} denote the trade costs per unit when the good is exported from country j to country i,[9] the profit function of the monopolist is defined by

$$\Pi(P;T) = \sum_{i=1}^{2}(p_i - t_{1i})D_i(p_i) - C(\sum_{i=1}^{2} D_i(p_i)), \tag{3}$$

where P and T, respectively, denote the vectors of consumer prices and trade costs (i.e., $P = (p_1, p_2)$ and $T = (t_{11}, t_{12}, t_{21}, t_{22})$); and $C(\cdot)$ is the cost function.[10]

We assume that the monopolist controls wholesale and can make direct contracts with domestic and foreign retailers. However, there are many competitive arbitragers that supply parallel imports or re-imports by purchasing in the low price market and selling in the high price market. Because of this possibility of arbitrage, the monopolist may not be able to set whatever prices it wants. The arbitrage constraint ensures that the price differential between the two markets cannot exceed the trade costs. Thus, the monopolist maximizes its profits (3) subject to the following constraint:

$$p_1 - t_{21} \leq p_2 \leq p_1 + t_{12}. \tag{4}$$

This constraint may or may not be binding, but we initially assume that the constraint is not binding. That is, the trade costs are so high that the monopolist does not need to take account of arbitrage between the countries when setting the prices. This is the case of market segmentation.

When the constraint is not binding, the first-order conditions of the profit maximization are

$$\frac{\partial \Pi}{\partial p_i} = D_i + (p_i - t_{1i} - C^{'})D_i^{\prime} = 0 \quad (i = 1, 2). \tag{5}$$

We assume that the second-order sufficient conditions are satisfied:

$$D_i^{\prime}(2 - \epsilon_i) - C^{''}(D_i^{\prime})^2 < 0 \quad (i = 1, 2) \tag{6}$$

$$[D_i^{\prime}(2 - \epsilon_i) - C^{''}(D_i^{\prime})^2][D_j^{\prime}(2 - \epsilon_j) - C^{''}(D_j^{\prime})^2] - (C^{''}D_i^{\prime}D_j^{\prime})^2 > 0 \quad (i, j = 1, 2;\ i \neq j). \tag{7}$$

Solving the first-order conditions, we have

$$p_i^S = \frac{\theta_i(p_i^S)}{\theta_i(p_i^S) - 1}[C^{'}(\cdot) + t_{1i}], \tag{8}$$

where θ_i denotes the price elasticity in country i.[11] We let superscript S denote the non-binding case (i.e., the segmented-market case). Substituting these prices into the demand functions, the supply to each market, x_i^S, can be obtained.

The Process of Economic Integration

In this subsection, we examine how profits, consumer prices, and trade flows change in the process of economic integration. For simplicity, we assume $t \equiv t_{12} = t_{21}/\alpha$, where $\alpha (> 0)$ is a parameter. A large α implies that trade costs from country 2 to country 1 are high relative to those from country 1 to country 2. Economic integration entails decreases in both t_{12} and t_{21} (i.e., t). We should note that a decrease in t may cause the constraint (4) to bind.

We first examine the case where the constraint remains non-binding. To find the effect, we totally differentiate (5) and obtain:

$$\begin{pmatrix} D_1^{\prime}(2 - \epsilon_1) - C^{''}(D_1^{\prime})^2 & -C^{''}D_1^{\prime}D_2^{\prime} \\ -C^{''}D_1^{\prime}D_2^{\prime} & D_2^{\prime}(2 - \epsilon_2) - C^{''}(D_2^{\prime})^2 \end{pmatrix} \begin{pmatrix} dp_1 \\ dp_2 \end{pmatrix} = \begin{pmatrix} 0 \\ D_2^{\prime} \end{pmatrix} dt \tag{9}$$

with the solution

$$\begin{pmatrix} dp_1 \\ dp_2 \end{pmatrix} = \frac{1}{\Omega} \begin{pmatrix} D_2'(2-\epsilon_2) - C''(D_2')^2 & C''D_1'D_2' \\ C''D_1'D_2' & D_1'(2-\epsilon_1) - C''(D_1')^2 \end{pmatrix} \begin{pmatrix} 0 \\ D_2' \end{pmatrix} dt, \tag{10}$$

where $\Omega \equiv [D_1'(2-\epsilon_1) - C''(D_1')^2][D_2'(2-\epsilon_2) - C''(D_2')^2] - (C''D_1'D_2')^2 > 0$ from (7).

In view of (6), therefore, the effects of a change in t on consumer price in each market are given by

$$\frac{dp_1}{dt} = \frac{C''D_1'(D_2')^2}{\Omega}, \quad \frac{dp_2}{dt} = \frac{[D_1'(2-\epsilon_1) - C''(D_1')^2]D_2'}{\Omega} > 0. \tag{11}$$

When the constraint is not binding, a decrease in t lowers the consumer price in country 2; and raises (resp. lowers) the price in country 1 if and only if $C'' > 0$ (resp. $C'' < 0$). Obviously, the volume of trade increases.

The above analysis can be verified with the aid of Figure 1. In the figure, R_iR_i shows the locus of the first-order condition (5) on the price plane. The initial equilibrium, S, is given by the intersection of R_1R_1 and R_2R_2. Using the implicit function theorem, the slopes of R_1R_1 and R_2R_2 are given by

$$\frac{dp_2}{dp_1}|_{R_1R_1} = \frac{D_1'(2-\epsilon_1) - C''(D_1')^2}{C''D_1'D_2'}, \tag{12}$$

$$\frac{dp_2}{dp_1}|_{R_2R_2} = \frac{C''D_1'D_2'}{D_2'(2-\epsilon_2) - C''(D_2')^2}. \tag{13}$$

Since the numerator of (12) and the denominator of (13) are negative from the second-order conditions, the signs of the slopes depend only on the sign of C''. While R_1R_1 is vertical and R_2R_2 is horizontal with $C'' = 0$, both loci are downward-sloping (resp. upward-sloping) with $C'' > 0$ (resp. $C'' < 0$).[12] The second-order conditions imply that R_1R_1 is steeper than R_2R_2. Moreover, the slopes of iso-profit contours (which surround S) are zero along R_1R_1 and are infinite along R_2R_2.

In the figure, T_1T_1 and T_2T_2 are, respectively, $p_1 - t_{21} = p_2$ and $p_1 + t_{12} = p_2$. The constraint (4) is not binding in the area between T_1T_1 and T_2T_2. In the following, this area is referred to as *Region 0*. Moreover, the area below T_1T_1 and the area above T_2T_2 are called *Region I* and *Region II*, respectively. Since the constraints are not binding in the initial equilibrium, S is located in *Region 0*. As the trade costs decrease, R_2R_2 and T_2T_2 shift downward and T_1T_1 shifts upward. It should be noted that a change in t never shifts R_1R_1. We can easily verify that p_1 rises but p_2 falls as long as the new equilibrium (i.e., the new intersection between R_1R_1 and R_2R_2) is located in *Region 0*. The effect of a decrease in t on profits can be obtained by using the envelope theorem:

$$\frac{d\Pi}{dt} = \frac{\partial\Pi}{\partial t} = -D_2 < 0. \tag{14}$$

Thus, the monopolist gains from a decrease in t.

The results obtained above are well known and very intuitive. We now consider cases where the constraint is binding and hence the markets are integrated. It is assumed that the monopolist continues to serve both markets even with binding constraints. There are two cases: $p_1 - t_{21} = p_2$ holds in one case and $p_1 + t_{12} = p_2$ in the other. The former case is shown in Figure 1 (b). In the figure, the intersection between R_1R_1 and $R_2'R_2'$, S', is in *Region I* (i.e., below $T_1'T_1'$). Thus, when maximizing its profits, the monopolist takes account of arbitrage from country 2 to country 1. The profit function (3) becomes

$$\Pi(p_1;t) = p_1D_1(p_1) + [(p_1 - t_{21}) - t_{12}]D_2(p_1 - t_{21}) - C(D_1(p_1) + D_2(p_1 - t_{21}))$$

$$= p_1D_1(p_1) + [p_1 - (1+\alpha)t]D_2(p_1 - \alpha t) - C(D_1(p_1) + D_2(p_1 - \alpha t)). \tag{15}$$

Then the first-order condition of the profit maximization is

$$\frac{d\Pi}{dp_1} = \{D_1 + (p_1 - C^{'})D_1{'}\} + \{D_2 + [p_1 - (1+\alpha)t - C^{'}]D_2'\} = 0. \tag{16}$$

The second-order sufficient condition is assumed to be satisfied:

$$2(D_1' + D_2^{'}) + (p_1 - C^{'})D_1^{''} + [p_1 - (1+\alpha)t - C^{'}]D_2'' - (D_1' + D_2^{'})^2C^{''} \equiv \Gamma < 0. \tag{17}$$

Solving the first-order condition (16), we can obtain the equilibrium prices. In Figure 1 (b), the equilibrium prices are determined by the point where an iso-profit contour (which surrounds S') is tangent to $T_1'T_1'$.

Since $R_2'R_2'$ shifts downward further but $T_1'T_1'$ shifts upward further as t further falls, the effects of a decrease in t on the consumer prices are ambiguous. Using the implicit function theorem, the effect on p_1 (i.e., the producer price) is given by

$$\frac{dp_1}{dt} = -\frac{\partial^2\Pi/\partial p_1 \partial t}{\partial^2\Pi/(\partial p_1)^2} = \frac{D_2'[(1+2\alpha) - \alpha(D_1' + D_2')C''] + \alpha D_2''[p_1 - (1+\alpha)t - C']}{\Gamma}. \quad (18)$$

When $C'' \geq 0$, the first term of the numerator is negative, while the sign of the second term depends on the sign of D_2''. Noting $p_1 - (1+\alpha)t - C' > 0$, a decrease in t lowers p_1 if $D_2'' \leq 0$ (i.e., the demand function in country 2 is concave).[13] When $C'' < 0$, the change in p_1 is more complicated.

The effect of a change in t on p_2 is given by

$$\frac{dp_2}{dt} = \frac{d(p_1 - \alpha t)}{dt} = \frac{-2\alpha D_1' + D_2' - \alpha(p_1 - C')D_1'' + \alpha(D_1' + D_2')D_1'C''}{\Gamma}. \quad (19)$$

Thus, a decrease in t may not lower p_2. With $D_i'' = 0$ and $C'' = 0$, for example, p_2 falls if and only if $2\alpha D_1' > D_2'$ (which is likely when α is small). Thus, a decrease in t lowers both consumer prices when $2\alpha D_1' > D_2'$, but reduces p_1 and raises p_2 when $2\alpha D_1' < D_2'$.

The following remarks should be added. First, with a binding constraint, a spill-over effect between the economies arises even when $C'' = 0$. That is, p_1 changes even when $C'' = 0$. This is in contrast to the non-binding case where a change in t does not affect p_1 at all. Second, once the constraint becomes binding, the directions of the price changes could be reversed. For example, this is the case if $D_i'' = 0$, $C'' > 0$ and $2\alpha D_1' < D_2'$ holds. Third, if $dp_1/dt < 0$, then $dp_2/dt < 0$ also holds because $p_2 = p_1 - \alpha t$. Fourth, a decrease in the trade costs may not increase the volume of trade.

Using the envelope theorem, we can obtain the effect of a decrease in t on profits:

$$\frac{d\Pi}{dt} = \frac{\partial\Pi}{\partial t} = -(1+\alpha)D_2 - \alpha[p_1 - (1+\alpha)t - C']D_2' = -D_2 + \alpha[D_1 + (p_1 - C')D_1']. \quad (20)$$

This implies that the monopolist may or may not gain from a decrease in t.

The reason why the changes in prices and profits are generally ambiguous with a binding constraint is that a reduction of trade costs results in two opposing effects. The trade costs the monopolist must incur fall, but the extent of price discrimination the monopolist can employ is reduced. To explore this further, suppose that $T_1'T_1'$ does not shift at all (i.e., t_{21} is constant in (15)) even if t_{12} is reduced. This corresponds to the decrease in trade costs for the monopolist without changing the extent of price discrimination. It can easily be verified that as t_{12} decreases, both p_1 and p_2 fall and profits rise regardless of the shape of MC curve (Ishikawa, 2000b). Thus, a decrease in t_{21} (i.e., an upward shift of $T_1'T_1'$) makes the changes complicated. This implies that if α is small enough, or, if t_{21} is very small relative to t_{12}, a decrease in t lowers both p_1 and p_2 and increases profits.

We now examine the second case where $p_1 + t_{12} = p_2$ holds. This case is shown in Figure 1 (c) where the intersection between R_1R_1 and $R_2'R_2'$, S', is in *Region II* (i.e., above $T_2'T_2'$). Thus, when maximizing its profits, the monopolist takes account of any arbitrage from country 1 to country 2. The profit function (3) becomes

$$\Pi(p_1; t) = p_1[D_1(p_1) + D_2(p_1 + t)] - C(D_1(p_1) + D_2(p_1 + t)). \tag{21}$$

The first-order condition of the profit maximization is

$$\frac{d\Pi}{dp_1} = (D_1 + D_2) + (p_1 - C')(D_1' + D_2') = 0. \tag{22}$$

The second-order sufficient condition is assumed to be satisfied:

$$\begin{aligned} &2(D_1' + D_2') + (p_1^I - C')(D_1'' + D_2'') - (D_1' + D_2')^2 C'' \\ &= 2(D_1' + D_2') - \frac{D_1 + D_2}{D_1' + D_2'}(D_1'' + D_2'') - (D_1' + D_2')^2 C'' \equiv \Phi < 0, \end{aligned} \tag{23}$$

where the equality is obtained from the first-order condition (22).

The effects of a decrease in t on the consumer prices are again somewhat complicated, because both T_2T_2 and R_2R_2 shift downward as t falls. Using the implicit function theorem, the effect on p_1 (i.e., the producer price) is given by

$$\frac{dp_1}{dt} = -\frac{\partial^2\Pi/\partial p_1\partial t}{\partial^2\Pi/(\partial p_1)^2} = -\frac{D_2'[1-(D_1'+D_2')C''] - D_2''(D_1+D_2)/(D_1'+D_2')}{\Phi}. \tag{24}$$

Noting the second-order condition (23) (i.e., $\Phi < 0$), we obtain the following condition:

$$\frac{dp_1}{dt} \gtrless 0 \Leftrightarrow D_2'' \gtrless \frac{D_2'(D_1'+D_2')[1-(D_1'+D_2')C'']}{D_1+D_2}. \tag{25}$$

This implies that a decrease in t may not raise p_1. When $C'' \geq 0$, a sufficient condition for $dp_1/dt < 0$ is $D_2'' \leq 0$. That is, if the demand function in country 2 is concave with $C'' \geq 0$, a decrease in t raises p_1.

The effect of a change in t on p_2 is given by

$$\frac{dp_2}{dt} = \frac{d(p_1+t)}{dt} = \frac{(2D_1'+D_2') - D_1'(D_1'+D_2')C'' - D_1''(D_1+D_2)/(D_1'+D_2')}{\Phi}. \tag{26}$$

Thus, we have

$$\frac{dp_2}{dt} \gtrless 0 \Leftrightarrow D_1'' \lessgtr \frac{(D_1'+D_2')[(2D_1'+D_2') - D_1'(D_1'+D_2')C'']}{D_1+D_2}. \tag{27}$$

When $D_1'' \leq 0$ and $C'' \geq 0$, p_2 falls. We should note that if $dp_1/dt > 0$, then $dp_2/dt > 0$ also holds. This implies that when p_1 falls due to a decrease in t, p_2 also falls. Thus, the constraint does not reverse the directions of the price changes.

Using the envelope theorem and (22), we can obtain the effect of a decrease in t_2 on profits:

$$\frac{d\Pi}{dt} = \frac{\partial\Pi}{\partial t} = -\frac{D_2'(D_1+D_2)}{D_1'+D_2'} < 0. \tag{28}$$

Thus, the monopolist necessarily gains from a decrease in t in this case.

Whether the first case (i.e., $p_1 - t_{21} = p_2$) or the second case (i.e., $p_1 + t_{12} = p_2$) arises depends on the location of S'' where R_1R_1 and R_2R_2 intersect with $t = 0$ (i.e., where R_1R_1

and $R_2''R_2''$ intersect) (Figure 1). If S'' is located below OZ, or, if $p_1^{S''} > p_2^{S''}$ (where $p_i^{S''}$ is the price of good i at S''), then the first case arises. If S'' is located above OZ, or, if $p_1^{S''} < p_2^{S''}$, the second case arises. It should be noted that $p_1^{S''} > p_2^{S''}$ (resp. $p_1^{S''} < p_2^{S''}$) holds when the demand elasticity at $t = 0$ is smaller (resp. larger) in country 1 than in country 2.

The above analysis leads to the following proposition:

Proposition 1 *The possibility of arbitrage affects the directions of the price changes caused by economic integration. The directions are reversed only if* $p_1^{S''} > p_2^{S''}$ *(where* $p_i^{S''}$ *is the price in country* i *at the equilibrium under segmented markets with no trade costs,* S''*). Economic integration benefits the monopolist when* $p_1 + t_{12} = p_2$ *but may harm it when* $p_1 = p_2 + t_{21}$*.*

Figure 2 shows three of the possible relationships between t and prices under $C'' > 0$. In all the figures, $p_1 < p_2$ at the initial equilibrium where $t = t^0$ holds. As t falls, p_1 rises and p_2 falls. In Figure 2 (a), the constraint, $p_1 - t_{21} = p_2$, becomes binding at $t = t^b$, and a further decrease in t makes p_1 lower and p_2 higher (Figure 2 (b) is a case when p_2 would fall). At $t = 0$ (i.e., at the final equilibrium), $p_1 = p_2$ holds.[14] In Figure 2 (c), the constraint, $p_1 + t_{12} = p_2$, becomes binding at $t = t^b$, but a further decrease in t never affects the directions of the price changes.[15]

The Complete Economic Integration

The analysis in the previous subsection shows that the changes in prices are not straightforward during the process of economic integration. We now directly compare the initial equilibrium with the final one where all trade costs are eliminated and complete economic integration has taken place (i.e., $p_1 = p_2$). To this end, we decompose the impact of the complete market integration into the two effects: *the trade-cost-elimination effect* and *the market-structure-switch effect*. The former corresponds to the shift of equilibrium caused by the elimination of trade costs when markets remain segmented. The latter corresponds to the shift of equilibrium caused by the movement from segmented markets to integrated markets with $t = 0$.

It is obvious that the trade-cost-elimination effect is the same as the effect of a decrease in t without any constraint. This has been analyzed by using (11) and (14), and in Figure 1, this effect is given by the shift from S to S''. To consider the market-structure-switch effect, we let $\bar{p}_i^I$ denote the price of good i that causes (5) and $p_1 = p_2$ to hold simultaneously under $T = 0$. We also let $p^{I''}$ denote the price under the complete economic integration. The appendix contains the proof of the following lemma:

Lemma 1 *Suppose $\bar{p}_i^I \leq \bar{p}_j^I$ $(i, j = 1, 2,\ i \neq j)$. Then $\bar{p}_i^I \leq p^{I''} \leq \bar{p}_j^I$ holds.*

We should note that with $C'' < 0$, $p^{I''} < p_i^{S''}$ or $p^{I''} > p_j^{S''}$ may hold.[16] This can easily be verified in Figure 3. The final equilibrium is given by a tangent point between OZ and an iso-profit contour which surrounds S''. Lemma 1 says that the tangent point must be located between A and B. $p^{I''} > p_1^{S''}$ holds if the tangent point I'' is located between A and C, while $p^{I''} < p_2^{S''}$ holds if I'' is located between B and D. Since the loci of the first-order condition are upward-sloping only if $C'' < 0$, $p^{I''} < p_i^{S''}$ or $p^{I''} > p_j^{S''}$ holds only if $C'' < 0$. The economic intuition is that the decreasing MC magnifies any change in the total supply which is generated by the shift of the MR curve as a result of the market-structure-switch effect.

This is illustrated in Figure 4. In the figure, MR^S is the MR curve under segmented markets with $t = 0$ and can be obtained by adding up two MR curves. The total supply under segmented markets is indicated by S'' where the MR curve intersects the MC curve. When the two markets are integrated, the new MR curve, MR^I, is derived from the new demand curve which is obtained by adding up the two demand curves. The market-structure-switch effect could shift the MR curve inward (say, MR_A^I) or outward (say, MR_B^I). In particular, as was shown in Robinson (1933), when $p_i^{S''} < p_j^{S''}$, the market-structure-switch effect shifts the MR curve inward (resp. outward) if the demand function of country i is strictly convex (resp. concave) and the demand function of country j is concave (resp. strictly convex).[17]

When the MR curve is given by MR^I_A, the total supply is smaller with $C'' < 0$ (say, point A') and is larger with $C'' > 0$ (say, point A'') relative to the case when $C'' = 0$ (point A). Similarly, if the MR is MR^I_B, the total supply is larger with $C'' < 0$ (say, B') and is smaller with $C'' > 0$ (say, B'') relative to the case when $C'' = 0$ (point B). If this magnification effect is large enough, $p^{I''} > p_j^{S''}$ arises when the market-structure-switch effect shifts the MR curve inward and $p^{I''} < p_i^{S''}$ arises when it shifts the MR curve outward.

It is well known that MR^S and MR^I happen to coincide with linear demands. Thus, the following lemma is immediate:

Lemma 2 *Suppose* $p_i^{S''} \leq p_j^{S''}$ *(*$i, j = 1, 2$*,* $i \neq j$*) and the demand functions are linear. Then* $p_i^{S''} \leq p^{I''} \leq p_j^{S''}$ *holds regardless of the shape of the MC curve.*

With the aid of Figures 1 and 3, the effects of the complete economic integration on consumer prices, profits and welfare can be seen by comparing the initial equilibrium, S, with the final one, I''. To examine the welfare effect, however, we need to specify what the trade costs are. If they are trade taxes, for example, then we have to further specify whether they are taxes related to exports or imports (i.e., which government obtains the tax revenue). If they are the iceberg type of transport costs, then they are wastes from the welfare viewpoint. We assume for simplicity that trade costs are wastes.[18]

We first consider the following three cases when $C'' \geq 0$.

Case 1: S, and hence S'', are located below OZ. As is seen in Figure 1 (a), p_1 falls but p_2 could go either direction. Whether the monopolist gains or loses from the complete economic integration is ambiguous. However, if S is located outside the iso-profit contour which surrounds S'', then the profits rise.[19] We should note that if α is close enough to zero, then S is close to A and is located outside the iso-profit contour which surrounds S''. Moreover, if α is close enough to zero, the complete economic integration lowers p_2, and both economies gain from the complete economic integration.

Case 2: S is located above OZ but S'' is below OZ. In this case, p_2 falls but p_1 could go either direction (Figure 1 (b)).[20] If R_1R_1 is very steep (or, if C'' is very small),[21] however, p_1 falls. Moreover, since S is necessarily located outside the iso-profit contour which surrounds S'', the profits increase. Thus, if C'' is small, the complete economic integration benefits both countries.

Case 3: Both S and S'' are located above OZ. As is seen in Figure 1 (c), p_1 rises whereas p_2 falls. Moreover, it follows from (14) and (28) that profits increase. Thus, although welfare of country 2 improves, that of country 1 may or may not improve.

We also consider the same cases when $C'' < 0$.

Case 1: S, and hence S'', are located below OZ. If S is located below OZ, any change in p_i ($i = 1, 2$) is possible. In particular, both p_1 and p_2 may rise and this is the case if I'' is between A and E (Figure 3). As in the case with $C'' \geq 0$, the effect on profits is ambiguous, and it is possible that neither consumers nor the monopolist benefits from the complete economic integration.

Case 2: S is located above OZ but S'' is below OZ. If S is located above OZ but S'' is below OZ, both p_1 and p_2 fall. For the same reason as in the case of $C'' \geq 0$, profits rise and both economies are necessarily made better off.

Case 3: Both S and S'' are located above OZ. This case is the same as when $C'' \geq 0$.

The above analysis establishes the following propositions:

Proposition 2 *Suppose $C'' \geq 0$ or linear demands. Then the complete economic integration necessarily benefits the consumers in the country where the consumer price is higher before integration. Only if $p_1^{S''} > p_2^{S''}$ (where $p_i^{S''}$ is the price in country i at the equilibrium under segmented markets with no trade costs, S''), all consumers gain from the complete economic integration. If $p_1^S \leq p_2^S$ (where p_i^S is the price in country i at the equilibrium under segmented* *markets with the initial trade costs, S), then the complete economic integration benefits the monopolist. If α is small enough and $p_1^S \geq p_2^S$ holds, then both countries gain from the complete economic integration. If C'' is small enough and $p_1^S \leq p_2^S$ and $p_1^{S''} > p_2^{S''}$ hold, then both countries also gain.*

Proposition 3 *Suppose $C'' < 0$ and demand is not linear. Then all consumers necessarily gain from the complete economic integration if both $p_1^S \leq p_2^S$ and $p_1^{S''} \geq p_2^{S''}$ hold. If $p_1^S \leq p_2^S$, the monopolist benefits from the complete economic integration. The complete economic integration makes all consumers (as well as the monopolist) worse off only if $p_1^S > p_2^S$.*

It should be remarked that "complete" economic integration is not necessarily required for the propositions to be valid. The propositions hold as long as the economic integration is close to the complete one in the sense that t is close enough to zero.

3. Alternative Interpretation: Antidumping Legislation

To this point, we have interpreted the movement from segmented markets to integrated markets as economic integration. This section briefly discusses a similar situation that could arise under antidumping law. In fact, we can reinterpret some of the above analyses and results without any modification.

The basic framework is as follows.[22] There is a single monopolist in country 1, while there are competitive firms in country 2. They produce a homogeneous good. The supply curve of the country 2 is upward sloping and the producers' surplus of competitive firms is positive whenever they sell the good. There exists a prohibitively high import barrier in country 1, whereas there is no import barrier in country 2. Hence, the monopolist can serve both markets, while the competitive firms in country 2 cannot sell in country 1.

In country 2, the monopolist has the dominant market position relative to firms in the competitive fringe. In the market of country 2, therefore, the monopolist behaves as a

Stackelberg leader in the price setting. Facing the import demand function of country 2, the monopolist chooses the price to maximize its profits. Observing the price, the competitive firms set their prices. Obviously, they set the same price as the monopolist. For country 2, therefore, (1) should be reinterpreted as the import demand function.

In the absence of antidumping law, the monopolist can freely choose the prices in both markets. If antidumping law with severe punishment is introduced in country 2, this imposes a constraint on the monopolist's behavior. Whenever the price in country 2 is lower than that in country 1, the industry in country 2 files an antidumping petition and the monopolist is punished. If $p_2^S < p_1^S$, the antidumping legislation constrains the monopolist to equate the price in country 2 with that in country 1. That is, in this situation, the monopolist regards the markets of countries 1 and 2 as if they are completely integrated.

The former analyses and results under economic integration are useful. In particular, we can directly apply the market-structure-switch effect analyzed in the previous section. When $C'' \geq 0$, the antidumping law raises p_2 and lowers p_1. Thus, the producers in country 2 as well as the consumers in country 1 gain at the cost of both the monopolist and the consumers in country 2.

However, some interesting cases can be observed when $C'' < 0$. Suppose that the equilibrium without the antidumping law is given by S'' in Figure 3 . Then the equilibrium with the law, denoted by I'', is on AB. If I'' is located between C and D, the effects are the same as those with $C \geq 0$. However, if it is located between B and D, all the consumers gain while all the producers lose. Moreover, if it is located between A and C, then only the producers in country 2 gain.

We thus obtain the following proposition:

Proposition 4 *When $C'' \geq 0$, the introduction of the antidumping law is harmful to the consumers in that country. When $C'' < 0$, however, the antidumping law could benefit all* *the consumers at the cost of all the producers.*

It is trivial that country 2 loses if and only if the price in country 2 rises and that the monopolist necessarily loses from the antidumping law. Thus, both countries lose from the antidumping law when both p_1 and p_2 rise. When p_1 falls, the welfare effect on country 1 is less obvious, because there is a tradeoff between the consumers in country 1 and the monopolist. However, when p_1 falls and p_2 rises, country 1's welfare improves if the total supply by the monopolist increases. This can be seen with the aid of Figure 5. In Figure 5, country 1's market is shown in panel (a) and the import demand curve of country 2 is shown in panel (b).[23] In country 1, the increase in the surplus is measured by area A. In country 2, on the other hand, the decrease in the surplus of country 1 is measured by area B minus area C. When the total supply by the monopolist increases, area A is obviously larger than area B and hence the total surplus of county 1 increases.

4. Concluding Remarks

We have examined the effects of economic integration in the monopoly framework. In this paper, economic integration specifically means the reduction of trade costs such as trade taxes. The monopolist can initially discriminate prices among markets without any restriction because of the high trade costs. As economic integration proceeds and trade costs fall, the monopolist has to take into account arbitrage between markets. However, as long as some trade costs exist, the monopolist can still price-discriminate to some extent. This market structure of incompletely integrated markets has the aspects of both segmented and integrated markets as pointed out by Baldwin and Venables (1995). Our analysis leads to some interesting insights into economic integration.

We have mainly focused on the effects of economic integration on consumer prices. We have found that once the arbitrage constraint becomes binding, the markets become interdependent and hence the changes in consumer prices result. In a certain case, the directions of the changes are reversed. While it is possible that all consumers gain from economic integration, it is also possible that when $C'' < 0$, all consumers lose. The basic point obtained in the paper is that the extent of arbitrage and the shape of the MC curve play crucial roles in economic integration.

Our study is in contrast with some other studies such as Smith and Venables (1988) in which economic integration equalizes the producer prices even with trade costs. In the literature of trade theory, there are two different notions of market integration. One is the aspect used in our study where neither producer nor consumer prices are equalized in the presence of trade costs. The other is used in Smith and Venables (1988), where producer prices are always equalized. We refer to the former as the "weak" version of market integration and the latter as the "strong" version.

In the weak version, the firm controls wholesale and can make direct contracts with domestic and foreign retailers. However, there are independent arbitragers that can buy in one market and sell in the other. In the presence of trade costs, the firm absorbs some of these costs and hence the producer prices across markets could be different.

In the strong version, on the other hand, there are many competitive independent wholesalers. The firm must sell all output to the wholesalers at a single price with no notion of where the output will eventually be retailed. There will then be a single producer price for all output. That is, the firm can control only its total supply and its allocation between markets is determined such that producer prices are equalized across markets.[24] In terms of our model, the constraint becomes $p_1 + t_{12} = p_2$, once the arbitrage is possible, and the analysis converges to that of (21). This implies that the analysis under the strong version can be regarded as a special case of our analysis (i.e., the weak version) from a technical point of view.

The European Commission reports that the differentials in retail prices net of tax for new cars in EU are still substantial, despite the introduction of the euro. In particular, they state “The generally low pre-tax prices in Finland, Denmark and Greece are largely due to manufacturers’ pricing policies and, to a lesser extent, in response to high taxes on car purchase in those Member states.”[25] This suggests that in order to analyze the European automobile market, the “weak” version be more relevant than the “strong” version.

In concluding this paper, it is fitting to add two remarks which highlight possible future research extensions. First, the domestic trade costs has been assumed away in our analysis. If such trade costs were permitted, we could compare the effects of market integration both within and between countries. Second, we have specifically focused on the monopoly in our study and it may be worthwhile to build alternative models to examine the various channels of the effects of economic integration on economies. In particular, economic integration is likely to generate pro-competitive effects under oligopoly. Even with oligopoly, however, we still believe that the basic point obtained in our study is robust.

Appendix

Proof of Lemma 1

We assume $\bar{p}_1^I \geq \bar{p}_2^I$ without loss of generality in this proof. The lemma is trivial if $\bar{p}_1^I = \bar{p}_2^I$, so we consider the case when $\bar{p}_1^I > \bar{p}_2^I$. Setting $t = 0$ and $p \equiv p_1 = p_2$ in (16), we evaluate it at $p = \bar{p}_1^I$ and $p = \bar{p}_2^I$. We can easily see from (5) and (6) that $(d\Pi/dp)|_{p=\bar{p}_1^I} < 0$, because the sign of the first bracket is zero and that of the second bracket is negative at $\bar{p}_1^I$; and that $(d\Pi/dp)|_{p=\bar{p}_2^I} > 0$, because, at $\bar{p}_2^I$, the sign of the first bracket is positive and the value of the second bracket is zero. Thus, we obtain $\bar{p}_2^I \leq p^{I''} \leq \bar{p}_1^I$. QED

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Notes

1. The literature on economic integration is extensively surveyed in Baldwin and Venables (1995).

2. It should be noted that by constructing a two-stage model, Venables (1990) tries to incorporate different degrees of market segmentation into Smith and Venables (1988).

3. Varian (1989) provides an excellent survey on price discrimination. Note that most of the studies on third-price discrimination deal with the effect of the introduction of the price discrimination.

4. Haaland and Wooton (1992) also show a possible loss from economic integration under imperfect competition. In their analysis, the presence of national preference bias plays a crucial role.

5. The model framework of Wright (2003) is an international Cournot duopoly with linear demand and costs. Thus, the comparison of results should be made with discretion.

6. Smith and Venables (1988) and Venables (1990), which make use of oligopoly frameworks, depend on numerical simulations because their models are somewhat complicated.

7. In Anderson and Ginsburgh (1999), the monopolist sets prices such that both second-degree and third-degree price discriminations arise. Thus, arbitrage actually occurs. Their interesting result is that world welfare may rise as arbitrage becomes more difficult.

8. Anderson et al. (1995) connect market segmentation and integration with antidumping legislation in the duopoly framework. They focus on the strategic interactions between two governments as well as two firms.

9. Even if the trade costs are an ad valorem type, the essence of our results would not change.

10. We assume $t_{11} = t_{22} = 0$.

11. In our analysis, θ_i is not necessarily constant. If it is constant, however, $\epsilon_i = 1 + 1/\theta_i$

holds.

12. Figure 1 is drawn with $C'' > 0$.

13. Recall that when $C'' > 0$, a decrease in t unambiguously increases p_1 and decreases p_2 when the constraints are not binding.

14. Recall that when $C'' > 0$, a decrease in $t \in [0, t^b]$ lowers p_1 with $D_2'' \leq 0$. It follows from (19) that with $D_1'' = 0$ and $C'' > 0$, a decrease in $t \in [0, t^b]$ is likely to raise (resp. lower) p_2 when α is relatively large (resp. small).

15. Recall that when $C'' > 0$, a decrease in $t \in [0, t^b]$ raises p_1 with $D_2'' \leq 0$ and lowers p_2 with $D_1'' \leq 0$.

16. This possibility can be conjectured from Hausman and MacKie-Mason (1988) which analyzes patent policy.

17. It has been pointed out that another sufficient condition provided in Robinson (1933) is incorrect. See Shih et al. (1988) for details and alternative conditions.

18. If the trade costs are the tariff imposed by country 2, the following welfare effects on country 1 are the same. The welfare effects on country 2 need some modification since it loses the tariff revenue.

19. When S is located outside the iso-profit contour which surrounds S'', the profits at S are lower than those at I'' even if the monopolist does not have to incur any trade costs.

20. Figures 2 (a) and (b) show the cases where p_1 falls.

21. See equation (12). R_1R_1 is vertical when $C'' = 0$.

22. The basic structure is the same as Staiger and Wolak (1992) who analyze capacity choice of the monopolist under antidumping law and uncertainty.

23. Figure 5 is drawn with $C'' = 0$. However, this is not crucial for the result.

24. Without any trade costs, the two notions result in the same equilibrium where the consumer prices, as well as producer prices, are equalized across markets.

25. http://europa.eu.int/comm/competition/car_sector/price_diffs/ "Car prices in the Eu-

ropean Union: still substantial price differences, especially in the mass market segments" Press Release - IP/02/1109 - 22.07.2002.

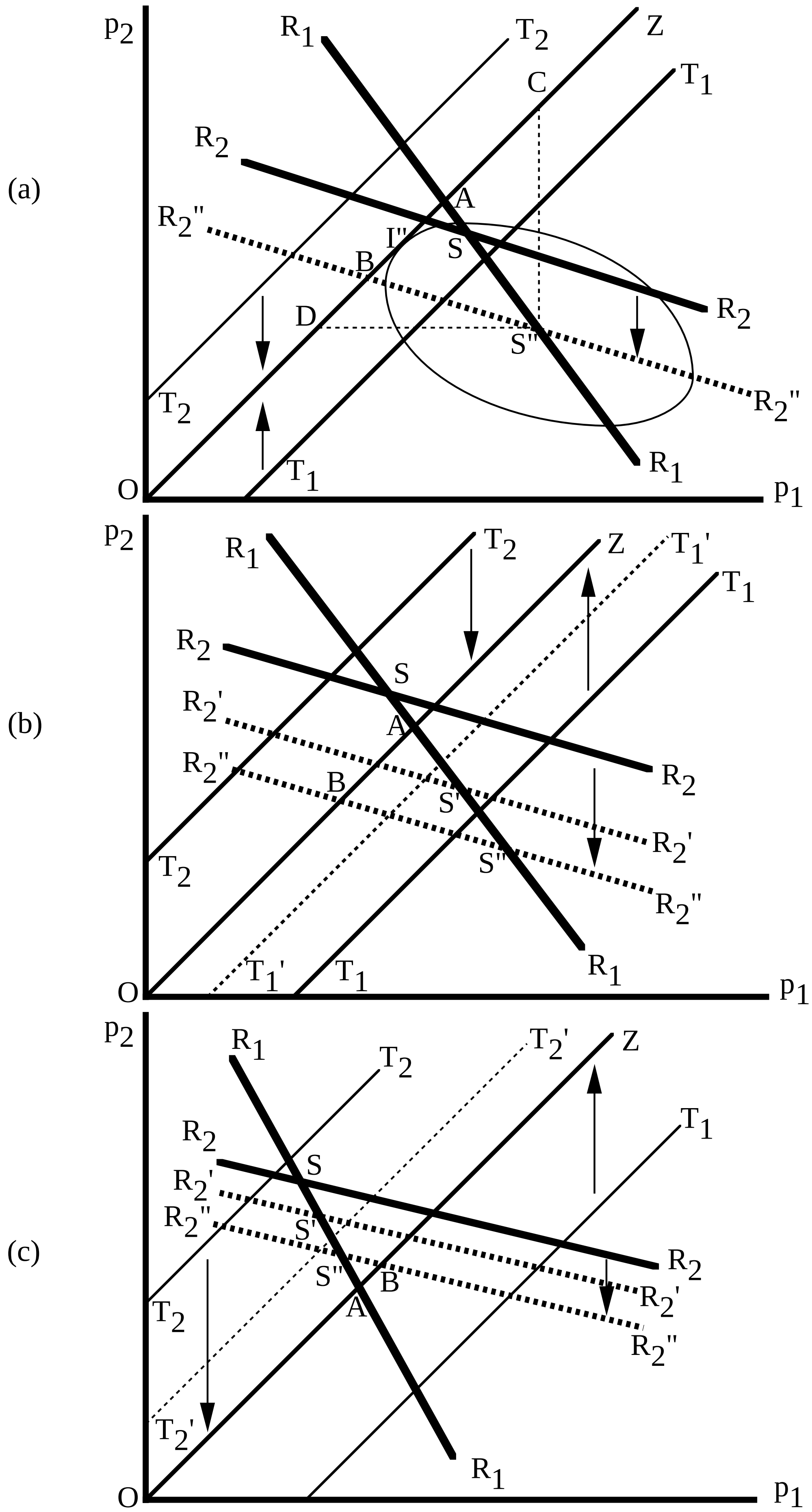

Figure 1. Consumer Prices

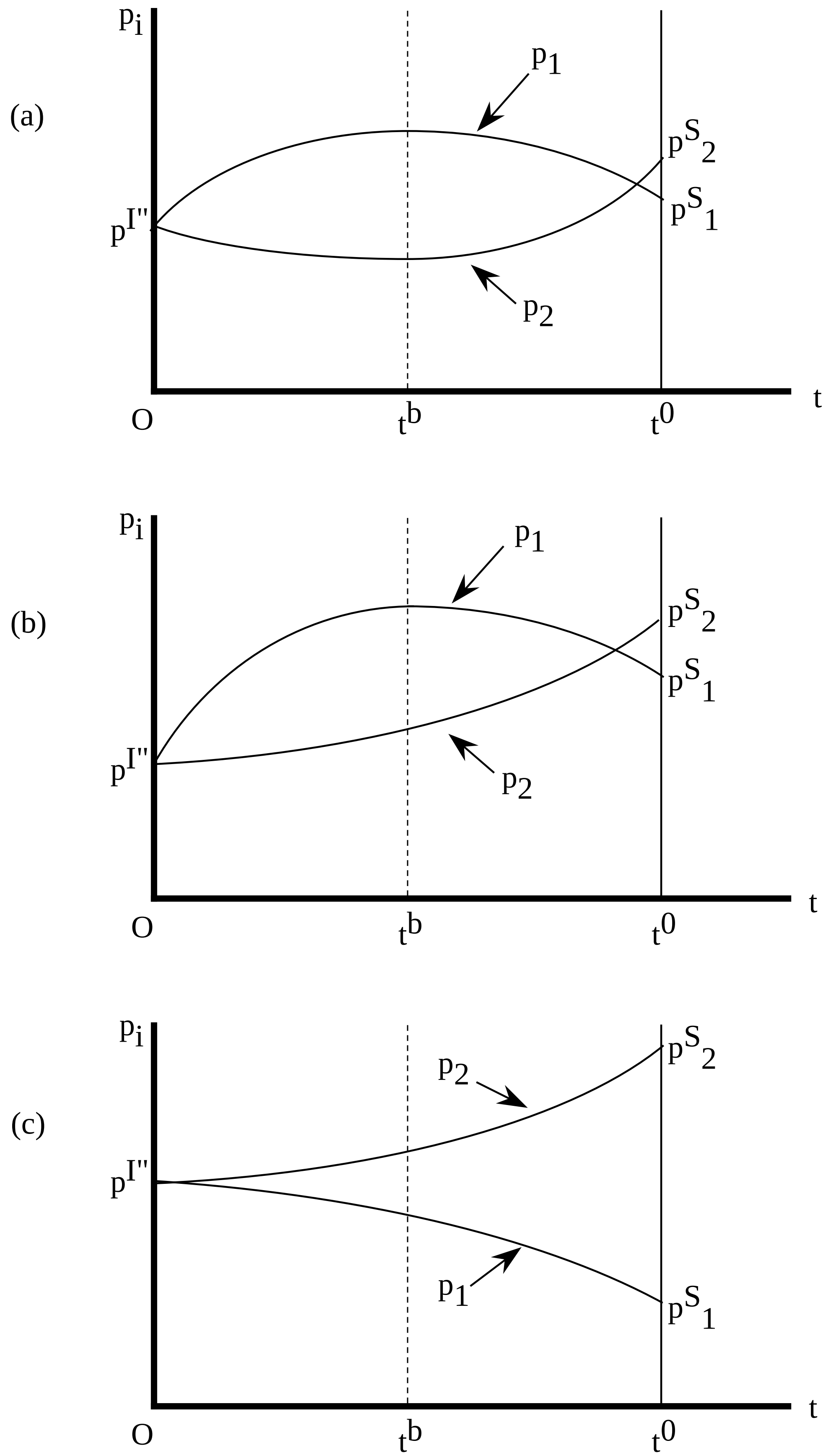

Figure 2. The Relationship between Trade Costs and Prices

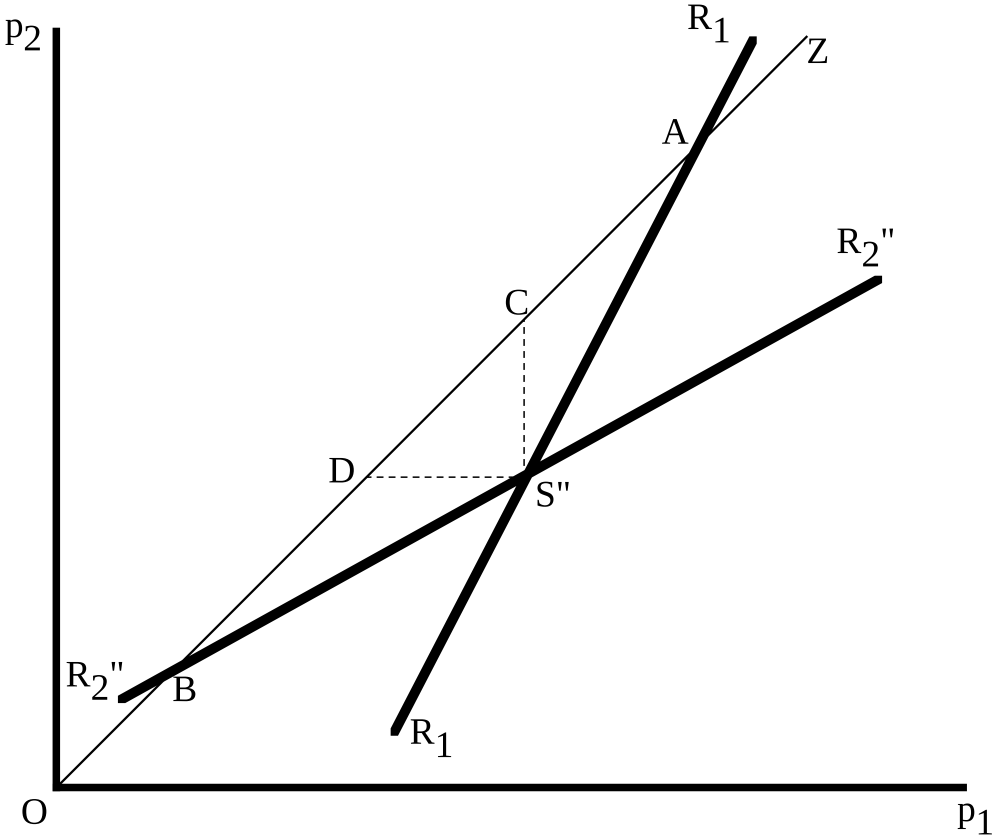

Figure 3. Complete Economic Integration with C"<0

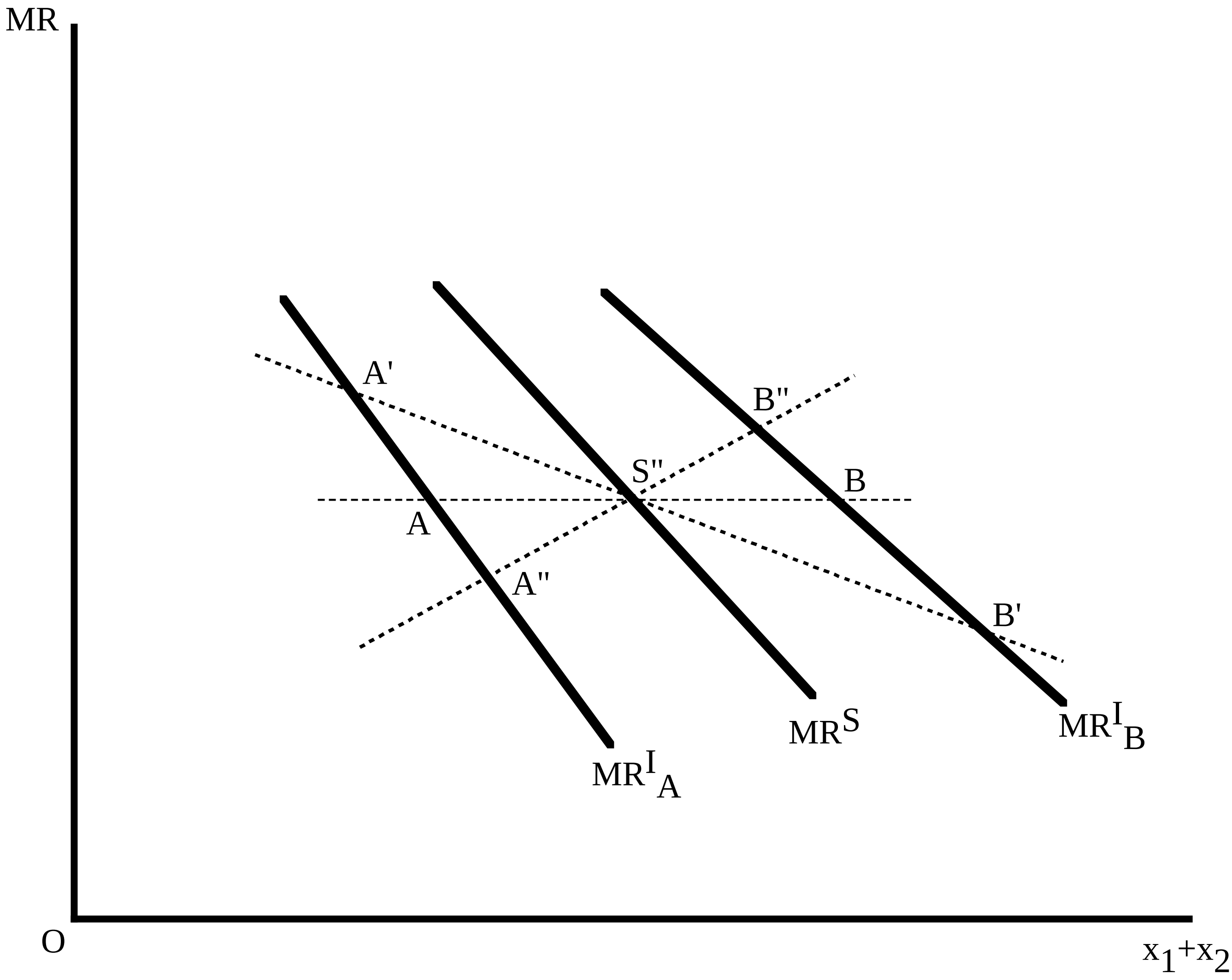

Figure 4. MR Curves under Segmented and Integrated Markets

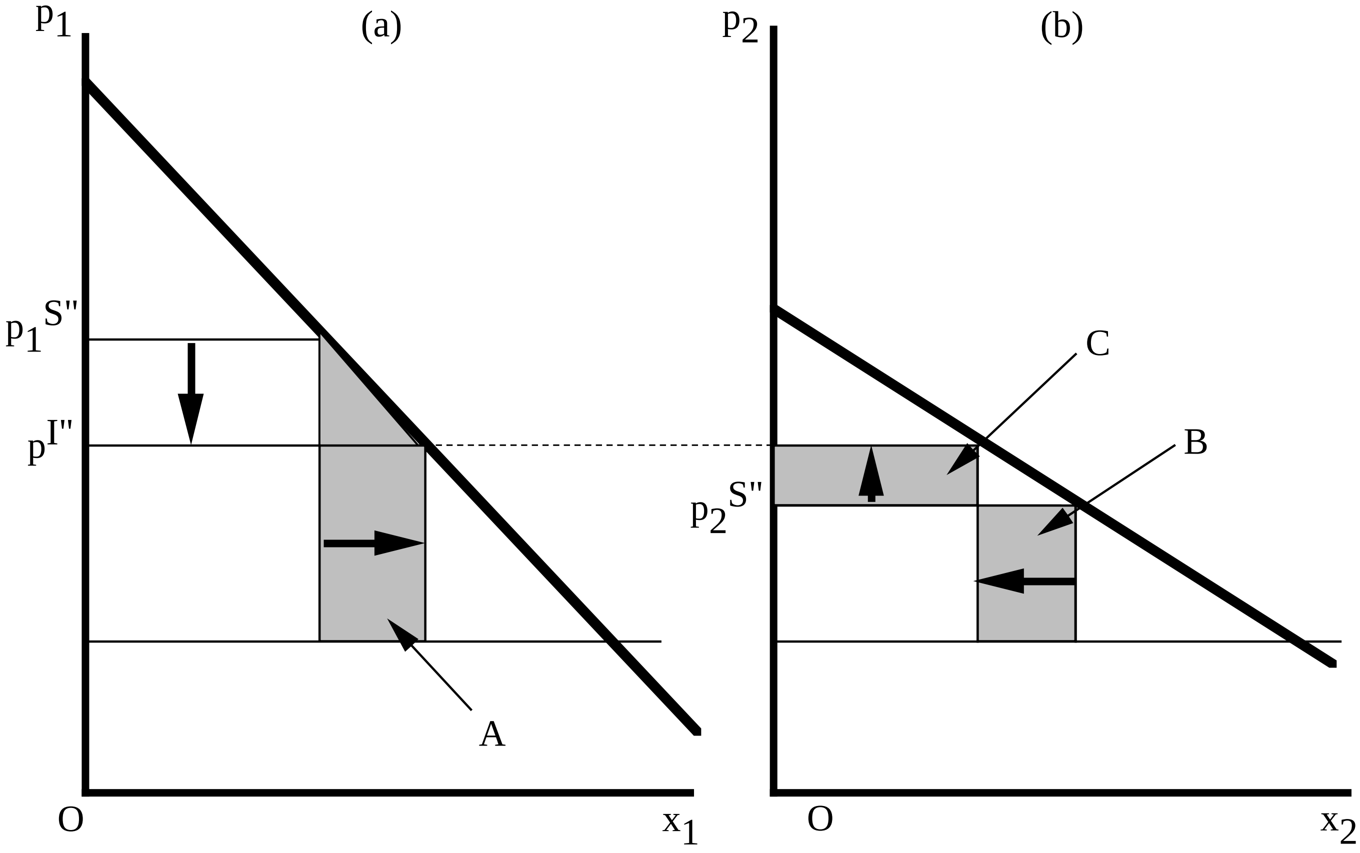

Figure 5. The Effects of Antidumping Law