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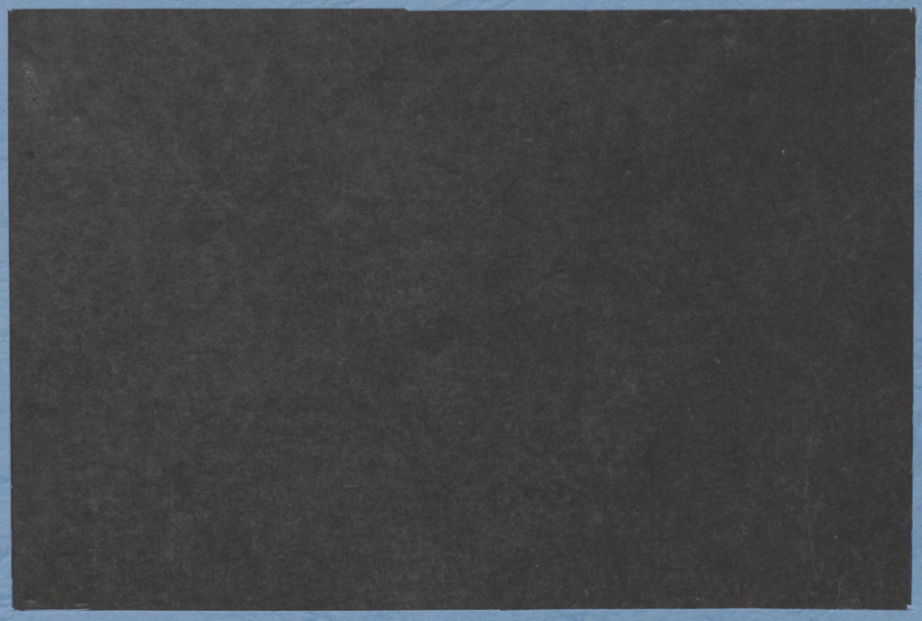

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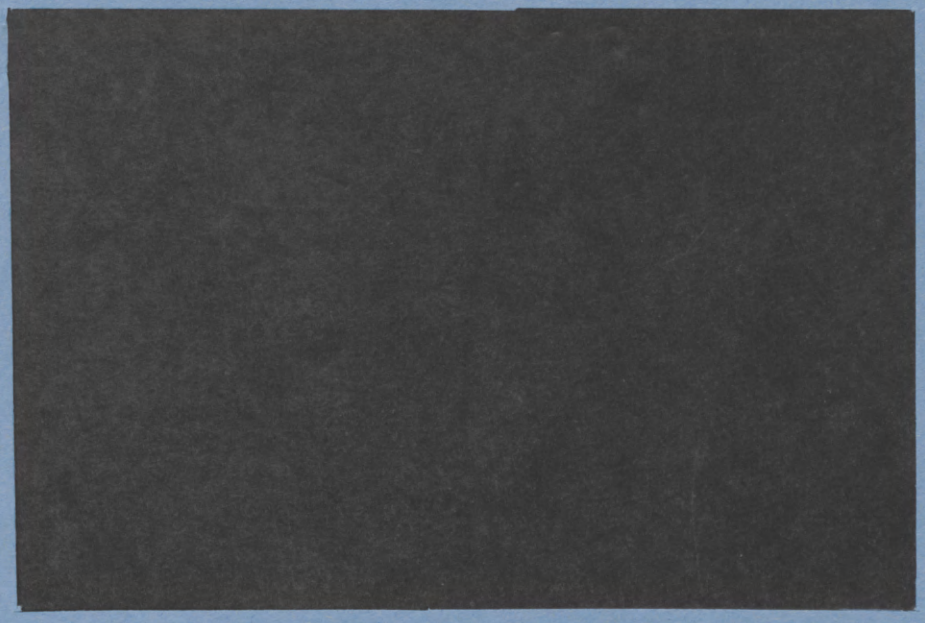

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LOCAL SERVICES AND INTERNATIONAL MARKET INTEGRATION*

by

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Abstract

The consequences of international market integration are typically evaluated by comparing an equilibrium where international consumer arbitrage is impossible to a different equilibrium where arbitrage is assumed to be completely costless. This note suggests that this procedure tends to exaggerate the gains from integration since firms can still segment markets themselves after government imposed trade restrictions are removed. We develop a simple example with two products, one that is homogeneous across markets, and one that is bundled with a non-tradable, e.g., local services. Integration of the markets for the homogeneous product has the expected consequence of yielding product's price equalization across markets. However, integration of the markets for bundled products will leave the economy entirely unaffected.

Key Words: Endogenous Market Segmentation, International Market Integration, Bundling of Local Services.

JEL Classification Numbers: L1, F5

1 Introduction

It is often claimed that prices of similar products vary across countries to an extent that seems to far exceed trading costs, as those for transportation, tariffs, and local value added taxes. This observation is indeed a cornerstone in the European Commission's (1988) assessment of the possible gains from the Internal Market, according to which the removal of various administrative obstacles to trade would create a European market in which prices will not differ by more than by trading costs. A typical procedure for theoretically as well as quantitatively analyzing policies like those of the "1992 program" is to assume that the international market structure changes from being "segmented" - in which case consumers or intermediaries are completely unable to make international arbitrage - to being "integrated", where such arbitrage is possible and costless. For instance, this method is employed by the European Commission in its quantitative assessment of the consequences of the EC Internal Market. The standard prediction of such models is that this change in market structure reduces mark-ups as well as price differentials across markets.

In practice, however, firms often have at their disposal means for making international arbitrage costly to consumers. It is also clear that firms may benefit from international price differences for their products. The purpose of this note is to suggest that when evaluating the consequences of market integration, one has to consider the possibility that firms will use these means themselves in order to segment markets when government imposed trade restrictions are absent.

Crucial to the present model is the assumption that firms have the possibility of bundling their products with locally produced and consumed non-tradables. The kind of non-tradables we have in mind are, in particular, services. For instance, when purchasing a personal computer, one also often gets supporting documentation designed particularly for the market in which the computer is bought, such as instruction book-

lets written in the local language, special configuration for a keyboard using local letters, etc.. To some users these bundled services are of little value, for instance because they can read the booklet in the original language, or because they can configure the computer themselves. However, there is usually a substantial number of consumers who require these locally provided services, and who therefore find it difficult to purchase from the cheapest international source. Instead, they go through local dealers who provide services by transporting and storing products, explaining the operation and installing the products, handling customs formalities, etc..

We consider a two-stage duopoly game in which two firms first choose whether to offer their products with or without bundled services, and then compete in prices. There are two countries, identical in all respects except that the costs of producing local services (such as wages for service personnel, and rent for storage space) are higher in one country than the other. In each country there are heterogeneous consumers who have different valuations (preferences) of services. In equilibrium one firm will bundle while the other will sell the product without services. The firm that bundles essentially chooses to segment its market, since its product bought serviced in one country cannot be re-serviced in the other country unless the consumer pays the full local servicing cost. In contrast to the non-bundling firm, the bundling firm thus possesses the means of imposing arbitrage costs on its consumers.

In the benchmark equilibrium, markets for both types of products are internationally segmented in the standard fashion. It is also assumed that in each country there is no independent service industry servicing the unbundled product; this ensures that the bundling firm is free to set its prices without facing competition from other serviced products. In this case, since the bundling firm faces different service production costs it will charge higher prices in the high cost market. As a result, prices of the unbundled product will also differ internationally.

The point of the note is to demonstrate that the consequences of international

market integration depend crucially on the causes of segmentation. In the present model, segmentation of the markets for the unbundled product cannot occur, unless market segmentation is assumed. Integration of these markets also yields the expected convergence of prices of the unbundled product and, indirectly of prices for the bundled product. On the other hand, the segmentation of the markets for the bundled product is endogenously determined in the model. As a consequence, integration of these markets does not affect the world economy at all. This is also true when an independent local service industry is permitted to emerge, since in equilibrium, consumers in the country with higher prices will *not* find it profitable to purchase the serviced product in the low price country, and then re-service the product in a local service industry in the high price country. In addition, it will not benefit consumers to purchase the unbundled product and then purchase the independently provided local service. Hence, an independent local service industry cannot profitably exist, even if there are no fixed costs involved in providing services.

The note is related to several strands in the literature. The idea that tradables are combined with non-tradables to be consumable is investigated in Sanyal and Jones (1982). They study a small open economy in which trades in "middle" products require local processing before reaching the final consumer. Our model is in some respects similar to those employed by J. Gabszewicz, A. Shaked, J. Sutton, and J. Thisse in a series of papers, for instance Gabszewicz et al. (1981, 1986). The present model also draws on the literature on bundling, and in particular, on Carbajo, de Meza, and Seidmann (1990). Yet another link is to the literature on price discrimination under competition, exemplified by Thisse and Vives (1988).

The paper that is closest in its "message" to the present note is Ben-Zvi and Helpman (1992), which extends the analysis in Kreps and Scheinkman (1983) of a homogeneous good industry, to a two market, three stage game. It is shown that even if arbitrage by consumers is ruled out by assumption, so that international price

differences are technically possible, competition between firms implies that in equilibrium prices will not differ more than by trading costs, (See also Venables (1990)). The present note differs from their analysis in that here the incentives to charge different prices across markets stem from differences in local production costs, while in Ben-Zvi and Helpman (1992) the incentives are due to transport costs and differences in demand across markets. Also, from a technical point of view, the present analysis has the virtue of being considerably less complicated.

Finally, we employ the term "price differences" when comparing prices of product packages that are not identical, in the sense that a service bundled product sold in one market is not identical to a bundled product sold in the other market. Nevertheless, we believe that such a comparison is what people often have in mind when claiming to observe price differences. After all, a PC bought with a Swedish keyboard configuration is in some sense a different item compared to a U.S. configured one. Nevertheless, most would agree that any significant price difference between the two products requires an explanation.

The paper is organized as follows: Section 2 develops the basic model, and introduces the benchmark case where markets for both types of products are segmented. Section 3 examines the consequences of integrating the markets for the unbundled product. Section 4 considers integration of the markets for the bundled product. Section 5 contains some concluding remarks.

2 The Model

Consider first a single market for a homogeneous product sold by two firms. The firms have the option of selling the product with or without supporting services. p^S denotes the product's price when bundled with services, and p^N the price when sold unbundled.

Consumers attach the same value B to the basic product. Services, however, yield different benefit to different consumers. To capture this, let consumers be uniformly distributed on the unit interval according to an increasing valuation for services. A consumer indexed $s = 0$ hence derives the least benefit from services, while the most service-oriented consumer is $s = 1$.[1] Each consumer buys at most one unit of the product, and we assume that B is large enough relative to consumers' reservation utilities that in equilibrium everyone buys a unit. The utility of consumer s, $0 \leq s \leq 1$, is given by

$$U^s = \begin{cases} B - p^N & \text{if the product is bought unbundled with services} \\ B + s - p^S & \text{if bought bundled with services} \end{cases} \tag{1}$$

Thus, the service-bundled product is vertically differentiated from the product itself in the sense that if both are sold for the same price, each consumer prefers to have the service bundled with the product, see Anderson, Palma, and Thisse (1992) for a definition. The interaction between the firms takes place in two stages. First, each firm decides whether to sell the product with or without a unit of services. In the second stage, the firms compete in prices.[2]

Three types of situations may arise in the second stage. To characterize the equilibrium, we consider each in turn.

[1] In a different context, Gabszewicz, Pepall, and Thisse (1992) interpret 's' as a degree of consumer's willingness or ability to learn how to use a new product.

[2] The combination of only two possible product varieties and price competition implies that for any strictly positive entry cost, a maximum of two firms would enter, since a third firm would necessarily make zero profits in the second stage. See Shaked and Sutton (1982) for a more general result of this type.

2.1 One firm bundles with services

If one firm sells the good bundled with local services and the other without services, and if each firm sells a positive amount, then the market dividing condition is given by $B + \hat{s} - p^S = B - p^N$, where $\hat{s}$ is the market size and share of the non-serviced product, while $1 - \hat{s}$ is the market size and share of the firm which bundles. Hence,

$$\hat{s} = \begin{cases} 1 & \text{if } p^S - p^N \geq 1 \\ p^S - p^N & \text{if } 0 < p^S - p^N \leq 1 \\ 0 & \text{if } p^S \leq p^N \end{cases} \tag{2}$$

Let $m > 0$ denote the unit production cost of the product itself (without any services), and let $w > 0$ denote the production cost of services (such as the wage rate in the services sector). Thus, a firm that bundles has a total cost of $(m + w)(1 - \hat{s})$, and a firm that does not bundle has a total cost of $m\hat{s}$. If one firm bundles and the other does not, the bundling firm chooses p^S to maximize $\pi^S = (p^S - m - w)(1 - \hat{s})$, and the non-bundling firm chooses p^N to maximize $\pi^N = (p^N - m)\hat{s}$. The reaction functions are given by, respectively,

$$p^S = \frac{1}{2}(1 + m + w + p^N) \quad \text{and} \quad p^N = \frac{1}{2}(m + p^S) \tag{3}$$

For the rest of the paper assume that $w < 2$; this is a necessary and sufficient condition to guarantee that each firm will have a non-negative market share. We also assume that $w > \frac{1}{2}$ in order to limit the number of cases to consider. Equilibrium prices, market shares, and profit levels are then

$$p^S = \frac{2}{3}(1 + w) + m; \quad 1 - \hat{s} = \frac{1}{3}(2 - w); \quad \pi^S = \frac{1}{9}(2 - w)^2 \tag{4}$$

$$p^N = \frac{1}{3}(1 + w) + m; \quad \hat{s} = \frac{1}{3}(1 + w); \quad \pi^N = \frac{1}{9}(1 + w)^2$$

Hence, an increase in the wage rate would increase the market share of the non-bundling firm, and would increase both prices since the prices are strategic complements. Of course, as w increases, p^S increases faster than p^N.

2.2 No bundling equilibrium

Suppose now that both firms do not bundle with services. Since the products are homogeneous, they are sold at a uniform price of $p^N = m$, both firms make zero profits and the market can be arbitrarily divided between the firms.

2.3 Both firms bundle equilibrium

If both firms bundle, the products become homogeneous again and will be sold at a price $p^S = m + w$. Hence, both firms make zero profits, and the market can be arbitrarily divided between the two firms.

2.4 Digression: The socially optimal provision of service

The socially optimal number of consumers purchasing the product bundled with service would be obtained under competitive pricing. Thus, let $p^S = m + w$ and $p^N = m$. Then, $\hat{s}^c \equiv p^S - p^N = w$. It can be easily verified that $w > \frac{1}{2}$ implies that $1 - \hat{s} > 1 - \hat{s}^c$. Hence, from a welfare point of view the equilibrium number of consumers purchasing the product bundled with service is too high.

2.5 International duopoly

Now suppose that the two firms can sell their products in two countries indexed by k, $k = 1, 2$. In each country firms can bundle the basic product with a non-tradable (local services). Hence, services can only be consumed where they are produced. Then, if a consumer purchases the service-bundled product in the foreign country,

only the product itself provides utility, while the bundled service is of no value to the consumer. We also assume that there is free disposal of service, that service cannot be resold, and that in principle domestic services can be used with the product without any adaptation costs.

Denote by w_k the cost of producing service in country k, and let country 2 be the country with higher service production cost: $w_2 > w_1$. We temporarily assume that there does not exist an independent market for product servicing in either country. However, it is shown below that such a market would be inactive in equilibrium, even if permitted to emerge.

In the first stage of their interaction firms have to decide whether to bundle the product with local services in both markets, or to sell without services, possibly as an "International Mail-Order" firm. For the same reason as before, the equilibrium will be such that in each market one firm will sell the unbundled product, while the other firm bundles.[3]

2.6 Both markets segmented

In sections 3 and 4 we will characterize some consequences of market integration. We let the benchmark case be that of complete segmentation. In this case the markets are entirely independent due to the absence of links between the markets in demands, costs or strategies. The equilibrium in the two economies are then given by equation (4), with w_k, $k = 1, 2$, substituted for w. It is clear that both products are sold at a higher price in the high cost country. Furthermore, the market share of the bundling firm is smaller in this country compared with its market share in the low cost country.

[3]In many cases the roles of the firms could be reversed in the two countries, without affecting the outcome. However, for simplicity we stick to case where one firm bundles in both markets, and the other firm does not.

3 Integration of the Markets for the Unbundled Product

Let us first compare the segmented markets equilibrium to one where there is an internationally integrated market for the basic, unbundled, product. The problem of the bundling firm is identical to the single-market problem as described in subsection 2.1, applied to each of the two markets separately.

However, the problem facing the non-bundling firm is different than before since this firm can no longer price discriminate between the countries. In particular, it has to take into consideration the possibility that it may be profitable to sell (at a high price) in only one country. The non-bundling firm thus takes p_1^S and p_2^S as given and chooses a world uniform price p^N to maximize $\pi^N = (p^N - m)(\hat{s}_1 + \hat{s}_2)$ subject to $0 \leq \hat{s}_k \leq 1$, where $\hat{s}_k$ are given in (2), $k = 1, 2$.

Assuming for a moment that both firms sell a positive amount in each market, the non-bundling firm's reaction function is given by $p^N = \frac{1}{4}(p_1^S + p_2^S) + \frac{m}{2}$, and hence by (2), $\hat{s}_k = \frac{1}{4}(3p_k^S - p_{\tilde{k}}^S) - \frac{m}{2}$, $k \neq \tilde{k}$. Therefore, $\hat{s}_1 + \hat{s}_2 = \frac{1}{2}(p_1^S + p_2^S) - m$ and hence $\pi^N = \frac{1}{2}[\frac{1}{2}(p_1^S + p_2^S) - m]^2$. The 'candidate' equilibrium prices (p_1^S, p_2^S, p^N) can be calculated by solving the reaction functions $p_1^S(p^N), p_2^S(p^N)$ from (3) together with $p^N(p_1^S, p_2^S)$ given above. Hence,

$$p^N = \frac{1}{6}(2 + w_1 + w_2) + m \quad \text{and} \quad p_k^S = \frac{1}{12}(8 + 7w_k + w_{\tilde{k}}) + m, \quad k = 1, 2. \tag{5}$$

Then, the market shares and profit of the non-bundling firm are

$$\hat{s}_k = \frac{1}{12}(4 + 5w_k - w_{\tilde{k}}) > 0 \quad \text{and} \quad \pi^N = \frac{1}{18}(2 + w_1 + w_2), \quad k, \tilde{k} = 1, 2, k \neq \tilde{k} \tag{6}$$

For the service bundling firm we have that in this 'candidate' equilibrium

$$1 - \hat{s}_k = \frac{1}{12}(8 - 5w_k + w_{\tilde{k}}) > 0 \quad \text{and} \quad \pi_k^S = \frac{1}{144}(8 - 5w_k + w_{\tilde{k}})^2 \tag{7}$$

Lemma 1 *The product is sold in two forms (service bundled and non-service bundled) in both markets, and the unique equilibrium prices are given in (5).*

Proof. Observe first that the bundling firm's reaction function in (3) (derived in closed economy section) implies that the bundling firm will always sell a positive amount in both markets in any equilibrium, since it can always price discriminate between the countries. To see this substitute (the lowest possible) $p^N = m$ into (3). Then, $p_k^S = m + \frac{1}{3}(1 + w_k)$, and hence $1 - \hat{s}_k = \frac{1}{3}(1 + w_k) > 0$, $k = 1, 2$.

Secondly, observe that the prices in (5) constitute unique best reply prices as long as the resulting market shares s_k are non-negative. For the non-bundling firm the *only* potentially profitable deviation would be to raise its price to a level such that $s_1 = 0$ while $s_2 > 0$. By way of contradiction suppose that such an equilibrium exists and let $\bar{p}^N$ and $\bar{p}^S$ denote this equilibrium. By construction, $\bar{s}_1 = 0$. Hence, since the non-bundling firm sells in market 1 only, the closed economy equilibrium applies to market 2. Hence, (4) implies that $\bar{p}^N = \frac{1}{3}(1 + w_2) + m$. Substituting $\bar{p}^N$ into (3), the bundling firm's price in market 2 when it optimally reacts to $\bar{p}^N$ is set to $\bar{p}_1^S = \frac{1}{6}(4 + 3w_1 + w_2) + m$. However, $\bar{s}_1 = \bar{p}_1^S - \bar{p}^N = \frac{1}{6}(2 + 3w_1 - w_2) > 0$. A contradiction. *Q.E.D.*

The consequences of integrating the markets for the unbundled product are directly obtained by comparing equations (5)-(7) with those in (4):

Proposition 1 *Integration of the markets for the unbundled product diminishes international price differences for both types of products.*

Obviously, the price of the unbundled product is equalized across countries, since the product is homogeneous. The convergence in the prices for the bundled product can be seen from the fact that $p_2^S - p_1^S = 2(w_2 - w_1)/3$ in the case of segmentation, while the price differential is equal to $(w_2 - w_1)/2$ in the present case. Hence, integration of the markets for the unbundled product has the expected consequences.

Which country benefits from the integration of the markets for the unbundled product? Let prices determined in base case of complete market segmentation be

denoted by tilde, and let prices without a tilde refer to the present case where the markets for the unbundled product are integrated. Then, from (4) and (5) we have that for country 1,

$$\tilde{p}_1^N - p^N = (w_1 - w_2)/6 < 0 \quad \text{and} \quad \tilde{p}_1^S - p_1^S = (w_1 - w_2)/12 < 0. \tag{8}$$

Hence, consumers in country 1 lose from this integration. However, consumers in country 2 gain since

$$\tilde{p}_2^N - p^N = (w_2 - w_1)/6 > 0 \quad \text{and} \quad \tilde{p}_2^S - p_2^S = (w_2 - w_1)/12 > 0. \tag{9}$$

This yields the following corollary:

Corollary 1 *Integration of the markets for the unbundled product benefits consumers in the high cost (wage) country and reduces the welfare of consumers in the low cost (wage) country.*

4 Integration of the Markets for the Bundled Product

In order to display the importance of the basis for market segmentation for understanding the consequences of international integration, we now consider the polar case of section 3, and permit consumer arbitrage in the bundled product. Consumers are hence permitted to transfer the product purchased from the bundling firm between the countries, while the service part can be consumed only where it is produced.

We proceed in two steps: First, we ask whether this integration matters in the sense of altering the equilibrium described in the segmented markets case (subsection 2.6). Secondly, we enhance the integration by allowing an independent servicing industry in each country, which can potentially service the bundled product purchased abroad, or the unbundled product.

4.1 No independent service industry

Suppose first that the initial equilibrium is one of segmented markets as described in subsection 2.6 and equation (4). We now argue that it would not benefit consumers in the high cost country (country 2) to purchase the bundled product in the other country, and then consume it without the service in country 2. This follows by observing that the marginal consumer in country 2 (defined by $\hat{s}_2 = p_2^S - p_2^N$) satisfies,

$$B + \hat{s}_2 - p_2^S > B - p_1^S$$

since $p_1^S - p_2^N = (1 + 2w_1 - w_2)/3 > 0$ by (4). Since it is unattractive for the marginal consumer to purchase the bundled product abroad, it would definitely be unattractive for the more service oriented consumers ($s_2 > \hat{s}_2$).

Secondly, suppose that (in addition to the integration of the markets for the bundled product), the markets for the unbundled product are also integrated. Import of the bundled product benefits the consumer indexed by $\hat{s}_2$ if $B + \hat{s}_2 - p_2^S < B - p_1^S$.

Since $\hat{s}^2 = p_2^S - p^N$ it can hold only if $p^N > p_1^S$ meaning that the unbundled product is not purchased in country 1. A contradiction.

Consequently, when there is no independent service industry, permitting consumer arbitrage in the bundled product would leave the equilibrium unaffected, regardless of whether the markets for the unbundled product are integrated or not.

4.2 Allowing independent service industries

Let us now permit the existence of an independent service industry providing services at cost w_k.[4] Then there is a couple of ways in which arbitrage possibilities could arise. First, it might be beneficial for a service oriented consumer in the high cost country (country 2) to purchase the serviced product in country 1 and then "re-service" the product in country 2. This would be beneficial if $p_2^S > p_1^S + w_2$. But by (5), $p_2^S - p_1^S = \frac{1}{2}(w_2 - w_1) < w_2$. Hence, this type of arbitrage would not be beneficial.

Secondly, with an independent service industry, consumers in each country can purchase the unbundled product and then obtain the service through the independent suppliers in their own countries. If the markets for the unbundled product are segmented this is profitable to consumers in country k if $p_k^S > p_k^N + w_k$. It is readily inferred from (4) that this is not beneficial, since $w_k > \frac{1}{2}$.

Similarly, if the markets for the unbundled product are also integrated, this arbitrage is beneficial if $p_k^S > p^N + w_k$. This is ruled out since by (5) it can hold if $7w_k < 4 - w_{\tilde{k}}$, which contrary to what is assumed requires that $w_k < 1/2$ for $w_{\tilde{k}} > 1/2$.

[4]Note, however, that there are many ways in which the lack of competing local providers of services can be explained. Foremost, there may be fixed costs associated with servicing an industry. For instance, most of the leading computer and car firms construct their products to depend upon special parts, some of which can be maintained only by special tools constructed for the particular model. Also, in many cases unauthorized service will revoke the warranty and other obligations of the producers.

We summarize this section with the following proposition:

Proposition 2 *Integration of the markets for the bundled product has no effect, regardless of whether the markets for the unbundled product are segmented or integrated, or whether an independent service industry is permitted or not.*

Intuitively, the cost difference between the two types of firms is the cost of services w_k. Due to the linear demand, the bundling firm absorbs some of this extra cost. Hence, since consumers cannot obtain the service cheaper than at cost w_k, this type of arbitrage is again not beneficial. Consequently, a market for independent services will not arise.[5]

5 Concluding Remarks

This note proposes a simple framework for analyzing consequences of market integration when some consumers have a preference for non-tradables - "services". In the model, one firm bundles with services an otherwise identical product in order to differentiate itself from its non-bundling competitor - a "Mail-Order" firm. The two firms sell their products in two countries, and when markets for the two types of products are segmented, differences in production costs of services give rise to international price differences for both types of goods.

The main point of the note is to suggest that, when evaluating the consequences of market integration, one has to take account of firms' incentives and abilities to segment markets themselves. This is demonstrated in the present example by a comparison between the effects of integrating the markets for unbundled and bundled products. The segmentation of the markets for the unbundled product is of the type traditionally

[5]This result is not unique to the assumed duopoly structure. Let the non-bundling firm be competitive, selling at cost m, and let the bundling firm maximize against the residual demand. Looking at the single market case, arbitrage would not benefit consumers if p^S, as given in (3), is less than $p^N + w = m + w$, i.e., as long $w > 1$.

considered in the literature - i.e., it is exogenously imposed on the model, without any other endogenously determined basis. Consequently, integration of this market has the consequences one would expect.

The markets for the bundled product are different, however. Here the segmentation is endogenous, in the sense that the bundling firm chooses to bundle its product with a non-tradable, thereby segmenting the markets, in order to lessen competition with the other firm. As a result, the removal of exogenously imposed hindrances to international consumer arbitrage turns out to have no effect (for the range of parameter values under consideration) for the markets for the bundled product. Thus, the present model suggests that when there is an endogenous basis for segmentation such as the demand for non-tradables, the removal of exogenous obstacles to international arbitrage may have little effect, even when there are no (other) trading costs.

Finally, the model also illustrates the potential role of standards as a basis for international price differences. For instance, in the case of automobiles, national regulations govern the design of safety belts, headlights, devices for emission control, etc.. The national standards thus make these parts non-tradable, and thereby provide a basis for bundling. In such cases international price equalization requires the abolishment of differences among standards.

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