

Post-Merger Product Repositioning

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Abstract

We study mergers among firms that compete by simultaneously choosing price and location. The merged firm moves its two products away from each other to reduce cannibalization, and the non-merging firms move their products in between the merging firm's products. Post-merger repositioning increases product variety, which benefits consumers, but repositioning also affects post-merger prices in two ways: There is upward pressure on price as products spread out, but the merged firm's incentive to raise prices is reduced as its products are moved away from each other. Either effect can dominate, although the latter is likely to be the more important. We use a novel technique known as the *stochastic response dynamic* to find equilibria, which does not require the computation of first-order conditions.

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1 Introduction

It is conventional to assume that firms in differentiated products industries compete by setting prices. A basic consequence of the economics of price competition among differentiated products is that mergers give rise to “unilateral effects” (Werden and Froeb 1994, 2005). The merger of firms selling competing differentiated products internalizes the competition between them, causing higher prices to be preferred for any given prices charged by rivals. Rivals respond by raising prices as well, in accord with their unchanged best-response functions. We relax the assumption that firms compete only in prices, and consider the effects of mergers when sellers of differentiated products compete in both price and product positioning.

The current understanding of unilateral effects is based almost entirely on the analysis models of competition in a single dimension, yet competition in two dimensions leads to a richer array of possible unilateral effects. For example, Berry and Waldfogel (2001) found that mergers among radio stations resulted in increased format variety. Although the increase in format variety presumably benefited listeners, it also may have “softened” price competition among stations for advertising. Both effects should be considered in evaluating the competitive effects of a radio station merger.

We consider a model in which firms simultaneously choose price and location. To highlight the impact of competition in two dimensions, we unrealistically assume that firms can instantaneously and costlessly reposition their products after a merger. We follow Anderson, de Palma, and Hong (1992) by positing a choice model with competition along a Hotelling (1929) line. Physical location, however, can be viewed as a metaphor for brand positioning. Our model shares the basic ingredients of the discrete choice models of competition widely employed in the theoretical and empirical literature on product differentiation.

We compare the effects of mergers in our price-location model to those in a model in which each product has a fixed location and firms compete only in price. We find that merger effects in the price-location model are significantly more complex than those in the price-only model. In the former model, the merged firm moves its products apart to reduce cannibalization, while the non-merging firms move their products to positions between the merging products. This leads to a beneficial increase in product variety, but the repositioning feeds back into the price effects of the merger. Repositioning reduces the substitutability between the merging products, thus mitigating post-merger price increases, but it also softens price competition generally, as products become more spread out.

If the merging products initially are close to each other, the merger is less anticompetitive in the price-location model than in the price-only model, because the merger causes the merging products to separate, thereby reducing the incentive to raise prices. Conversely, if the merging products initially are far apart, the merger is more anticompetitive in the price-location model than in a price-only model, because there is a general softening of price competition as products spread out post merger.

Post-merger product repositioning also enables the merging firms to capture a larger portion of the additional profits their merger generates. Norman and Pepall (2000) show that much the same is true in a model of quantity-setting firms when a merged firm can change location. In the price-location model, the repositioning of the merging products towards the ends of the market has the effect of pushing the non-merging products together in the middle. This intensifies price competition among the non-merging firms, and reduces, or even eliminates, their profit gains from the merger. In the price-only model, the non-merging firms profit more than the merged firm by free-riding on its price increases, but in the price-location model, the non-merging firms are likely to profit less than the merging firms and may even suffer a reduction in profits following a merger.

For the price-location model studied in this paper, standard root-finding algorithms are unsatisfactory. They require that profit functions be smooth enough so that their first derivatives exist and can be computed precisely, but in models like ours, small changes in rivals' prices or locations can cause a firm to leap from one location to another. Root-finding algorithms also can be problematic when there are multiple equilibria, as there are in our model.

Instead, we use what Gandhi (2005) calls the *stochastic response dynamic*: Players in the game take turns responding to the actions of rivals stochastically. Unlike similar deterministic processes that converge only under certain conditions (Fudenberg and Levine 1998, ch. 2), the stochastic algorithm produces a Markov chain that converges probabilistically to the pure strategy equilibria of the underlying game under very general conditions. A key advantage is that the methodology is not dependant on first derivatives or starting values: Only the profit functions are necessary to compute equilibria (Gandhi 2005); best-response functions and first-order conditions are not used in the process.

2 Simultaneous Price and Location Game

2.1 Specification of Demand and Firms

We employ a simple version of a demand model commonly applied to differentiated products. Consumers with heterogeneous tastes choose among alternatives viewed as “bundles of characteristics.” A consumer with given tastes chooses the alternative with a combination of price and characteristics that make it preferred over alternatives. Each consumer in set I chooses a single alternative from set J . These alternatives are supplied by set N of firms, with each firm $m \in N$ producing subset $J_m \subseteq J$ of the alternatives, such that the J_m are mutually exclusive and exhaustive for J . Y denotes the space of product characteristics, and product $j \in J$ has characteristics $y_j \in Y$. X denotes the space of consumer characteristics, and consumer $i \in I$ has characteristics $x_i \in X$.

A widely employed specification for the utility of consumer i choosing alternative j is

$$u_{ij} = \delta_j - \alpha_i p_j + V(x_i, y_j) + \epsilon_{ij}.$$

In this utility function, δ_j is a quality level for alternative j ; α_i indicates consumer i 's price sensitivity; $V(x_i, y_j)$ is the utility a consumer with tastes x_i derives from a choice with characteristics y_j ; and ϵ_{ij} is an idiosyncratic taste shock for consumer i from alternative j . This model is employed in many recent econometric analyses of product differentiated industries (e.g., Berry, Levinshon, and Pakes 1995, Nevo 2000, and Petrin 2002). The idiosyncratic taste shock both adds flexibility and realism to the model.

In our simple version of this model, all consumers have the same price sensitivity, α , and $X = Y = [0, l] \subset \mathbb{R}$, i.e., the space of both tastes and characteristics is the same segment of the real line. Thus, X and Y represent the Hotelling (1929) line, along which are located both consumers and the alternatives among which they choose, which we refer to as stores. Other things being equal, a consumer's preference for a store increases the closer the consumer lives to the store. We follow Hotelling by specifying V as the negative of the cost of travelling between two locations. Thus,

$$V(x_i, x_j) = -\tau|x_i - x_j|,$$

where τ is the travel cost per unit of distance, and x_i and x_j are the locations of consumer i and store j . We also include an “outside alternative” $j = 0$, which can be thought of as the “no purchase” alternative. Its utility is normalized so that

$$u_{i0} = \epsilon_{i0}$$

The utility maximization hypothesis implies that consumer i chooses store j if $u_{ij} > u_{ik}, \forall k \neq j$. This choice depends upon the vector of consumer i 's attributes $z_i = (x_i, \epsilon_i)$, $\epsilon_i = (\epsilon_{ij})_{j \in J}$. Assuming a density $f(z)$ for this vector over the population, aggregate demand for store j is the share of the population selecting it:

$$s_j = \int_{A_j} f(z) dz,$$

for $A_j = \{(x, \epsilon) \in X \times \mathbb{R}^{|J|} : \delta_j - \alpha p_j + V(x, x_j) + \epsilon_j > \delta_k - \alpha p_k + V(x, x_k) + \epsilon_k, \forall j \neq k\}$. For convenience, we express $-\alpha p_j + V(x, x_j)$ as $v(x, x_j, p_j)$.

We assume $f(z)$ is the product of independent components, $f(z) = f(x)f(\epsilon)$, with $f(x)$ being uniform over X and $f(\epsilon)$ being independent Gumbel variates across $\mathbb{R}^{|J|}$. These simplifications give rise to the familiar logit functional form for the demand of store j from consumers at location $x \in X$,

$$s_j(x) = \frac{\exp^{\delta_j + v(x, x_j, p_j)}}{\sum_{k \in J} \exp^{\delta_k + v(x, x_k, p_k)}}.$$

The aggregate demand of store j is found by adding the aggregate demands from each location:

$$s_j = \int_0^l s_j(x) dx = \int_0^l \frac{\exp^{\delta_j + v(x, x_j, p_j)}}{\sum_{k \in J} \exp^{\delta_k + v(x, x_k, p_k)}} dx.$$

This is a ‘‘mixed logit’’ demand specification (McFadden and Train 1999), which has become a prominent part of econometric work on differentiated products industries. The specification allows for a range of substitution patterns among stores to be controlled by a single parameter—the travel cost, τ . Adjusting travel cost makes competition on the line more or less localized. Anderson, de Palma, and Hong (1992) use this model to study competition among two firms simultaneously choosing price and location. We extend their analysis to the case of an arbitrary number of firms, then consider the effect of mergers.

Firms strategically choose prices and locations for their stores, with store $j \in J_k$, owned by firm k , having constant marginal cost c_j for serving each consumer. The vector of prices for stores owned by firm k is $\mathbf{p}_k = (p_j)_{j \in J_k}$, and the vector of locations for stores owned by firm k is $\mathbf{x}_k = (x_j)_{j \in J_k}$. The vector of prices of all the stores is $\mathbf{p} = (\mathbf{p}_k)_{k \in N}$, and the vector of locations of all the stores is $\mathbf{x} = (\mathbf{x}_k)_{k \in N}$.

The share of each store j is a function of the prices and locations of all the stores: $s_j(\mathbf{p}, \mathbf{x})$. Because the no purchase alternative is assigned a share,

$\sum_{j \in N} s_j < 1$. If the total population of consumers is M , firm k has profit function

$$\pi_k(\mathbf{p}, \mathbf{x}) = M \sum_{j \in J_k} (p_j - c_j) s_j(\mathbf{p}, \mathbf{x}).$$

The N profit functions define a static game G among the firms in which each firm k chooses a vector of strategic variables $(\mathbf{p}_k, \mathbf{x}_k)$. The outcome of this game is the Nash equilibrium consisting of prices $\mathbf{p}^* = (\mathbf{p}_k^*)_{k \in N}$ and locations $\mathbf{x}^* = (\mathbf{x}_k^*)_{k \in N}$.

We leave open at this point whether G actually has an equilibrium and, if so, whether it is unique. Given the integral that defines $s_j(\mathbf{p}, \mathbf{x})$, these questions are difficult to address analytically. Instead, we take a numerical approach to analyzing the model.

2.2 Computation of Nash Equilibria

To avoid the inherent analytic intractability of the model, we employ numeric methods. The usual approach to finding the Nash equilibrium vector of prices and locations would be to find the (\mathbf{p}, \mathbf{x}) vector that solves, for $k \in N$, the system of equations

$$\begin{aligned} \frac{d}{d\mathbf{x}_k} \pi_k(\mathbf{p}, \mathbf{x}) &= 0 \\ \frac{d}{d\mathbf{p}_k} \pi_k(\mathbf{p}, \mathbf{x}) &= 0. \end{aligned}$$

Needless to say, computing the solution of the above system can be difficult. Econometric literature on models of product differentiation (e.g., Berry 1994) has avoided performing this computation repeatedly over a range of a parameter values by avoiding computing the equilibrium altogether. For our model, standard iterative methods for solving the above system fail to converge unless the derivatives are computed fairly precisely and suitable starting values are chosen, yet these conditions typically cannot be met.

Instead of abandoning the computation of the equilibrium, we abandon the usual approach for computing the Nash equilibrium. Instead, we follow the approach of Gandhi (2005), which is based on the *best response dynamic* proposed in early game theory literature (e.g., Robinson 1951; see Vega-Redondo 2003, pp. 421-426) as a method for finding an equilibrium through iterative “fictitious play.” If players are imagined to take turns responding to each others’ actions, and if this process settles down to a single state, it is a Nash equilibrium. While conceptually simple and assumption free, there is no guarantee that this process converges.

Gandhi (2005) addressed this potential failure of convergence by adding an element of noise to the process. Instead of optimally responding to each others' actions, players respond stochastically: A player first randomly samples a candidate response from his action set, then probabilistically chooses between the chosen response and the previously taken action. The choice probabilities are governed by the binary logit model and depend on the pay-offs of the two actions. Players take turns selecting stochastic responses, and the resulting process is termed the *stochastic response dynamic*. It is a Markov chain, which converges to a stationary distribution.

As the variance parameter of the logit choice probabilities approaches zero, the stationary distribution collapses to a degenerate set of point masses over the Nash equilibria of the game. Hence, the new computational method is simply to simulate the stochastic response dynamic and let the variance of the choice probabilities approach zero as the simulation progresses. Simulating the stochastic response dynamic requires only the values of the utility and profit functions. There is no need to identify best responses.

3 Parameters and Equilibria Selection

We consider a simple spatial model of four stores located along a line segment. Each store is initially owned by a separate firm, then two of the firms merge. Before and after the merger, firms play a price-location game. We examine the effects of a merger in this game and compare them to the effects of a merger when stores are constrained to their pre-merger locations. The four-firm model allows for a sufficiently rich industry structure to exhibit interesting effects of post-merger product repositioning.

For purposes of illustrating these effects, we assume the following parameter values: Each store $j \in J$ has marginal cost $c_j = 2$ and a quality level of $\delta_j = 4$. We consider a single value of the price sensitivity parameter, $\alpha = .2$, but a broad range of values for the travel cost parameter, τ , which allows for a wide range of substitution patterns. When τ is sufficiently small, competition among stores is essentially global, and as τ increases, competition becomes more localized.

We now take up the questions avoided thus far on the existence and uniqueness of equilibrium in the price-location game. As explained by Anderson, de Palma, and Hong (1992, pp. 78-79) and Anderson de Plama, and Thisse (1992, ch. 9), equilibrium in this model does not exist for travel costs close to 0, making the logit error insignificant. Similarly, d'Aspremont, Jaskold, and Thisse (1979), and Economides (1993) show that the same non-

existence problem arises in two-period spatial models, in which location is chosen in the first period and price in the second.

For travel costs not close 0, there is always a *bunching equilibrium*, with all stores located at the midpoint of the line segment. As travel costs increase, a second equilibrium emerges, which we term a *partial-separating equilibrium*. In this equilibrium, two stores locate at a single point on one side of the the midpoint, and two store locate at a single point on the other side. With yet higher travel costs, there is a third equilibrium, which we term a *full-separating equilibrium*, in which all four stores locate at different points, two on each side of the midpoint of the line segment. Whenever equilibrium exists, there is a bunching equilibrium, and whenever there is a full-separating equilibrium, there is also a partial-separating equilibrium.

For any travel cost giving rise to multiple equilibria, we select the equilibrium with the greatest separation. There are two reasons for this approach: In both the pre- and post-merger state, all stores are more profitable the more separation there is. And more importantly for our purposes, the bunching equilibrium does not allow us to study the effects of repositioning because all of the stores are located in the same place both pre and post merger.

Before the merger, each firm j has one store for which it strategically chooses price p_j and location x_j , in the interval $[0, 10]$. This game is denoted G^{pre} , and its Nash equilibrium is $\mathbf{p}^{pre} = (p_j^{pre})_{j \in J}$ and $\mathbf{x}^{pre} = (x_j^{pre})_{j \in J}$.

Label the four stores 1, 2, 3, and 4. Without loss of generality, we assume the following pattern of locations in the pre-merger equilibrium: $0 \leq x_1^{pre} \leq x_2^{pre} \leq x_3^{pre} \leq x_4^{pre} \leq 10$. Figure 1 plots the four equilibrium locations along the vertical axis against values of the travel cost parameter on the horizontal axis.

The figure may be most easily understood by working from right to left. With sufficiently high travel cost, the four stores are fully separated in equilibrium. As travel costs decline, the pair of stores above the midpoint move toward each other, as do the pair of stores below the midpoint, until the two stores in each pair share a single location. As travel costs decline further, the two pairs of stores sharing a single location move toward each other until all four stores share the same location when travel costs are sufficiently low.

This pattern reflects the fact that as travel costs decline, there is less opportunity to gain market power by separating from other stores and thus a greater incentive to locate in the manner that best serves the greatest number of customers. For a given travel cost, consider what prevents store 1 from locating further towards the end of the interval at 0. The logit choice probabilities imply that every store, regardless of location, draws at least a

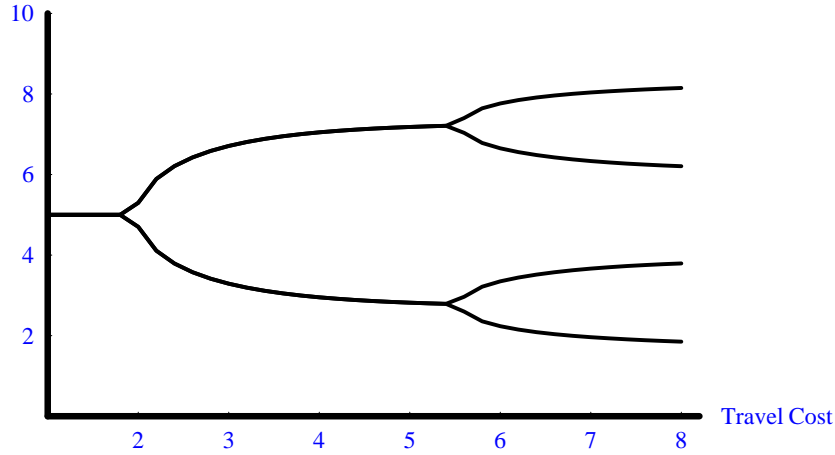


Figure 1: Pre-Merger Store Locations as a Function of Travel Cost

small share of the customers from every point on the interval, but its share of the customers at any point depends on its proximity, and that of each of the other stores, to those customers. The advantage in competing for local customers gained by separating from the other stores is outweighed by the disadvantage in competing for customers over the rest of the interval. Thus, the profit-maximizing calculus for each store limits differentiation. Of course, a merger alters this calculus by allowing the owner of stores 1 and 2 to move store 1 closer to 0 while serving customers far from 0 with store 2.

Let G^{PL} (PL signifying “price-location”) denote the post-merger game in which firms strategically choose both price and location. This game has an equilibrium $\mathbf{p}^{PL} = (p_j^{PL})_{j \in J}$ and $\mathbf{x}^{PL} = (x_j^{PL})_{j \in J}$, and \mathbf{x}^{PL} differs from \mathbf{x}^{pre} because firms reposition their stores post merger. If the travel cost parameter is sufficiently high that a separating equilibrium exists post merger, the merged firm relocates its stores, whatever their pre-merger positions, to outside locations, while the non-merging firms take the inside locations. We depict this in Figure 2. The solid lines are the post-merger locations, and the locations closest to the endpoints of the interval are those of the merged firm’s stores. The dashed lines are the pre-merger locations from Figure 1.

As compared with mergers in the game holding locations constant, mergers in the price-location game affect consumers differently in several ways. Mergers are likely to increase variety, which benefits consumers directly. In-

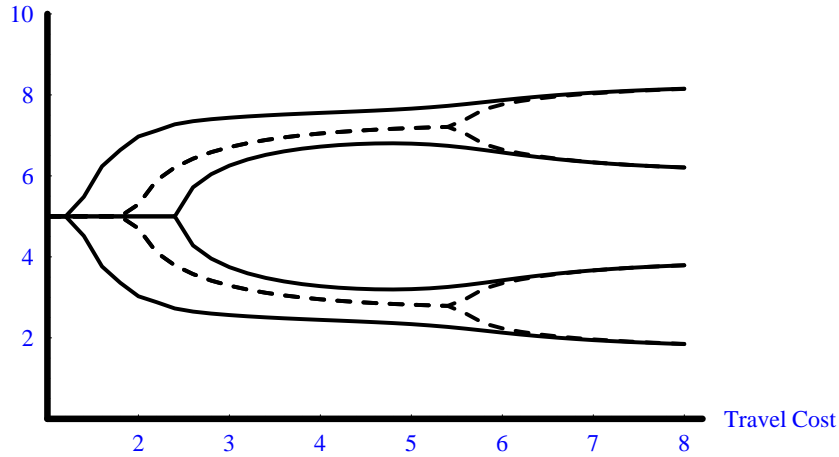


Figure 2: Pre- and Post-Merger Store Locations

creased variety, however, softens price competition, which indirectly affects consumers in two ways. As stores separate, they gain localized market power which they exploit by raising prices, but the post-merger separation of the merging stores also mitigates the impact of the merger on prices. In the next section, we provide a more formal analysis of both effects.

As compared with mergers in games that hold locations constant, the non-merging firms are likely to profit less. By moving closer to the midpoint, each faces stiffer competition from the other, which exerts downward pressure on their prices and profits. They also benefit less from the price increases of the merged firm to the extent that those price increases are mitigated by the repositioning of the merged stores. Post-merger product repositioning may cause the non-merging firms to be less profitable after the merger than before. We also take up this issue later.

4 Analysis

The standard approach to merger analysis with differentiated products considers only price as a strategic variable. The post-merger game, G^{PO} (PO signifying “price-only”) constrains all firms to keep their stores at their pre-merger locations \mathbf{x}^{pre} . At these locations, the firms play a price-only game in which the merged firm maximizes the joint profits of the two stores merged

together, while non-merging firms continue to maximize profit for their individual stores. The shift to the new equilibrium prices $\mathbf{p}^{PO} = (p_j^{PO})_{j \in J}$, is driven by the internalization of price competition between the merging stores, causing the merged firm to raise their prices. To focus on just the prices of the merged firm, we use the scalars p^{pre} and p^{PO} to represent a share weighted price index of the merging stores.

The shift from p^{pre} to p^{PO} generates the incremental markup

$$m^{PO} = \frac{\Delta^{PO}}{p^{pre}}, \Delta^{PO} = p^{PO} - p^{pre}.$$

And the shift from p^{pre} to p^{PL} with price-location competition generates the incremental markup

$$m^{PL} = \frac{\Delta^{PL}}{p^{pre}}, \Delta^{PL} = p^{PL} - p^{pre}.$$

In comparing the effects of mergers in the two models, we are interested in the difference

$$\Delta m = m^{PL} - m^{PO} = \frac{p^{PL} - p^{PO}}{p^{pre}}. \quad (4.1)$$

If $\Delta m > 0$, the anticompetitive effects of a merger are greater with price-location competition than with price-only competition. And if $\Delta m < 0$, the reverse is true.

To compare the effects of merger in price-location game, G^{PL} , with those in the price-only game, G^{PO} , we introduce a hypothetical intermediate game, G^{RE} (*RE* signifying Repositioning Effect). It is a price-only game in which firms price as they do in the pre-merger game G^{pre} , and the merged firm does not internalize the price competition between the stores merged together. Stores, however, are located as they are in the post-merger equilibrium of the price-location game, G^{PL} . This gives rise to the share-weighted price index for the merging stores' equilibrium prices, p^{RE} . The price change $\Delta^{RE} = p^{RE} - p^{pre}$ reflects the change in prices due solely to the merging firms having moved away from each other, as seen in Figure 2, while not yet having internalized price competition.

The post-merger locations \mathbf{x}^{PL} reflect the merging firm's more isolated positions relative to the pre-merger locations \mathbf{x}^{pre} . Thus, each merging store has more local market power in the \mathbf{x}^{PL} locations, so even if the firms continue to price as single-store firms, there is an upward pressure on price in moving from G^{pre} to G^{RE} , which implies that $\Delta^{RE} > 0$.

The merged firm also internalizes price competition, causing its share-weighted price index to change from that of the G^{RE} equilibrium, p^{RE} , to that of the post-merger price-location game equilibrium, p^{PL} . The resulting price change, $\Delta^{PL} = p^{PL} - p^{RE}$, reflects the change in prices due only to internalization of price competition between the merging stores, after they already were separated from one another. Thus, Δ^{PL} is analogous to the effect of a merger on prices in the price-only game, Δ^{PO} , because both are differences in equilibrium prices between a pre-merger ownership structure and a post-merger ownership structure with locations held fixed. The difference is that the locations for Δ^{PL} are \mathbf{x}^{PL} while the locations for Δ^{PO} are \mathbf{x}^{pre} .

The magnitudes of Δ^{PL} and Δ^{PO} are determined by the degree of substitutability between the merging stores, i.e., how closely they are located. As seen in Figure 2, the merging stores are further apart at their \mathbf{x}^{PL} locations than at their \mathbf{x}^{pre} locations, if travel costs are sufficiently high that a separating equilibrium exists post merger. Consequently, $\Delta^{PL} < \Delta^{PO}$. This is perhaps the main result the paper.

We are now ready to decompose Δm . Since $p^{PL} = p^{pre} + \Delta^{RE} + \Delta^{PL}$ and $p^{PO} = p^{pre} + \Delta^{PO}$,

$$\Delta m = m^{PL} - m^{PO} = \frac{\Delta^{RE}}{p^{pre}} + \frac{\Delta^{PL} - \Delta^{PO}}{p^{pre}}. \quad (4.2)$$

The sign of Δm , thus, depends on whether the positive component, Δ^{RE}/p^{pre} , or the negative component, $(\Delta^{PL} - \Delta^{PO})/p^{pre}$, dominates. The first component is the “softening of price competition effect” because its positive sign results from the more-spread-out store locations in \mathbf{x}^{PL} as compared to \mathbf{x}^{pre} . The second component is “cross-elasticity effect” as its negative sign results from the fact that the cross price elasticity of demand between the merging stores is lower at \mathbf{x}^{RE} locations than at the \mathbf{x}^{pre} locations.

As demonstrated in the next section, which effect dominates hinges on how close merging stores are before the merger. The closer together the merging stores pre merger, the larger in magnitude is the cross elasticity effect, and hence the more likely it is that mergers are more anticompetitive in the price-only game than in the price-location game.

5 The Price Effects of Mergers

We now consider the price changes associated with Figure 2 and choose the merging stores to be 1 and 2 (those closest to 0). As a function of travel

cost, Figure 3 plots the two terms appearing in equation 4.2 for the merging firms—labelled the “Softening Effect” and the “Cross Elasticity Effect”—as well as their “Sum.” As is apparent, the positive effect from softening price competition is far outweighed by the negative cross elasticity effect.

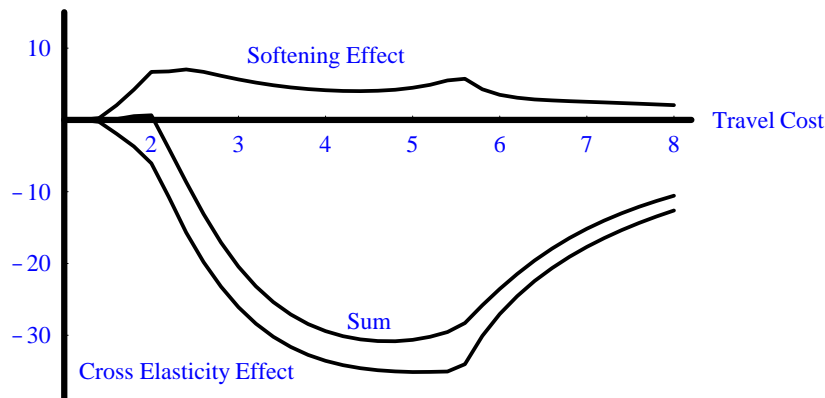


Figure 3: Decomposition of Merged Stores’ Incremental Markup

In addition, the softening of price competition effect works in the opposite direction for the non-merging firms, which places a downward pressure on their prices. While the merging firms move to more isolated positions nearer the end points, the non-merging firms, 3 and 4, are pushed towards the midpoint of the interval. This effect intensifies as travel cost increases. Figure 4 plots the magnitude of the softening of price competition effect for the non-merging stores for travel costs greater than 5.6, which is the range in Figure 2 over which the post-merger positions of the non-merging stores move closer together towards the middle of the line as travel costs increase. Figure 4 demonstrates the non-merging stores actually lower their prices for values of the travel cost greater than 5.8. The repositioning of the non-merging stores intensifies price competition for them in the G^{RE} game.

6 Producer Profits and Consumer Welfare

We now consider two important ways in which post-merger product repositioning matters. First, unlike the situation in the standard price-only model,

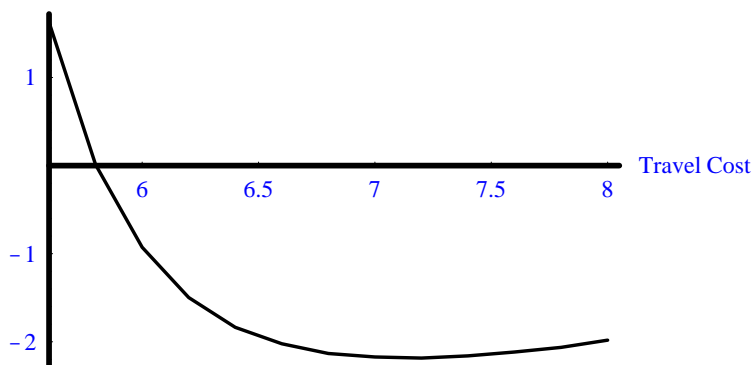


Figure 4: Incremental Markup for the Non-Merging Stores

non-merging firms need not profit more from a merger than does the merged firm. As travel costs increase and competition becomes increasingly local, a greater proportion of the profits generated by the merger accrues to the merged firm. For sufficiently high travel costs, the profits of non-merging firms actually decline. Figure 5 plots the percentage change in profit between the pre-merger state and the post-merger product-repositioning state for both the merging and non-merging firms. With low travel costs, the non-merging firms gain more from the merger than the merging firms, but as travel costs increase, repositioning increasingly disadvantages the non-merging firms.

Post-merger product repositioning also confers consumer benefits not observed in the standard price-only model. Variety increases, which has a direct welfare-enhancing effect, and the post-merger price increases with post-merger product repositioning are significantly less. Figure 6 plots the percentage change in consumer welfare from the pre-merger game, G^{pre} , to four different post-merger states. The “Variety” state refers to the post-merger state in which stores are at their post-merger locations in the product-repositioning game, G^{PL} , but the prices are still at the pre-merger levels. The line corresponding to this state falls above the zero point on the consumer welfare axis, indicating that product repositioning enhances consumer welfare. The next post-merger state is labelled “*RE* Game” and is the equilibrium of the intermediate game, G^{RE} . In this states, the prices

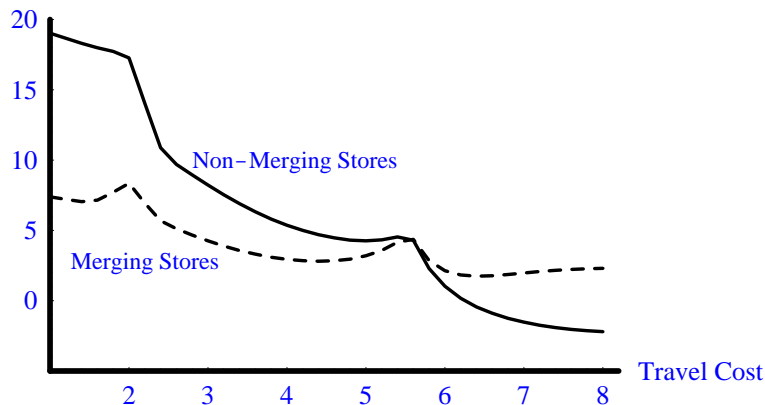


Figure 5: Post-Merger Profit Changes for Merging and Non-Merging Stores

of the variety state are adjusted to an equilibrium level that reflects the new locations of the products. This change is driven by the softening of price competition effect. This causes consumer welfare to fall slightly but enough to result in post-merger decline in consumer welfare.

The next post-merger state is the equilibrium of the price-location game, G^{PL} , in which stores 1 and 2 price jointly at the repositioned locations. Consumer welfare falls below the G^{RE} level, since the merger causes an increase in price. The final post-merger state is that of the price-only equilibrium, in which firms are constrained to remain at their pre-merger locations. Unless travel cost is quite low, this game displays a far greater consumer welfare loss following a merger than the price-location game.

7 Conclusion

In our simple model, post-merger product repositioning substantially alters the effects of a merger because the merged firm finds it optimal to separate closely competing products combined by the merger. The merged firm's product repositioning both mitigates the reduction in consumer welfare the merger otherwise would produce and allows the merged firm to capture a much larger portion of the profits the merger generates.

Of course, product repositioning in the real world can be quite expensive and time consuming, and mergers therefore may have no effect on product

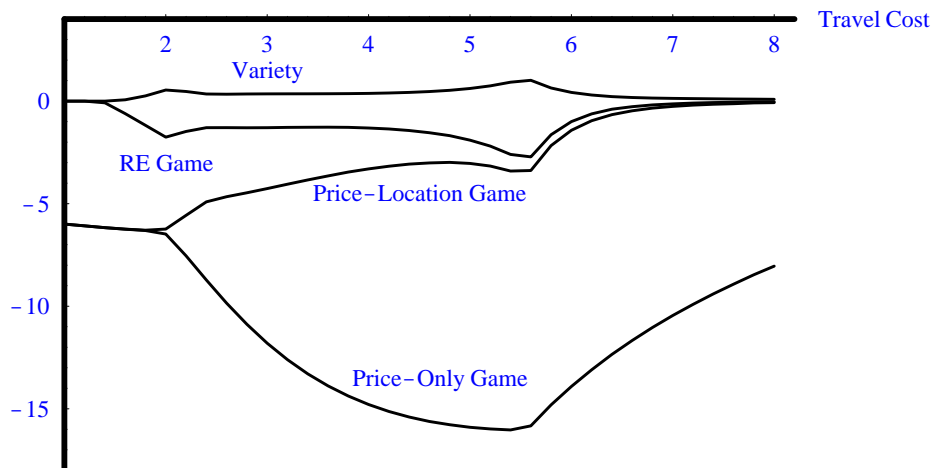


Figure 6: Post-Merger Consumer Welfare Changes

positioning over the relatively near term. Werden and Froeb (1998) find that relatively modest fixed costs of entry generally can be expected to prevent entry in response to differentiated products mergers, and the same likely is true for product repositioning. Certainly, the significance of post-merger product repositioning must be judged on the basis of the facts associated with any particular merger.

Although product repositioning has been a consideration in the antitrust evaluation of mergers, repositioning in our model works quite differently than has been postulated in antitrust circles. The Horizontal Merger Guidelines (1992, §2.21), which explain how the two federal enforcement agencies analyze mergers, indicate that “[s]ubstantial unilateral price elevation in a market for differentiated products requires that . . . repositioning of the non-parties’ product lines to replace the localized competition lost through the merger be unlikely.” Similarly, the only court decision extensively discussing unilateral effects (*Oracle* 2004, p. 1118) states that before a differentiated products merger may be enjoined on the basis of such a theory, “the plaintiff must demonstrate that the non-merging firms are unlikely to introduce products sufficiently similar to the products controlled by the merging firms to eliminate any significant market power created by the merger.”

The Guidelines and the case law anticipate the possibility that the anticompetitive effects of a merger are mitigated by the repositioning of non-merging products, but not the possibility that the anticompetitive effects of a merger are mitigated by the repositioning of merging products. Our analysis finds that the latter is more important, and repositioning of merging products was observed following the Princess-Carnival merger of two cruise lines, as the Cunard Line was repositioned as a premium brand and P&O Cruises was repositioned as brand designed to appeal primarily to British consumers.

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