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NETWORK EFFECTS AND ANTITRUST IN THE COMPUTER INDUSTRY

Over the past ten years, the antitrust profession has shown increasing interest in so-called "network effects," particularly in the context of high-technology, information-based industries such as computers and software. In principle, network effects enable large firms to get larger, thereby raising the issue of natural monopolies. It does not follow, however, that industries with network characteristics necessarily exhibit network effects that raise antitrust concerns.

Network effects exist when the value of a product or service to a user is affected by the number of other users. Telephone service provides a clear example. The value of telephone service to users is clearly a function of the number of other subscribers. Few would be interested in telephones that were not connected to anyone, and most would pay more for phone service linked to a national network rather than just a local network. Similarly, many computer users would pay more for a computer system that allowed them to exchange information readily with other users.

Network effects are thus demand-side externalities that generate a positive feedback effect in which successful products become more successful. In this way, network effects are analogous to supply-side economies of scale and scope. As a firm increases output, economies of scale lead to lower average costs, permitting the firm to lower prices and gain additional business from rivals. Continued expansion results in even lower average costs, justifying even lower prices. Similarly, the positive feedback from network effects builds upon previous successes. In the computer industry, for example, users will pay more for a more popular computer system, all else equal, or opt for a system with a larger installed base if the prices and other features of two competing systems are equivalent. As with economies of scale, large firms tend to get larger. Thus, network industries raise issues of the tendency toward natural monopoly.

It is appropriate to take into account the possibility of a natural monopoly in analyzing network industries. Nevertheless, several potential pitfalls must be avoided. The first pitfall is the assumption that because an industry can be viewed as a network, user demands are necessarily interrelated and generate network effects. Not all networks exhibit network effects. Cable television, for example, can be viewed as a network of interconnected elements, but the value users place on subscribing is largely unaffected by the number of other users. A resident of an area with poor over-the-air television reception may value a cable system highly, even if that resident were the only subscriber in the local area. The same cannot be said of telephone service with a similar subscribership pattern.

The second pitfall is the assumption that network effects, when they are present, are necessarily of sufficient magnitude to produce a natural monopoly. As with economies of scale, the positive feedback from network effects may be limited. It has been noted, for example, that while the DOS and Windows operating systems may exhibit network effects, the Macintosh

ALSO IN THIS ISSUE

- Disciplining Price Increases Through Lost Sales of Complementary Products
- Electric Power: Relevant Antitrust Products

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and Unix operating systems have had a fairly stable (if smaller) share of total PC operating systems over time. The third pitfall is that in many industries network effects may be only one of a number of externalities, and not necessarily the most important. While network effects are an important element of industry structure in the telephone industry, economies of scale are important in the tendency toward natural monopoly at the local level. Network effects in the computer software industry may create positive feedback effects that allow some firms to increase in size, but economies of scale are also important for these products. Fixed costs of software development dominate, and average cost falls dramatically and possibly continuously with succeeding units produced. There may be a number of elements of industry structure that are important to the functioning of an industry, especially the high-tech, information-based industries that seem to be the focus of concerns about network effects.

While concern about network effects is relatively recent, other types of conduct perceived as potential areas for antitrust concern have been scrutinized in network industries for many years, at least since *U. S. v. IBM*. These areas include standard setting, access and compatibility, product pre-announcements, leveraging, and exclusive dealing. High-tech, information-based industries such as the computer industry are not unique in raising these kinds of concerns.

That the government eventually dropped the suit against IBM does not demonstrate that concerns about such behavior in the computer industry are necessarily unwarranted. Network effects could play an important role for many computer industry products. Like other considerations such as economies of scale and scope, however, network effects may be more important in some industries than others, and these other considerations may be more important in some cases. It would be incorrect to assume that conclusions regarding the importance of network effects in one industry necessarily carry over with the same force to others. In addition, it is important to recall that the potentially problematic conduct identified in connection with network industries has been explored before in the computer industry and that one can likely learn from these prior experiences. In the end, of course, the merit of specific allegations will depend on the facts of each specific case.

Principal Bruce R. Snapp has worked on matters involving network industries. This article summarizes his presentation at a recent ABA conference on network industries.

DISCIPLINING PRICE INCREASES THROUGH LOST SALES OF COMPLEMENTARY PRODUCTS

The Department of Justice/Federal Trade Commission Merger Guidelines define product markets based on demand-side factors, where the possible responses to a price increase are limited to customer substitution of competing products. Yet the exercise of market power in product markets defined in that manner may become problematic if suppliers of the product in question also sell to the same customers other, non-competing products whose aggregate dollar value is large. Examples include customers who prefer to purchase complementary products as part of a "package" from the same supplier. In these cases, price increases on the initial product would be less likely to the extent that customers could exert "discipline" by threatening to reduce purchases of complementary products purchased from the same suppliers, especially if price-cost margins on the complementary products are high.

The economics literature supports the concept that relatively small sales losses on a product will make a price increase unprofitable if price-cost margins for that particular product are high. The price increase becomes unprofitable because the seller cannot afford to lose many high-margin sales to achieve a higher price. The same principle can be extended to the more complex situation of a price increase on one product and potential lost business (and lost margins) on that product and, through disciplining behavior by buyers, on another product. The greater are price-cost margins in both products, the smaller the loss of

sales on these products before the price increase would be unprofitable.

The importance of discipline strategies in inhibiting price increases on the initial product depends on (a) whether buyers' disciplinary threats with respect to complementary products are likely to be credible, and (b) whether the profit losses from reduced complementary product sales are enough to make a price increase on the initial product unprofitable. From the buyer's side, the threat to curtail purchases of complementary products depends on the cost of switching to an alternative producer of the complementary products. Low switching costs enhance the credibility of the threat. In addition, the credibility of the buyer's threat increases with its expenditures on the initial product because the buyer would be willing to absorb more switching costs to avoid the price increase on the initial product.

From the seller's side, several factors affect the likelihood of a price increase on the initial product. As is true of price increases on any single product, a supplier's willingness to increase the price of the initial product depends on that product's price-cost margin as well as its elasticity of demand (price sensitivity). High margins and high elasticity of demand imply a small optimal price increase. When potential losses from a price increase on the initial product involve not only lost initial product sales, but lost complementary product sales as well, several additional factors must be taken into account in evaluating the profitability of a price increase on the initial product. First, if margins on complementary product sales are high, a small loss of complementary product sales could be costly enough to make an increase in initial product prices unprofitable. Second, the larger are complementary product sales relative to initial product sales, the greater will be the perceived punishment of losing complementary product sales. Third, if significant losses of complementary product sales are expected from a price increase on the initial product, the price increase is more likely to be unprofitable.

One approach for modeling these factors that is particularly relevant to the Guidelines market definition test is to calculate the profit-maximizing monopoly price increase on the initial product, without any associated complementary sales loss, and determine the loss of complementary sales that would render this optimum price increase zero. Price increases on the initial product are likely to be highly constricted for reasonable values of the key parameters. For example, assume an elasticity of demand for the initial product of 1.2, contribution margins for both the initial product and complementary products in the range of 30 percent, and revenues from complementary products that are three times the revenues for the initial product. If losses of complementary product sales are about half as much as losses of initial product sales, the optimal price increase on the initial product is close to zero.

Buyers who purchase both the initial product and the complementary products have the potential to limit substantially the ability of sellers to raise the price of any individual product. Whether this potential is realized depends on the price-cost margins, the relative magnitude of purchases and the elasticity of demand.

Vice President Robert D. Stoner has worked on these issues in conjunction with recent cases.

ELECTRIC POWER: RELEVANT ANTITRUST PRODUCTS

As deregulation proceeds in the electric power industry, greater competition raises new issues for both regulation and antitrust. One of the most important and difficult issues is the identification of relevant products for competition analysis. Traditional product classifications in the electric power industry often are inadequate for competition analyses. Rather, the two most important products in the industry-delivered energy and delivered capacity-should be defined by the preferences of buyers.

Traditionally, electric power generation, transmission, and distribution have been viewed as separate products. This classification is based on the technology of delivering electricity and on government-established accounting categories, but it does not reflect preferences of those buying electricity. Modern competition analysis recognizes that buyer preference is an important determinant of relevant prod-

ucts. If an increase in the price of a "product" above competitive levels causes enough buyers to switch to another product so that the price increase would be unprofitable, then the relevant "product" must be revised.

What are relevant electric power products? One product is electric energy delivered to specific locations. Electric energy in Spokane, Washington is of little use to a buyer needing energy in Annapolis, Maryland. When viewing alternatives, a buyer in Annapolis will compare delivered prices of alternative sources of electric energy in Annapolis. Electric energy can be delivered in Annapolis either by generating it in Annapolis or by generating it elsewhere and transporting it over transmission lines to Annapolis. Buyers perceive these two alternatives as good substitutes if their delivered prices and reliability are similar. Given similar reliability, delivered cost to the buyer is the main deciding factor between alternatives. Therefore, from the perspective of electric power buyers, generation and transmission are not separate products. Each is a component in producing the relevant product–delivered energy.

Using the Department of Justice/Federal Trade Commission Merger Guidelines method for identifying products, one would often conclude that transmission is not a separate product market. Consider the situation where the lowest-cost supply alternative for a buyer is to purchase energy generated by Utility A and transmitted by Utility B. The transaction could be structured as the buyer purchasing energy from A and purchasing unbundled transmission from B. Alternatively, B could purchase the energy from A and resell the energy to the buyer, offering the bundle of energy and transmission as delivered energy. Given these alternatives, B could not profitably raise the price of unbundled transmission by a significant amount, holding the price of delivered energy constant. In response to a higher transmission price, the buyer would purchase delivered energy from B instead of buying energy from A and transmission from B. Therefore, transmission by itself is not a relevant product.

Whether energy from outside an area should be included in a market or even constitute a separate market relates to the geographic scope of markets. For example, if the generators within an area are unable to prevent a monopolist importer from raising prices by 5 percent, then delivered imported energy could constitute a relevant market. This might be called a "transmission market," but that is a semantic difference. The issue really concerns the geographic scope of markets and participants in delivered energy markets.

In addition to delivered energy, delivered capacity is also a relevant product. Delivered capacity is the ability of a buyer to use (or take) energy on specified terms at specified times. Buyers can vary the amount of capacity they purchase both in terms of quantity and quality. The quantity of capacity is measured by the amount of watts that the buyer can take at a given time. The quality depends upon the reliability of the supply. At one extreme, interruptible energy can be shut off at any time, which, in essence, is the same as having no capacity. At the other extreme, both sellers and buyers may use redundant operating and standby generators and redundant power lines to ensure as close to 100 percent reliability as possible. Demands for electric energy are often very inelastic–buyers value highly a steady supply of electric energy despite factors like demand peaks or equipment failures that may affect supply. To provide assured supply, energy suppliers must purchase redundant and little-used facilities, the costs of which are ultimately passed on to buyers.

Delivered capacity is a relevant product in electric power because for most uses electric energy cannot be stored; instead it must be transported over physically fixed transmission lines. A hypothetical monopolist of capacity could raise energy and capacity prices to monopoly levels because it would have the ability to cut off energy to buyers. Buyers of electric power delivered capacity have no other product to which they could substitute. In contrast, a hypothetical monopolist of heating oil delivery capacity in a city would have relatively little market power because heating oil can easily be transported between geographic locations.

In summary, traditional product divisions in the electric power industry–generation, transmission, distribution–are not based on buyer preference. Buyers desire delivered energy and delivered capacity, regardless of the method of production. Therefore, these are the products most appropriate for competitive analyses in the industry.

Vice President John R. Morris works on antitrust issues involving electric power. He recently testified on behalf of intervenors in the Northern States Power/Wisconsin Electric Power merger. He is currently working on issues of market access for nonutility generators and computer simulation models to measure electric utility market power.