Competition Policy Analysis

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8 Competition policy in the information economy

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Introduction

The recent monopolization action brought by the United States against Microsoft has galvanized public interest in competition policy as applied to the high-technology sector. Yet the *Microsoft* case is but one in a series of public enforcement actions, and private antitrust suits, that are determining how antitrust laws will be applied to the information economy. This chapter describes the economic characteristics of information industries, draws out the implications of these characteristics for competition policy, and illustrates how antitrust policy has evolved recently in the United States in the high-tech sector.

Some commentators have suggested that enforcement officials should leave the high-tech sector alone, since it is fluid, experiencing rapid technological change, and by and large displaying vigorous competition. Yet few can deny that pockets of monopoly power remain, usually associated with the control of some information bottleneck: local telephone companies, cable television operators, and Microsoft present themselves as examples, but many more companies enjoy powerful positions, often based on their control over interfaces or standards, if not genuine bottlenecks of network hubs. The leading goal of competition policy in the information economy should be to hasten the erosion of such monopoly power, and to prevent the use of monopoly power to destroy competition in adjacent markets.

This chapter is organized into four parts. The first part offers a strategic guide to the network economy. Competitive strategies in the information economy are distinct from strategies in other sectors of the economy, and competition policy must be attuned to the new strategies that firms are employing. While durable monopoly power has always been rooted in underlying scale economies, the sources of those scale economies, and the resulting barriers to entry, are distinctive in the information economy. Demand-side economies of scale associated with network externalities are especially important in many high-tech markets.

The remaining parts of the chapter explore the three broad areas of antitrust law in the United States: merger enforcement, limits on the ways in which rivals firms can cooperate, and limits on the behavior of dominant firms.

In the merger area, I do not detect any need for a special 'high-tech' enforcement policy. Certainly, we are in the midst of an enormous merger wave, but this consolidation has taken place under the watchful eye of the antitrust authorities. Both the US Department of Justice and the Federal Trade Commission have been actively involved in reviewing high-tech mergers, and have sought to block or modify certain mergers. A review of selected mergers shows that established guidelines for merger review are working in the information and communications sector.

The information economy *does* call for greater inter-firm cooperation to set standards, to supply complementary components that form a system, to build interconnecting networks, and to cross-license or pool patents to enable new products. Happily, the needed cooperation looks to be proceeding without undue antitrust barriers. Literally thousands of standards are being hammered out among horizontal rivals every year, all this generating little or no antitrust liability. The one dark cloud in this picture is the residual fear in the antitrust bar that clients cooperating with rivals to establish new standards or launch new technologies will be judged by *per se* rules intended to outlaw price fixing. And the limits on cross-licensing and patent pools are still being set.

Concerning dominant firms, there is certainly no reason to believe that the information economy spells the end of monopoly power, but neither is there justification to expand the reach of competition policy, such as by imposing mandatory licensing of intellectual property. The traditional limits on unilateral conduct by dominant firms, such as prohibitions on exclusive dealing and tying, can be fruitfully applied in the information economy. These points are illustrated below with a brief analysis of the recent Justice Department action against Microsoft.

A brief strategic guide to the information economy[1]

One hears a lot these days about the 'new economy'. The implication is that time-tested economic principles must be discarded, and new principles sought. Were this true, it would presumably imply a need for a top-to-bottom re-thinking of competition. Fortunately, history can still be our guide, both to business strategy and to competition policy. While we cannot rely much on the classical model of perfect competition and price-setting firms, we do not need a fundamentally new economics. There has merely been a shift in emphasis, as networks, interconnection, compatibility, interfaces, and intellectual property rights have become increasingly important sources of competitive advantages.

The telephone industry illustrates my point nicely. Just 100 years ago, the Bell System (later to become AT&T) was successfully consolidating its position as the dominant telephone company in the United States. At the time, the Bell System controlled less than half of the telephones in the United States, and faced direct competition in many locales. The key was that the Bell System was the technical leader in offering long-distance service, and adopted a strategy of refusing to interconnect its local rivals with its long-distance network. Before long, the Bell System began to benefit from positive feedback: by controlling the largest national network, the Bell System could offer a superior product, and this superiority fed on itself until the Bell System emerged victorious over its local rivals, and securely in control of the long lines. The point: networks, interconnection, and leveraging are not a new phenomenon, just increasingly important.

At the risk of over-simplifying, I offer here six basic principles for firms competing in the information economy. Understanding these principles is key for fashioning competition policy.

1. Innovation is king

Perhaps the defining characteristic of the information economy is rapid innovation. No company can afford to stand still, whether it designs microprocessors for computers, writes software, offers communications services, or creates information content. Failure to seize opportunities for innovation is likely to be fatal. Of course, a dominant firm will not lose its grip overnight, and a technical pioneer will keep its reputation even if it falls being the cutting edge of technology, but the classical notion of the sleepy monopolist just does not fit this sector. Ultimately, performance is driven by innovation, not pricing. Competition is typically Schumpeterian in character, with a fierce struggle to be the next temporary monopolist.

2. Intellectual property as sword and shield

Precisely because innovation is king, intellectual property rights play a greater role than ever before in competitive strategy. Copyrights have always been crucial in publishing; now content providers must carefully guard against rampant piracy on the Internet. Patents have always been a sword, usable against infringing firms that would rob the innovator of its just rewards; now patents often serve as a shield as well, used to mount counterclaims against others who bring infringement claims. Mutually blocking patents are all too common, creating a need for cross-licenses and patent pools. Trade secrets have always been a way to preserve a competitive advantage; as patents become cross-licensed and products rapidly reverse-engineered, trade secrets and carefully protected software source code loom larger than ever.

3. Versions, versions everywhere

Information products exhibit very strong economies of scale: most of the costs are 'first-copy costs', with the incremental cost of additional copies being far smaller than the average cost. This pattern is accentuated by the Internet, since physical replication is no longer necessary and distribution costs are minuscule. With large fixed costs, the imperative to engage in price discrimination grows. We see very large gross margins, typically 80 per cent or more in software,

and we see multiple versions designed to appeal to different customer groups: a low-end version for new users, a fully featured version for power users, a business version with site licensing for local area networks, etc. Neither price discrimination, versioning, or high gross margins is necessarily indicative of any lasting monopoly power. Both competitive strategy and antitrust analysis must reflect the ubiquity of *information product lines*.

4. Nurture your complements

Products have always worked together to form systems: automobiles, spare parts, service, fuel, driver training, and roads combine to form a 'transportation system'. But never before have so many products been so tightly bound up through interfaces. The personal computer is a complex system, incorporating a microprocessor, various other chips, busses than connect these parts, a monitor, an operating system, interfaces with local and global communications networks, and on and on. As a result, companies spend a great deal of time forming alliances, setting standards, and working with partners to make sure their products work together effectively to comprise an overall 'system'. In the network economy, every company must pay close attention to the provision of *complements*; Microsoft and Intel form one of the most prominent examples of such a partnership.

Antitrust thinking about substitutes (competitors) is far more advanced than antitrust thinking about complements (partners). That must change. Cooperation among *complementors* is generally pro-competitive. See the discussion below on cooperation. The Technical Appendix sketches out of the most basic economic theory of the pricing of complements.

5. Networks rule

To the extent there is a 'new economy', it is the economy of networks rather than an older economy based on sheer scale. Many networks are self-evident: the telephone network, the network of fax machines, a credit-card acceptance network, a network of automatic teller machines and ATM cards, or the Internet itself. As a general rule, large networks offer more value to users than small networks, creating a virulent form of scale economies often denoted by network externalities (or network effects) which generates positive feedback: the strong get stronger and the weak get weaker. Put differently, there are now strong *demand-side* economies of scale: customers value a popular product (network) more than an unpopular one. For just this reason, the terms on which outsiders can gain access to a dominant network can be critical for the very nature of competition in these industries.

The role of networks and network economics in the information economy is even larger than it might appear at first, because of the presence of many *virtual* networks: the network of users of Apple Macintosh computers, the network of

owners of compact disk machines, the network of users of Zip drives, or the network of users of Microsoft Word. As these networks have grown in importance, compatibility standards and the control over interfaces have become central to rivalry. Some of the most pressing issues in competition policy revolve around the control over bottlenecks and interfaces: a company controlling one component of a system may be able to wrest control over adjacent components by redesigning the interface between its core component and these other components. In part, this is what Microsoft is alleged to have done, i.e., gain control of the browser component based on its control over the operating system. Since the browser is itself an interface to the Internet, many observers are asking where Microsoft's dominance will stop.

6. Monopoly power lives

Clearly, there are strong forces in the information economy that favor scale. On the supply side, the creation of information involves strong economies of scale, and the design of many new products involves substantial fixed (and sunk) costs of R&D. On the demand side, network effects favor popular products and established networks. Together, we have fertile ground for market power. But not so fast. The winds of innovation blow strong, and are a powerful counterweight to these forces. My rule of thumb: be wary of branding a company as dominant for antitrust purposes if it recently gained a leading position, but look seriously at barriers to entry if you observe a company that has held a dominant position for several years or more. I reject the simple position that monopoly power cannot persist in the network economy, even while recognizing that many of today's leading companies must continue to improve quality and reduce price to protect their current positions.

Horizontal mergers[2]

Keeping these strategic principles in mind, we are now prepared to examine several substantive areas of antitrust law, in this order: horizontal mergers, vertical mergers, standard-setting and cooperation, and the conduct of dominant firms. The remainder of this chapter focuses on the US experience for the simple reason that most of my specific knowledge and experience relates to the United States. Horizontal mergers are analyzed by the US Department of Justice and the Federal Trade Commission under their 1992 *Horizontal Merger Guidelines* (the *Guidelines*). Here I discuss how those *Guidelines* have been applied in the high-tech area.

Unilateral competitive effects

In most high-tech mergers, the focus of merger enforcement is on unilateral competitive effects: the danger that the merged firm, acting independently of

any remaining rivals, will find it profitable to raise its prices after the merger. This concern is founded on economic theory which demonstrates that there is quite generally an incentive to raise prices following the consolidation of rival brands.[3] Theories based on coordinated competitive effects, including the danger that a cartel will successfully form in the industry, while historically the focus of merger enforcement policy, have taken a back seat to unilateral effects in the high-tech area.

Two key factors influence the magnitude of these unilateral competitive effects (this is not to say that entry, product repositioning, or efficiencies can be ignored): the gross margins for the merging brands, and the *diversion ratio* between those two brands.[4] The diversion ratio from brand *1* to brand 2 measures the fraction of sales lost by brand *1* when its price is raised that are captured by brand 2. Unilateral competitive effects are greatest when gross margins are high and when the diversion ratio is high.

This line of reasoning indicates that mergers involving information products can indeed lead to significant unilateral competitive effects, unless entry is relatively easy. Gross margins throughout the high-tech sector tend to be larger than in other areas of the economy. Indeed, they *must* be large to cover the fixed costs of R&D, the first-copy costs of creating information, and the fixed costs of building and maintaining networks for the transmission of information. There is nothing sinister about high gross margins, nor does their presence suggest any monopoly power. But high gross margins can accentuate concerns in the merger context.

Merger synergies

The strong production and demand-side economies of scale present in many high-tech markets open up the possibility of significant efficiencies associated with horizontal mergers. For example, efficiencies would result if development costs can be saved by having one rather than two teams develop new products. Whether efficiencies of this type would make up for any loss in variety and loss in direct competition requires a fact-specific inquiry in any given case.

Some efficiencies flowing from high-tech mergers may be achievable without the necessity of a merger. For example, while the degree of compatibility between two sets of products can be increased through a merger, such changes may well be possible through cooperation on development efforts and the licensing of copyrights without the necessity of a full merger. Under the *Guidelines*, efficiencies of this sort, which are not 'merger-specific', cannot be used to defend or justify an otherwise anti-competitive deal.[5]

Selected cases[6]

Although most mergers, high-tech or otherwise, gain government approval, the FTC and the DOJ have had a significant impact on the information sector in blocking or seeking modifications of several prominent mergers. I have selected a few cases to illustrate how antitrust principles have been applied to high-tech mergers. The cases reported here are heavily skewed towards deals that were either abandoned or modified in response to antitrust challenge, in part because there is far less public information concerning transactions that were cleared without modification. I should note, however, that many enormous high-tech deals have been cleared without modification, including the acquisitions of Lotus by IBM, of Nynex by Bell Atlantic, and of Pacific Bell Telephone by SBC. Furthermore, Microsoft has engaged in a long series of acquisitions that have not been challenged, including HotMail, WebTV, and Vermeer.

Borland and Ashton-Tate (1991)

In 1991 Borland International announced its intention to acquire Ashton-Tate. The key product overlap was in the area of database management programs. The two leading programs at the time were Ashton-Tate's dBase program and Borland's Paradox program. This case was an important early test of how mergers in the personal computer software industry would be treated by the antitrust agencies. Would the deal be blocked as the merger of the two leading suppliers of personal computer based 'relational database' programs, or would the deal be permitted in the light of the highly dynamic nature of software markets?

To satisfy DOJ concerns, Borland agreed to issue FoxPro a license to the dBase code; FoxPro was a rival to dBase then in litigation with Ashton-Tate over infringement of dBase copyrights. The license was intended to insure that the installed base of dBase users had a viable alternative outside of Borland's control. Since then, the Paradox program has lost most of its following, dBase has faded out, Microsoft purchased FoxPro to serve the high end of the market and promoted Access at the low end, and Microsoft now dominates the personal computer database market. Some would point to this case as evidence that software markets are so fluid that mergers are of little concern. I draw a more limited conclusion: that licensing fixes to mergers can indeed enable new competitors.

Adobe and Aldus (1994)

In 1994 Adobe announced its intention to acquire Aldus. The two companies sold the leading brands of professional illustration software: Adobe Illustrator and Aldus Freehand. The parties argued with some effect that each was driven to upgrade its product in order to earn revenues from its own installed base. This was not the only dimension along which competition took place, however. There was evidence, for example, of substantial direct pricing competition between the two programs, both for new customers and for sales to their own installed bases. In the end, the FTC required the merged firm to divest the FreeHand professional illustration software owned by Aldus to a third firm, Altsys Corporation, which had originally developed the software. Again licensing was seen as a fix to a direct horizontal overlap in software products.

Microsoft and Intuit (1995)

In 1994, Microsoft proposed a $2 billion acquisition of Intuit, Inc. Intuit was the owner of Quicken, the leading personal financial software package. Microsoft's Money product performed many of the same functions. The government viewed Quicken and Money as competing in a market for 'Personal Finance/Checkbook' software. In that market, Quicken was the leading product, with a 69 per cent unit share, followed by Microsoft's Money with a 22 per cent unit share. The DOJ described Microsoft as Intuit's most significant competitor, and stated that the proposed acquisition would eliminate competition between Microsoft and Intuit, which had benefited consumers by leading to high quality, innovative products at low prices

The Antitrust Division rejected Microsoft's proposed 'fix' in which some of its Money assets would have been transferred to Novell Inc. The Division believed that Novell would not be as effective a competitor with Money as was Microsoft. The Division also did not accept Microsoft's arguments that entry was easy,[7] and that competition from banks (e.g., on-line banking) would discipline the pricing of Quicken. Moreover, in this situation a licensing fix was regarded as inadequate. In response to DOJ's challenge, the parties abandoned the transaction in July 1995.

Computer Associates and Legent (1996)

In 1996 Computer Associates proposed to acquire Legent for $1.7 billion. The focus of the antitrust inquiry was on certain mainframe computer software markets. In particular, Computer Associates and Legent were the largest and second-largest vendors of systems management software products for IBM mainframe computers.

Mainframe software markets are different from personal computer software markets in a number of respects: mainframe software is a much more stable market, which is experiencing little if any growth; technological change is not so rapid; there is very substantial lock-in by individual customers, although network effects are less pronounced; the software itself is extremely sophisticated; and vendor reputation is critical, due to the 'mission critical' nature of much of this software.

Computer Associates agreed to grant licenses for Legent's products in each of five software markets of concern to the Antitrust Division. The five areas all involved computer systems management software products used with mainframe computers running the VSE operating system: security software; tape and disk management software; job scheduling software; and automated operations software. The goal of the settlement was to establish a new viable competitor in each of these areas. Two aspects of this case are noteworthy. First, notice that the relevant product markets are quite 'narrow', reflecting the fact that users need solutions in each of these categories, and the specialized nature of the software that meets these needs. Second, the government found that entry was quite

difficult, a reminder that ease-of-entry is not a silver bullet for merging software companies.

Autodesk and Softdesk (1997)

Autodesk, Inc. negotiated a consent decree in 1997 with the FTC to settle Commission concerns about its proposed $90 million acquisition of Softdesk, Inc. Autodesk develops and markets computer-aided design (CAD) software for use in the architecture, engineering, and construction industries, including 'AutoCAD', a design engine for use on Windows-based personal computers. Autodesk products account for some 70 per cent of the installed base of Windows-based CAD engines, with approximately 1.4 million users. Softdesk, which primarily sells CAD application software, was developing and testing its own CAD engine, IntelliCADD, and was within months of introducing IntelliCADD into the market, when the Autodesk acquisition of Softdesk was announced.

Compatibility issues were central in this enforcement action. The FTC asserted that 'IntelliCADD, if brought to market, would have provided substantial direct competition to AutoCAD because it offered compatibility and transferability with AutoCAD generated files and application software – features other CAD engines do not offer.' The FTC further alleged that 'the large installed base of AutoCAD users necessitates that any new CAD engine developed and offered in the market offer file compatibility and transferability with AutoCAD in order to be an effective competitor.'[8]

The FTC asserted that Autodesk's acquisition of Softdesk, as originally proposed, would have substantially lessened competition in the development and sale of CAD software engines. Under the terms of the settlement, IntelliCADD was divested to Boomerang Technology, Inc., which in turn assigned and sold its rights and title to IntelliCADD to Visio Corporation. The settlement did not include the IntelliCADD development team, although it did prohibit Autodesk and Softdesk from interfering with the ability of Boomerang to recruit or hire employees of Softdesk who worked on development of IntelliCADD.

Primestar (1998)

In April 1998 the Justice Department sued to block the sale of direct-broadcast satellite (DBS) assets from MCI and News Corp. to Primestar, which is largely owned by cable companies, including Tele-Communications Inc., Time Warner, Comcast, and Cox Enterprises. The key asset involved was an orbital slot capable of beaming programming directly into homes throughout the entire continental United States. Since there are only three such slots, the Justice Department was concerned that letting this slot fall into the hands of cable operators would mute the threat from DBS to local cable franchise monopolies in the delivery of video programming to the home. Facing the DOJ objections, Primestar abandoned its plans to purchase this orbital slot.

This case illustrates concern over the distribution of information, the Internet notwithstanding. Presumably, the concerns in the Primestar case would be far less if telephone companies (or others) had already put into place widespread fiber optic lines to homes and thus offered strong broadband competition for cable companies; but such a distribution network appears to be very expensive to build out, leaving DBS as the current best alternative to cable for multichannel video distribution.

Vertical and complementary mergers

Although the focus of merger enforcement, in high-tech and generally, is on horizontal mergers, it is worth taking a quick look at *vertical* or *complementary* mergers that have been reviewed or challenged by the antitrust agencies in the United States. These mergers involve products that work together rather than serve as substitutes for one another.

Impeding two-level entry

The primary concern in vertical or complementary mergers should be based on the two-level entry theory. Under this theory, a complementary merger can make entry more difficult by requiring an entrant to develop products in two markets at once: two distinct types of software, or hardware and software, or content and distribution. A variant of this theory arises when the integrated firm degrades the compatibility of products sold by rivals that compete with its own products in one of the markets.

For the two-level entry theory to be applicable, market power and entry barriers must be significant at each of the two levels. The market power must be such that an entrant into a single level is significantly disadvantaged by not being able have its component work with the otherwise complementary component produced by the merging firms. These theories, and their application, are subtle, in part because the alternative to a merger may be a complex long-term contract.

Synergies

There can be genuine synergies involved in vertical and complementary mergers. As discussed above (see the Technical Appendix), integration can overcome inefficiencies associated with the pricing of goods or services that stand in a vertical relationship to each other. Less well known, perhaps, is the fact that these same efficiencies can arise for complementary mergers.

Selected cases

Silicon Graphics and Alias and Wavefront (1995)

In 1994 Silicon Graphics, Inc. (SGI), a maker of high-end graphics workstations, announced its plans to acquire two relatively small software houses specializing in 'entertainment graphics software', Alias Research Inc. and Wavefront Technologies. This software is used in producing high-resolution two- and three-dimensional images, e.g., the dinosaurs in *Jurassic Park* and the characters in electronic games. SGI was responding in part to Microsoft's acquisition of the third leading firm in this segment, SoftImage, Inc.

This double deal had significant horizontal as well as vertical aspects. The parties argued in part that SGI had no incentive to raise the price of the software, since this would cut into the sales of the SGI hardware running that software. Ultimately, expressing more concern over the vertical aspects of the deal than its horizontal element, the FTC, in a 3–2 vote, required SGI to enter into a porting agreement with one of DEC, HP, IBM, Sun or another company as approved by the Commission, to make sure that Alias's software was available on these other platforms.

The FTC also required that SGI:

> establish and maintain an open architecture, and publish the Application Program Interfaces (APIs), for [SGI's] computers and operating systems in such manner that software developers and producers may develop and sell Entertainment Software for use on [SGI's] computers in competition with Entertainment software offered by [SGI].[9]

For those watching the Microsoft case, and for those contemplating mergers in the software or hardware industry, the SGI precedent of opening up APIs is worthy of note. Although the FTC action can be criticized on a number of grounds, including the fact that SGI's market position has deteriorated markedly over the past three years (calling into question whether SGI ever had any meaningful power), it stands as an example of mandated 'open interfaces'. Critics assert that such provisions are burdensome or unenforceable, but I am unaware of any disputes that have arisen under this consent decree regarding the definition of 'open'.

Time Warner/Turner (1996)

The FTC conducted an extensive review of Time Warner's acquisition of Turner Broadcasting. The FTC was concerned in part that Time Warner would use its extensive cable properties to protect the position of CNN from competition by the Fox News Channel and MSNBC. This would supposedly be accomplished by denying Fox News and MSNBC carriage on the Time Warner cable systems.

As in the Primestar case, concerns here were rooted in the distribution bottleneck that cable operators enjoy for multichannel video programming. Ultimately, the FTC forced Time Warner to agree to carry one of these rival channels on its systems. Interestingly, after Time Warner cut a deal to carry MSNBC, Fox sued Time Warner on antitrust grounds seeking to gain carriage for Fox News as well. That lawsuit was later settled, with Fox News indeed gaining access to the Time Warner cable customers.

Cadence Design Systems and Cooper & Chyan Technology (1997)

Cadence Design Systems, Inc., of San Jose, California, agreed in 1997 to settle FTC charges that its $400 million acquisition of Cooper & Chyan Technology, Inc. (CCT) would substantially reduce competition for key software used to automate the design of integrated circuits. The FTC was primarily concerned with the vertical aspects of this transaction. In particular, Cadence's 'Virtuoso' layout environment was seen as a 'platform' on which a variety of software could run. The FTC acted to ensure that other brands of software – competitive with that offered by CCT – would not be blocked from running on the Cadence platform. This case illustrates that many software companies, not just Microsoft, can be characterized as controlling a key 'platform' with which other programs must work.

Standard-setting and cooperation[10]

High-technology firms are constantly forming alliances, jointly developing standards, meeting to make sure their products work smoothly together in a system, signing licenses and cross-licenses, and generally cooperating in a fluid environment. In a very real sense, organizational form in the network economy has itself tilted towards loose networks of alliances rather than clear boundaries between hierarchical organizations. Even the most bitter of rivals, Microsoft and Netscape, have agreed to support various software standards, including Virtual Reality Modeling Language for viewing three-dimensional images on the Internet, and the Open Profiling Standard for privacy on the Internet.

Open compatibility standards fundamentally change the nature of competition. Standards lead to expanded network externalities. Standards reduce the technology risk faced by consumers who would otherwise fear picking a losing technology and being left stranded. Truly 'open' standards reduce consumer lock-in to any one vendor. Standards shift the locus of competition: incompatible systems compete *for* the market; compatible products compete *in* the market. Standards shift competition more towards price and away from features, which are at least partially standardized. Standards lead to component competition, which favors specialists, rather than competition between entire systems, which favors generalists. Antitrust authorities need to understand the deep impact of standards on competition, even as they give companies a wide berth to establish standards cooperatively.

I cannot do justice to the whole area of cooperation and compatibility here. Suffice it to say that there are significant efficiencies to be achieved through such cooperation. Competition authorities are well advised to be cautious in treating cooperation that crosses company boundaries any more harshly than cooperation within a single company, so long as the purpose and effect of the cooperation is to establish new products and standards, ensure compatibility, and the like. To do so could stifle the innovative forces expressing themselves in all manner of loose-knit cooperation. In the United States at least, companies seem quite comfortable meeting to establish standards without fear of antitrust sanctions, so long as they confine their activities to genuine standard-setting activity. There are some cases in which companies are wary of cutting licensing deals within a formal the standard-setting process for fear of antitrust sanctions, and there is the occasional attack on standards, but by and large antitrust is not standing in the way of needed cooperation to establish compatibility standards.[11]

Furthermore, there are fundamental economic reasons to encourage, rather than discourage, cooperation among the suppliers of complements. As I show in the Technical Appendix to this chapter, cooperation by two companies selling complements is likely to lead to lower prices than would independent conduct. The precise form taken by this cooperation – pricing commitments, long-term contracts, or full integration – is less important for my current purposes than the simple point that such cooperation generally benefits consumers. This notion cuts against the deep instincts of antitrust lawyers, but is beyond doubt as a matter of economics.

Antitrust lawyers are well versed in the evils that can arise when companies selling substitutes, i.e., direct rivals, collude or merge. They rarely recognize, however, that these evils turn into virtues when the companies are selling complements. To the economist, these situations are perfectly analogous, and indeed a single theory can be applied in both cases with a simple change of sign from positive to negative to study complements rather than substitutes. In practice, analyzing vertical relationships is not so simple, since one must ask whether companies standing in a vertical or complementary relationship to each other can and will devise contractual relationships that lie in between simple uniform pricing and full integration (merger).

Cooperation between two companies owning patents that block each other's products is a good example of the principle. Without some form of cooperation, neither company can bring a product to market. (The same would be true if each company possessed know-how that could only lead to a commercially viable product when combined with the other company's know-how.) This being the case, competition cannot reduced if the companies agree to jointly market and sell a product using both of their patents. Alternatively, they could sign a cross-license, or form a patent pool if they seek to license their patents to third parties as well. Assuming that the patents were valid and blocking, it is hard to see how cooperation between the two companies could do anything other than augment competition. Three recent cases involving patent pools are the FTC's 1998 action against Summit and VisX in the market for laser eye surgery, and the Justice

Department's 1997 approval of the MPEG consortium and 1998 approval of cooperation to promote the DVD standard.

A much harder set of cases arises when products that *today* are complements have the prospect of evolving over time to become substitutes. This pattern arises as part of the Microsoft case: will Netscape's browser evolve from a complement to Windows to a genuine substitute for Windows, in conjunction with the Java programming language?

Unilateral conduct by dominant firms

Finally, I turn to the thorniest area for competition policy in the information economy: the nature of the limits to be placed on conduct by dominant firms.

General principles

I have made it clear that monopoly power is not a casualty of the information age. Monopoly power lives, often based on control over bottlenecks or interfaces. Certainly one should not merely look at a fleeting high market share as indicative of monopoly power, but neither does rapid innovation imply the absence of any such power.

The primary role of competition policy, in my view, is to prevent dominant firms from blockading innovation that would threaten their current position. I see no reason why antitrust law, at least in the United States, needs to transform itself to deal with dominant firms in the information, communications, and entertainment industries in the years ahead.

Nintendo's position in the video game market offers a good example of the uses and limits of antitrust in high-tech: Nintendo held a dominant position from roughly the mid-1980s through the early 1990s, at which time competition from the Sega Genesis, and later the Sony Playstation, grew stronger. Yet I still consider Nintendo's exclusivity policies with game developers to have been anticompetitive: from 1985 until 1992 Nintendo would only allow a game to appear on its system if the game developer agreed not to make that game available on the rival Atari and Sega systems for a two-year period.[12] Policies that prolong monopoly power can be anti-competitive, even if that power will ultimately be eroded by the forces of technological progress.

Looking at the traditional areas of monopolization and abuse of dominance, some categories of conduct in high-tech markets seem quite amenable to antitrust limits, while others present more hazards than opportunities for competition policy. I see no reason why exclusive dealing contracts and their close cousins cannot be attacked on antitrust grounds in the information sector as in other areas. The same is true of tying when used to blockade two-level entry. But I urge caution when invoking the 'essential facilities' doctrine, especially when this involves mandatory licensing, as in the recent *Image Technical Services* v. *Kodak* case from the Ninth Circuit Court of Appeals. And the usual hazards associated with predatory pricing cases are brought into stark relief for information products, with their very low marginal costs.

US v. *Microsoft*

The highly visible case of the *United States* v. *Microsoft* provides an excellent vehicle for seeing high-tech antitrust in action. I will not recount here in detail the primary allegations being made by the Justice Department, but less the extensive factual record that has now been developed at trial. Suffice it to say that the case is ultimately about whether Microsoft has acted to defend its operating system monopoly by blockading an entrant, Netscape with its browser, that could grow to become a threat. The case also involves claims that Microsoft has suppressed competition in the browser market itself, but I consider the core concern to be that of defense of the operating system monopoly. Indeed, one of Microsoft's arguments is that there is no distinct browser market, because the operating system will some encompass the functionality that once was offered only in stand-alone browsers.

The Justice Department complaint described various exclusionary contracts that Microsoft allegedly entered into with various partners and customers, specifically Original Equipment Manufacturers (OEMs), Internet Service Providers (ISPs) and Internet Content Providers (ICPs). Whether or not the facts ultimately show that these contracts damaged competition, Justice's attack of exclusionary contracts entered into by a monopolist is squarely within established antitrust jurisprudence. Some samples from the Complaint:

> Virtually every new PC that comes with Windows, no matter which OEM has built it, presents users with the same screens and software specified by Microsoft. As a result of Microsoft's restrictive boot-up and desktop screen agreements, OEMs are deprived of the freedom to make competitive choices about which browser or other software product should be offered to their customers, the ability to determine for themselves the design and configuration of the initial screens displayed on the computers they sell, and the ability to differentiate their products to serve their perceptions of consumers' needs. These restrictive agreements also maintain, and enhance the importance of, Microsoft's ability to provide preferential placement on the desktop (or in the boot-up sequence) to various Internet Service Providers ('ISPs') and Internet Content Providers ('ICPs'), in return for those firms' commitments to give preferential distribution and promotion to Internet Explorer and to restrict their distribution and promotion of competing browsers.
>
> Microsoft's agreements with ISPs allow Microsoft to leverage its operating system monopoly by conditioning these ISPs' inclusion in Windows' lists on such ISPs' agreement to offer Microsoft's Internet Explorer browser primarily or exclusively as the browser they distribute; not to promote or even mention to any of their subscribers the existence, availability, or compatibility of a competing Internet browser; and to use on their own Internet sites Microsoft-specific programming extensions and tools that make those

sites look better when viewed through Internet Explorer than when viewed through competing Internet browsers. Microsoft's anticompetitive agreements with ISPs have substantially foreclosed competing browsers from this major channel of browser distribution. Over thirty per cent of Internet browser users have obtained their browsers from ISPs.

Microsoft has also entered into exclusionary agreements with Internet Content Providers ('ICPs') - firms such as Disney, Hollywood Online, and CBS Sportsline, that provide news, entertainment, and other information from sites on the web. One of the new features included in Internet Explorer 4.0 is the provision of 'channels' that appear on the right side of the Windows desktop screen after Internet Explorer 4.0 has been installed on a Windows 95 PC. The same channels will appear automatically on the Windows 98 desktop screen if Microsoft is permitted to tie Internet Explorer 4.0 to Windows 98 in license agreements with OEMs and in sales to consumers. Microsoft provides different levels of channel placement, 'platinum' being the most prominent. Under Microsoft's Internet Explorer 4.0 channel agreements, beginning in mid-1997, ICPs who desired 'platinum' placement (and even some seeking lower-level placement) were required to agree: (a) not to compensate in any manner the manufacturer of an 'Other Browser' (defined as either of the top two non-Microsoft browsers), including by distributing its browser, for the distribution, marketing, or promotion of the ICP's content; (b) not to promote any browser produced by any manufacturer of an 'Other Browser'; (c) not to allow any manufacturer of an 'Other Browser' to promote and highlight the ICP's 'channel' content on or for its browsers; and (d) to design its web sites using Microsoft-specific, proprietary programming extensions so that those sites look better when viewed with Internet Explorer than when viewed through a competing browser.

Given the extensive coverage afforded to this case, and my overall point that the Microsoft case is by far from the only one at the intersection of antitrust and the information economy, I will not offer here any detailed analysis of that case. Suffice it to say that the outcome of this case will have potentially profound implications for how *monopolization* claims are viewed in high-tech industries. However, the case is unlikely to lead to great changes in the law or in enforcement policies regarding mergers and standard-setting, whatever its final outcome.

Conclusion

In a world of networks, where interfaces, compatibility, standards, and bottlenecks take on great significance, competition authorities cannot afford to stand on the sidelines just because innovation is rapid. On the contrary, competition authorities have a duty to prevent today's dominant firms from stifling innovation that threatens their leadership.

I am hopeful that competition authorities are up to the task. Looking at the US experience, merger policy is on a sound footing, and antitrust is not impeding companies from cooperating when necessary to combine their offerings and to establish standards. Regarding unilateral conduct by dominant firms, the Justice Department's recent action against Microsoft will likely have a profound effect on how monopolization cases are viewed in the information economy.

Acknowledgements

I am deeply indebted to my co-authors on related projects. I have learned a great deal about the information economy, the Internet, and on-line commerce from my colleague Hal R. Varian, Dean of the School of Information Management and Systems at the University of California at Berkeley. This chapter draws from our book, *Information Rules: A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999. See http://www.inforules.com for more information. I also am relying heavily on my colleague Michael L. Katz, and our joint paper, 'Antitrust in Software Markets,'which can be obtained at http://haas.berkeley.edu/~shapiro/software.pdf.

Technical appendix: pricing of components and systems

The Model

Consider a situation in which two components, A and B, are used in fixed proportions to constitute a system. Let the unit cost of components A and B be c_A and c_B respectively. Call the unit cost of a system $c_S \equiv c_A + c_B$. By making c_A and c_B invariant with respect to the institutional setting (see below), we are assuming that there are no economies or diseconomies of scope if the system is assembled within one firm vs. two. The focus here is thus entirely on pricing incentives for a given cost structure. The results here are well known in the fields of microeconomics and industrial organization, but their implications for antitrust may not be fully appreciated. The treatment here is intended to illustrate some standard theoretical results, not to break new ground.

There are many examples of (actual or nearly) fixed-proportion components in the information sector, including (a) a computer and a monitor; (b) a computer and an operating system; or (c) a microprocessor and a chipset within the computer. We explore here the pricing of the components, and the system, in three different institutional settings.

The first setting is that of an *integrated firm* that manufacturers and assembles the entire system. Call the unit cost of the system $c_S \equiv c_A + c_B$. Call the price of the system to consumers, to be set by the seller, p_S.

The second setting is a *vertical chain* in which firm A manufactures and sells component A to firm B, which then combines the A component with the B component and sells the resulting system to consumers. Firm B sets the system

price p_S. In this case, call p_A the price for component A that firm A charges to firm B.

The third setting involves the *complements*: each of the two firms, A and B, sells its component to the consumer, which then combines the components into a system. In this case, call the prices charged by the two firms p_A and p_B; the system price faced by the consumer is $p_A + p_B$.

Consumers ultimately care about the total price of the system, p_S, which governs the demand for systems. Call this demand relationship $\chi_S = D(p_S)$, where χ_S is unit sales of systems, and the demand function, $D(\cdot)$ is downward sloping, exhibits declining marginal revenue, and satisfies the usual regularity conditions for oligopoly theory. We will illustrate our results using the constant-elasticity demand curve, $D(p_S) = p_S^{-\varepsilon}$. Note for use below that in this special case - $D(p_S/D'(p_S)' = p_S/\varepsilon$. Note also that in general – $D(p_S)/D'(p_S)$ is equal to the difference between price and marginal revenue at the price p_S, or, equivalently, at output level $D(p_S)$.

Integrated firm

With a single, integrated, firm, we have a standard monopoly pricing problem. The firm's problem is to pick p_S to maximize

$$D(p_S)(p_S - c_S).$$

The standard solution can be written as

$$p_S - c_S = -\frac{D(p_S)}{D'(p_S)}.$$

With constant-elasticity demand, this gives the standard mark-up rule

$$p_S = \frac{c_S}{1-1/\varepsilon}.$$

Vertical chain

If firm A sets a single, uniform price p_A selling to firm B, which in turn sets a single uniform price selling to consumers, we have the standard "chain of monopolies'' problem. A standard result is that prices are higher under this structure than with an integrated monopolist.

The resulting price is obtained in two steps. First, consider how firm B prices the system for a given price p_A set by firm A. Effectively, firm B now has a unit cost of each system of $p_A + c_B$. Naturally, this leads to a higher system price to consumers that would unit costs of $c_A + c_B$, as in the integrated case just above. Firm B thus prices according to the rule

$$p_S - (p_A + c_B) = -\frac{D(p_S)}{D'(p_S)}.$$

With constant-elasticity demand, substituting for $-D/D'$ gives

$$p_S\left(1-\frac{1}{\varepsilon}\right) = p_A + c_B.$$

The next step is to determine A's optimal pricing, given B's demand as reflected in the equation just above. This is analogous to the Stackelberg problem in standard oligopoly theory. Firm A sets p_A to maximize $D(p_S)(p_A - c_A)$, where p_S is determined by the relationship just above. In the case of constant elasticity of demand, using the linear relationship between p_S and p_A noted above, a series of calculations leads the following expression for the resulting systems price:

$$p_S = \frac{c_S}{(1-1/\varepsilon)^2}.$$

Complements

If firms A and B each set prices independently for their components, the problem is analogous to Cournot oligopoly, as opposed to the Stackelberg solution just derived. Firm A sets p_A to maximize

$$D(p_A + p_B)(p_A - c_A),$$

taking p_B as given. Since $dp_S/dp_A = 1$ in this situation, the resulting first-order condition is simply

$$D(p_S) + D'(p_S)(p_A - c_A) = 0.$$

Firm B does likewise, giving the analogous condition for p_B of

$$D(p_S) + D'(p_S)(p_B - c_B) = 0.$$

Adding up these two first-order conditions gives

$$2D(p_S) + D'(p_S)(p_S - c_S) = 0,$$

which can be rewritten as

$$p_S = c_S - 2\frac{D(p_S)}{D'(p_S)}.$$

Note that this equation is identical to the equation for the integrated firm, except for the factor of two on the right-hand side.

In the special case of constant-elasticity demand, we have

$$p_S = \frac{c_S}{1-2/\varepsilon}.$$

Notice that this special case becomes internally inconsistent if the elasticity of demand is less than two. (Each firm will want to set arbitrarily high prices.)

Pricing comparisons

We know that in general the system price set by the integrated firm is lower than the price under the vertical chain or complements. The intuition behind this result is as follows. Lower prices for one component generate a positive external effect of the owner of the other component. These externalities are internalized through integration, leading to lower prices. However, this intuition alone does not tell us whether the prices are highest under complements or the vertical chain.

In the case of constant elasticity of demand, the resulting systems prices are

$$p_S^I = \frac{c_S}{1-1/\varepsilon},$$

for the integrated firm,

$$p_S^V = \frac{c_S}{(1-1/\varepsilon)^2},$$

for the vertical chain, and

$$p_S^C = \frac{c_S}{1-2/\varepsilon},$$

for the independent pricing of complements. Direct comparison of these prices reveals that the system price is lowest for the integrated firm, somewhat higher for the vertical chain, and highest of all under the complements arrangement.

In the case of constant elasticity of demand, prices are lower under the vertical chain than under complements because the upstream firm, which we have denoted by firm A, recognizes that firm B will *raise* its own component price in response to A's higher price. Put differently, the system price will go up by more than one unit, for every unit increase in p_A. Another way to say this is that firm B's reaction curve (optimal p_B as a function of p_A) is upward sloping. (This follows from the fact that a monopolist facing constant elasticity of demand, firm B, more than passes through any increases in unit costs, p_A.) Recognizing this reaction, firm A sets a lower price under the vertical chain than under complements pricing. It follows that the systems price is lower, because firm B is setting its optimal component price given p_A under either the vertical chain or complements structure.

More generally, the comparison of system prices between the vertical chain and complements depends upon whether the reaction curve of firm B is upward or downward sloping. Put differently, prices are higher under complements if and only if cost increases are more than passed through to final consumers. Formally, this occurs if and only if $dp_S/dp_A > 1$ in the vertical chain setting. (We always have $dp_S/dp_A = 1$ in the complements setting.) Since in general the vertical chain systems price is given by

$$p_S + \frac{D(ps)}{D'(ps)} = p_A + c_B,$$

the comparison hinges on the derivative of the left-hand side of this equation with respect to p_S. A few steps of calculus tell us that prices are higher in the complements case if and only if the ratio $D(p_S)/D'(p_S)$ is declining in p_S, which is equivalent to

$$D'(p_S)D'(p_S) < D(p_S)D''(p_S).$$

(For simplicity, I am assuming that these various conditions hold or fail uniformly at all points on the demand curve.) This condition is always met for constant elasticity of demand.

Note, however, that the condition just provided always *fails* for linear (or concave) demand. Under those conditions, prices are higher in the *vertical chain* setting.

We can illustrate these points by solving the linear case explicitly. Suppose that demand for systems is given by $D(p_S) = K - p_S$. For simplicity, and without (further) loss of generality, let c_A and c_B equal zero. The integrated firm maximizes $(K - p_S)p_S$, which involves a systems price of $K/2$. Under complements, firm A maximizes $(K - p_A - p_B)p_A$, which gives a reaction curve of $p_A = (K - p_B)/2$. Solving for the equilibrium prices gives $p_A = p_B = K/3$, for a systems price under complements of $2K/3$.

Finally, under the vertical chain arrangement, firm B's response to p_A is $p_B = (K - p_A)/2$, so firm A, the first mover, maximizes $(K - p_A - (K - p_A)/2)p_A$. The solution to this is given by $p_A = K/2$, causing B to set a component price of $K/4$, with a resulting systems price of $3K/4$. In this case, the systems price responds *less* than one-for-one to increases in p_A, so firm A is led to set a higher price under the vertical chain than under complements. In the linear case, firm A charges $K/2$ for its component, rather than $K/3$, an increase of $K/6$. However, firm B lowers its component price in response from $K/3$ to $K/4$, a decrease of only $K/12$ (the slope of B's reaction function is only 1/2). As a result, the final systems price rises from $2K/3$ under complements to $3K/4$ under the vertical chain, an increase of $K/12$.

Notes

1 For a thorough treatment of competitive strategy in the information economy, see Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

2 This section is drawn in part from my paper with Michael Katz, 'Antitrust in Software Markets'.

3 This is true whether the firms engage in pricing competition or quantity competition. See Davidson and Deneckere (1985) and Farrell and Shapiro (1990), respectively.

4 See Shapiro (1996b) for an accessible treatment of gross margins and diversion ratios in merger analysis. See Werden and Froeb (1994) for a more extensive analysis using the 'logit' model of demand.

5 The DOJ and FTC revised the 1992 *Guidelines* in 1997 to articulate more fully how efficiencies would be handled in the merger review process. Although the stated intention of the agencies was to be more receptive to efficiency claims, it remains to be seen how this will work in practice.

6 I have been involved in many of these merger reviews. In particular, I worked for the FTC in the Adobe/Aldus merger, for the DOJ in the Microsoft/Intuit and Computer Associates/Legent deals, for the merging parties in the Borland acquisition of Ashton-Tate, and for DIRECTV in the Primestar matter. In the vertical mergers discussed below, I was retained by the acquiring firm in the Silicon Graphics/Alias/Wavefront, the Time Warner/Turner, and the Cadence/CCT deals. The statements in this chapter are not intended to represent the views of either the government agencies or the companies involved.

7 The experience of Computer Associate's 'Simply Money' program in this market is instructive regarding entry barriers in software. Even though Computer Associates virtually gave its program away, and received some favorable reviews, it still could not gain wide acceptance.

8 FTC press release, 31 March 1997, at www.ftc.gov/opa/9703/autodesk.htm.

9 *Decision and Order in the Matter of Silicon Graphics, Inc.*, Docket No. C-3626, November 1995. The FTC also required that SGI offer independent entertainment graphics software companies participation in its software development programs on terms no less favorable than those offered to other types of software companies.

10 See Chapter 8 of *Information Rules* for a more complete discussion of compatibility and cooperation.

11 See my recent paper with Michael Katz for a more extensive discussion of standard setting and antitrust. The highly successful CD standard has been challenged in a private action, *Disctronics Texas, Inc., et al.* v. *Pioneer Electronic Corp. et al.* Eastern District of Texas, Case No. 4:95 CV 229.

12 I testified for Atari Corporation against Nintendo in their antitrust trial. Nintendo was not found to have violated the antitrust laws.

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9 Regulating manufacturers and their exclusive retailers

Margaret E. Slade

Introduction

In most Western economies, a very large fraction of retail sales are subject to some form of exclusive-dealing clauses.[1] Within this class, new-automobile sales dominate. Other products and services, however, such as gasoline, fast food, and business services, are also important. Most of these exclusive-retailing arrangements can be grouped under the umbrella of franchising.

Within the realm of franchising, there are two commonly used modes. Traditional franchising, which involves an upstream producer and a downstream seller (e.g., gasoline), is more important from a sales-revenue point of view. Business-format franchising, however, is growing faster.[2] With business-format franchising, production takes place at the retail outlet (e.g., fast-food). In this chapter, I consider the traditional manufacturer–retailer relationship.

The products that are sold through exclusive-retailing arrangements are most often branded and are thus not homogeneous from the consumer's point of view. It is well known in the economics literature that differentiation, whether it results from the brand name, the spatial location of the retail outlet, or any other source, endows a seller with some degree of pricing power.[3] Furthermore, manufacturers of consumer products are apt to operate in markets that can be classified as oligopolistic rather than perfectly competitive. At the upstream or manufacturing level, pricing power can be due to economies of scale that limit entry, exclusive trademarks, or unique product features.

When both upstream and downstream firms possess some degree of pricing power, the monopoly market failure is compounded. Indeed, since each firm extracts a profit, there are successive output restrictions that result in retail prices that are higher than those that would be chosen by a single vertically integrated producer/retailer pair. This phenomenon is usually referred to as double marginalization.[4] Furthermore, the manufacturer's profit is lower, and the sum of manufacturer and retailer profits can be lower under double marginalization than under integration.[5] One might therefore expect manufacturers to sell their products themselves or through vertically integrated subsidiaries. However, although such arrangements exist, they do not dominate retail markets. Indeed, retail markets tend to be organized according to one of several standard forms.