

Antitrust, Innovation, and Intellectual Property

Testimony Before the Antitrust Modernization Commission

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1. Introduction

Thank you for the opportunity to appear here today. I am Carl Shapiro, the Transamerica Professor of Business Strategy in the Haas School of Business, and Professor of Economics in the Department of Economics, at the University of California at Berkeley, where I have taught since 1990. I also am Director of the Institute of Business and Economic Research, an Organized Research Unit at U.C. Berkeley. I have served as the Editor and Co-Editor of the *Journal of Economic Perspectives*, a leading economics journal published by the American Economic Association. I also am a Senior Consultant and Member of the Board of Directors at CRA International, an economic consulting firm.

I am an economist who has been studying antitrust, innovation, and competitive strategy for roughly twenty-five years. I have written numerous articles in the area of antitrust economics, many of them addressing issues relevant to industries experiencing rapid technological change. My curriculum vitae and recent articles are available at <http://faculty.haas.berkeley.edu/shapiro>. My book with Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy*, has been widely read and cited. Some of my opinions in this area are explained in the 2002 report I prepared for the OECD, "Competition Policy and Innovation," which is available at <http://faculty.haas.berkeley.edu/shapiro/oecd.pdf>. Recently, my research has focused on patent licensing, patent settlements, and patent reform.

I also have considerable practical experience applying economics for the purpose of enforcing the antitrust laws in high-technology industries. I served as the Deputy Assistant Attorney General for Economics in the Antitrust Division of the U.S. Department of Justice during 1995 and 1996. I have served on numerous occasions as an expert witness or consultant to the Antitrust Division or the U.S. Federal Trade Commission. I also have consulted or served as an expert witness on numerous antitrust matters for private companies, including a number of monopolization and merger cases in which innovation and intellectual property were central.

2. General Approach to Antitrust, Innovation and Intellectual Property

A. Antitrust for the “New Economy”?

The Commission has posed several questions relevant to antitrust in the “New Economy.” While catchy, the phrase “New Economy” tends to suggest the need for a “New Economics,” which I submit is neither justified nor desirable. One of the most often quoted passages from *Information Rules* states: “Technology changes. Economic laws do not.” Hence, a certain conservatism runs through my testimony here: the Commission should be wary of proposals to modify the antitrust laws, or their enforcement, based on claims that we are living in a “New Economy.” True, we are experiencing a shift in economic activity from the industrial sector to the information sector (broadly defined). True, certain economic forces like network effects and switching costs are more significant than twenty or one hundred years ago. But the same economic principles that have guided antitrust law and policy for the past century remain relevant and valid today. Nor does the rapid pace of technological progress in some industries itself imply that our core antitrust laws are outdated. To the contrary, innovation has been the driver of American economic growth since at least the passage of the Sherman Act in 1890. To believe that the basic economic forces now governing innovation, commercial success, and monopoly power are unprecedented is a dangerous conceit.

While I resist the term “New Economy,” I embrace the formulation actually contained in the Commission’s “New Economy Study Plan,” which focuses on the *economic characteristics* of certain industries, namely those in which innovation, intellectual property, and technological change are central features. In such “innovative industries,” antitrust must pay careful attention to the incentives and obstacles facing firms seeking to develop and commercialize new technologies, and antitrust must very explicitly recognize that market conditions, business strategies, and industry structure can be highly dynamic.

B. Innovation is King

I take as a starting point that, at least over the medium to long term, the lion’s share of consumer benefits associated with competition in our most dynamic industries results from innovation. Here I use the term “innovation” broadly, including the introduction of new and improved products as well as the adoption of new business methods and production processes. Put simply: “Innovation is King.”

If we accept that innovation is king, at least in certain industries, what does this principle imply for antitrust law and policy? I have no easy answer to this question, but rather a warning.

Some observers argue as follows: (1) innovation is king; (2) firms rarely if ever obtain market dominance without having been innovators at some point in time; so (3) laws limiting the business strategies of dominant firms reduce the rewards from achieving dominance and thus tend to slow the rate of technological progress. They add to this the assertion that (4) ongoing technological change can topple current market leaders; and thus claim that (5) durable monopoly power is rare. The conclusion is that antitrust should be extremely cautious of

imposing limits on the conduct of dominant firms, and perhaps even from preventing direct rivals in dynamic industries from merging.

The following counterargument reveals why any such sweeping conclusion is unwarranted: (1) yes, innovation is king; and (2) true, firms rarely obtain market dominance without having been innovators at some point in time; but (3) it does not follow that antitrust laws limiting the returns to dominant firms are undesirable. If that were true, we should give innovators waivers from other laws, such as environmental and labor laws, an absurd result. Furthermore, major innovations often come from lean and hungry firms introducing disruptive technologies, hoping to topple current market leaders, rather than from dominant incumbents who profit greatly from the status quo. So (4) to promote technological progress we must prevent dominant firms from abusing their power to hold back smaller, innovative rivals who would overtake them, or else (5) today's market leaders may be able to maintain or extend their dominance while slowing the pace of innovation. Indeed, the stultifying effects of monopoly may be most worrisome when they retard the pace of innovation and perpetuate the status quo.

3. General Questions Posed by the Commission

I now address the Commission's general questions regarding the antitrust analysis of industries in which innovation, intellectual property, and technological change are central features.

1. Does antitrust doctrine focus on static analysis, and does this affect its application to dynamic industries?

In my experience, antitrust doctrine does not focus on static analysis. To answer more fully, it is instructive to distinguish between three categories of antitrust cases: (a) price fixing; (b) mergers; and (c) monopolization.

In price fixing cases, antitrust analysis necessarily focuses on whether the defendants in fact entered into an agreement to control prices or quantities. This inquiry is necessarily historical, although it need not be static. For example, an industry might experience certain cyclical or seasonal variations that either disrupt or disguise collusion. To my knowledge, no serious observers are arguing that enforcement of the antitrust laws against price fixing has slowed innovation, or is undesirable in innovative industries, so I presume that the Commission's interest in "new economy" issues does not primarily involve price fixing cases.

Merger analysis must always be forward looking, while grounded in the actual, historical experience in the industry. Recent merger enforcement has been informed and flexible enough to recognize situations in which historical market shares, for example, provide a poor guide to future competitive effects. In some cases, the future competitive significance of one of the merging firms is likely to be far less than would be indicated by its historical market share. This could occur, for example, if the firm in question had failed recently to introduce new and improved products comparable to those offered by its rivals and has no promising new products in the pipeline. In other cases, we observe that one of the merging firms with a small historical market share has recently entered the market, or introduced a vastly improved product, or is developing a promising new product. That firm's future competitive significance is greater than

its historical share alone would indicate. More generally, the government enforcement agencies and merging parties must ground their predictions of future competitive effects in the historical record, carefully identifying recent and emerging trends in technology, business strategies and capabilities, and other factors such as the expiration of patents or entry and exit by non-merging parties. Gone are the days when the government could rely heavily on a static measure of market shares to challenge a merger in a dynamic industry. Modern merger analysis is far from static.

Nor is antitrust doctrine towards monopolization static. In my experience, courts and enforcement agencies recognize that current dominance may not persist and are open to the arguments of an alleged monopolist that it could lose its position of leadership rapidly if it were to serve its customers poorly. But accepting the need to consider market dynamics does not and cannot mean that no firm has durable monopoly power. The harder questions arise when we seek to assess the durability of monopoly power in dynamic industries. The obvious starting point is to ask how long the firm has enjoyed a dominant position using some measure of market share. While a firm that has long captured a dominant share of the market *might* lose share rapidly, some good reason needs to be provided why this is likely to be the case. Perhaps a strong threat is emerging in the form of a superior product or service that has recently been introduced or soon will be introduced. Simply identifying threats that the dominant firm tracks in the normal course of business falls far short of showing that these threats are likely to erode the dominant firm's monopoly power in the near future.

The video game industry provides a nice example of monopoly power in a dynamic industry. I testified in the early 1990s on behalf of Atari Corporation in its antitrust case against Nintendo. The primary conduct at issue was Nintendo's exclusive contracts with third-party game developers. During the late 1980s, Nintendo enjoyed a commanding share of the U.S. video game business. Sega and Atari had much smaller sales of consoles and cartridges. Nintendo argued that it had achieved its position of leadership through innovation, and that leadership in this industry could change quite rapidly, twelve-year old boys being a fickle crowd. I agreed that Nintendo might well cease to be dominant in the future, but noted that Nintendo's dominance in the early 1990s was not transitory: Nintendo had captured a very large share of the market for at least five years. We now know that Nintendo later lost its dominant position, facing strong rivalry by the late 1990s from Sony and Microsoft. That observation does not diminish legitimate antitrust concerns about conduct by Nintendo that allegedly maintained its dominance and harmed consumers for several years.

As a rule of thumb, a reasonable working hypothesis is that a firm with a very large market share that has persisted for several years or more in a market with relatively stable contours has durable monopoly power. To test that hypothesis, however, requires evidence that the firm truly possesses monopoly power, as reflected by the ability to maintain prices above competitive levels or to exclude rivals, not just by a large market share. Even if historical monopoly power is established, one must still check that there are no major, predictable changes in technology or other market conditions that are likely to disrupt that dominance in the near future. The shorter is the time period over which the firm has commanded a large market share, the less significant is its current market share and the more likely that the firm's current advantage is transitory, based on some smart or lucky business decision that has yielded a temporary competitive advantage but will soon be copied or improved upon by others. On the other hand, if market

shares have been relatively stable over a number of years, the mere fact that technology is advancing rapidly does not imply that durable market power is absent.

2. What features, if any, of dynamic, innovation-driven industries pose distinctive problems for antitrust analysis, and what impact, if any, should those features have on the application of antitrust analysis to these industries?

Antitrust analysis in dynamic industries can be challenging when one needs to make reliable projections of future industry conditions. Such projections are necessary in merger cases and frequently needed for monopolization cases. Yet these projections inevitably tend to be less reliable in highly dynamic industries than in more settled and stable industries. In industries where market leadership and market shares are highly volatile, significant market power is more difficult to obtain or retain, implying a lessened need for antitrust intervention.

Collaboration among industry participants may be especially important in dynamic industries. For example, if product compatibility standards enhance the value of new products due to network effects, there are legitimate reasons for rival producers to cooperate to establish such standards. In other settings, collaboration between suppliers of complements, such as hardware and software, or content and distribution, can lead to more rapid product introduction, improved products and services, or lower prices. Antitrust doctrine, with its emphasis on limiting coordination among competitors, can have difficulty distinguishing pro-competitive collaboration from collusion, especially in situations where two parties may have complex relationships that involve competition in some areas and collaboration in other areas. These complexities are the norm for large firms in the information technology sector of the economy.

Intellectual property rights play an especially critical role in innovative industries, and thus raise a number of thorny issues for antitrust analysis of these industries. The intersection between intellectual property law and antitrust law has been studied in great detail, with some observers focusing on the alleged “tension” between these two bodies of law. Fundamentally, I do not believe there need be any such tension, at least if antitrust law properly recognizes the importance of providing incentives, along with the necessary flexibility, for industry participants to conduct research, engage in product development, and diffuse the resulting innovations widely in the marketplace. However, certain specific issues regarding intellectual property rights and antitrust are gaining saliency as the number of patents grows, as the quality of those patents is called into question, and as patents play an increasingly central role in the business strategies of companies in certain sectors of the economy, including the information technology sector. Several aspects of patent licensing pose distinctive problems for antitrust analysis in innovative industries, especially those experiencing a surge in the number of patents issued: package licensing; cross-licenses; patent pools; and agreements to settle patent litigation.

Lastly, determining when and whether to intervene in dynamic industries can be especially difficult in the presence of switching costs, network effects, and other factors than can cause a market to “tip” towards one supplier or one technology in a lasting manner. A snapshot of market shares may suggest effective competition between two or more firms, yet if one firm has a sizeable market share that is rapidly growing, that firm may come to dominate the market in a manner that will be difficult to reverse. In such cases, one must assess (a) whether such a firm

truly is likely to obtain a dominant position in the near future, and, if so, (b) whether the firm's growing market share is the result of legitimate competition or anti-competitive behavior, and (c) whether the market will remain sufficiently fluid or dynamic to discipline that firm's behavior, even if it does achieve a dominant market position.

3. Are different standards or benchmarks for market definition or market power appropriate when addressing dynamic, innovation-driven industries, for example, to reflect the fact that firms in such industries may depend on the opportunity to set prices above marginal costs to earn returns? Or, are existing antitrust principles sufficiently flexible to accommodate the facts relevant to dynamic industries?

No, different standards or benchmarks for market definition or market power for innovative industries are neither necessary nor desirable.

In answering this question, I must emphasize that defining relevant antitrust markets and assessing market power are merely intermediate steps in an antitrust analysis. For horizontal mergers, market definition can be quite important, but only to the extent that the resulting market shares are used to infer competitive effects. For monopolization cases, the assessment of market power plays the role of a screen, but monopoly power alone cannot trigger liability without the presence of some anticompetitive conduct.

There is a great deal of confusion in antitrust law about the proper ways to test for and measure market power. Part of this confusion stems from the way in which the term "market power" is usually defined in economics textbooks. Most economics textbooks state that a firm has "market power" if it has any control over the price it receives for its products, as distinct from a price-taking firm in a perfectly competitive market. The gap between price and marginal cost, $(P-MC)/P$, is widely known as the Lerner Index of market power.

The gap between price and marginal cost is frequently an important piece of information for antitrust purposes. For example, this margin is highly relevant when estimating the unilateral effects of a horizontal merger. The Lerner Index measures what I like to call "technical market power." The Lerner Index summarizes information about the availability of substitutes (at current prices) for the firm's product: standard pricing theory teaches that the Lerner Index is equal to the inverse of the elasticity of demand facing a firm. (With price discrimination, different values of the Lerner Index arise for different sales made to different customers.)

Confusion arises, however, because the gap between price and marginal cost, taken alone, is not a useful measure of market power *as that term is used in antitrust law*. Many, many firms have technical market power but no real market power from an antitrust perspective. Virtually every movie theatre, magazine, restaurant, and retail store sets the prices for its products well above their marginal costs. Few of these firms have meaningful market power in an antitrust sense: they are unable to maintain prices above competitive levels or exclude competitors from the market. For very similar reasons, while firms engaging in price discrimination must have some technical market power, the vast majority of them lack real antitrust market power.

For the purpose of measuring antitrust market power, we need to ask whether a firm is able to maintain prices above the *competitive price*. Over the long run, the competitive price covers all costs, including a risk-adjusted cost of capital. (In the short run, competitive prices can be above or below this level: above if additional investment is needed to meet demand, below if demand has fallen, leaving stranded, industry-specific capital.) In this sense, the long-run competitive price equals average cost. However, marginal cost is commonly less than average cost. This relationship is especially likely to hold if there are large fixed costs. Since R&D costs often do not vary with the scale of output, such fixed costs are common in innovative industries. In my experience it is common in the technology sector for firms to follow a rule of thumb that involves investing some percentage of revenues into R&D; hence, long-term viability requires sufficient margins to fund ongoing R&D efforts. Fixed costs also are very common in industries that create informational content. Indeed, in some of these markets, such as those for movies or music, that involves “hits” and “duds,” it is well understood that the large margins earned on the “hits” are necessary to compensate for the larger number of “duds” that are inevitable.

For all of these reasons, competitive prices are often above marginal cost in innovative industries, and sometimes far above marginal cost. This basic economic observation is not new, either in practice or in theory: it holds in any industry with large fixed costs, from railroads to microprocessors, from newspapers to computer software. Indeed, back in the 1930s, Edward Chamberlin and Joan Robinson worked out the theory of competition with differentiated products, demonstrating that competitive, equilibrium prices in these industries must exceed marginal cost.¹

Summarizing, it is an error to infer genuine antitrust market power based on the gap between price and marginal cost. This error may be more common or more pronounced in innovative industries, but it is not confined to such industries. The gap between price and marginal cost provides a necessary return to cover various fixed costs, including R&D costs in innovative industries and the “first-copy” costs in content-based markets. The key point to bear in mind here is that the competitive price can easily and significantly exceed marginal cost. Existing antitrust principles are sufficiently flexible to recognize that a gap between price and marginal cost, taken alone, does not imply the presence of true antitrust market power. However, the Commission might play a useful role by emphasizing these economic principles in order to help Courts improve the accuracy and sophistication of their antitrust analysis in innovative industries.

4. Specific Questions Posed by the Commission

- 1. Should there be a presumption of market power in tying cases when there is a patent or copyright? What significance should be attached to the existence of a patent or copyright in assessing market power in tying cases and in other contexts?**

¹ See Edward Chamberlin, (1933), *The Theory of Monopolistic Competition*,” Cambridge, Harvard University Press, and Joan Robinson, (1934), *The Economics of Imperfect Competition*, London, Macmillan.

No, a patent or copyright should not create a presumption of market power.

Many patents are of limited commercial significance. Indeed, some two-thirds of patents lapse prematurely because their owners do not make the required maintenance payments.² The mere presence of a patent cannot and should not substitute for an inquiry into the presence of market power over the tying good. Likewise, many copyrights merely allow their owners to differentiate their products from many other similar products. Surely, not every owner of a copyrighted book or piece of music or computer software has market power in the sense required under tying law.

A patent is only important for the assessment of market power in a tying case if the patented technology confers a significant competitive advantage on the patent holder. This could occur if products practicing the patented technology are distinctly superior to products that do not use the patented technology, or if the patented technology enables significant cost savings. So, if the tying product is patented, one must still compare the attractiveness of rival, non-infringing products to the patented product. Many patents merely allow their owners to differentiate their products or enjoy a slight cost advantage, not enough to create genuine antitrust market power.

Likewise, many copyrights simply protect a particular creative work, like a piece of music or a book, or a computer game, without creating any real market power. However, in some cases, especially those involving computer software, copyrights can create significant market power by making it difficult or impossible for others to write software that is compatible or has a similar user interface. Determining whether a given copyright confers such power requires a fact-intensive inquiry; no such presumption is warranted in general. Copyrights over content are much less likely to confer meaningful market power than are copyrights that prevent other firms from offering similar functionality or compatibility, as in the area of information technology.

- 2. In what circumstances, if any, should the two-year time horizon used in the *Horizontal Merger Guidelines* to assess the timeliness of entry be adjusted? For example, should the time period be lengthened to include newly developed products when the introduction of those products is likely to erode market power? Should it matter if the newly developed products will not erode market power within two years? Is there a length of time for which the possession of market power should not be viewed as raising antitrust concerns?**

The *Horizontal Merger Guidelines* ask, in §3.0, whether “entry would be timely, likely, and sufficient in its magnitude, character and scope to deter or counteract the competitive effects of concern.” In *Guidelines* go on to state, in §3.2: “The Agency generally will consider timely only those committed entry alternatives that can be achieved within two years from initial planning to significant market impact.”

² See Mark Lemley, (2001), “Rational Ignorance at the Patent Office,” *Northwestern University Law Review*, 95:4, pp. 1497–532. The required fees are \$830 at 3½ years, \$1,900 at 7½ years, and \$2,910 at 11½ years.

For the purpose of answering this question, it is necessary to distinguish entry that *deters* anti-competitive conduct from entry that *counteracts* such conduct.

Entry That Deters Anti-Competitive Conduct: If the prospect of entry outside the two-year time frame would fully and reliably *deter* any anti-competitive conduct, even during the two-year time frame, such entry certainly should be included in the analysis of competitive effects, presumably then leading to a conclusion that the merger poses no danger to competition. This might occur, for example, if entry were certain to occur in response to the anti-competitive conduct and if the profits earned from the anti-competitive conduct prior to entry were smaller (in expected present discounted value) than the profits lost due to the subsequent entry. Presumably, this fact pattern is more likely, the larger is the scale of entry, the sooner the entry would occur, and the longer-lived are the industry-specific investments associated with the entry. One reason to place less weight on entry that takes longer to accomplish is that such entry is less likely in fact to deter anti-competitive conduct. But there is nothing magical about the two-year time horizon in this calculus.

Entry That Counteracts Anti-Competitive Conduct: A rather different logic applies when considering entry that would *counteract* anti-competitive conduct. As emphasized in the *Guidelines*, such entry must be timely, likely, and sufficient. For the purposes of answering the Commission's question, I will assume that the entry in question is likely and sufficient. Therefore, we can focus on what constitutes "timeliness." To pose the question crisply, suppose that sufficient entry would occur for sure precisely N months after the merger is consummated, and suppose that this entry would instantly counteract the anti-competitive effects of the merger. Therefore, the merger would lead to anti-competitive effects, and consumer harm, for N months, after which its effects would be neutralized. Under these circumstances, I can see no principled basis for simply ignoring those N months of consumer harm. Rather, I interpret the two-year time horizon for entry under the *Guidelines* to be a compromise: entry that is likely and sufficient and takes place in less than two years greatly limits any consumer harm, and as a policy matter (i.e., looking across mergers as a whole) such harm is likely to be offset by the various merger synergies that are difficult to demonstrate or measure and thus as a practical matter play little role in the antitrust analysis. So, I do not agree that enhanced market power resulting from a horizontal merger that lasts less than two years (say) is of no antitrust concern. Rather, I would say that enhanced market power due to a horizontal merger that is fleeting is much more likely to be offset by (difficult to prove) merger synergies than is more durable market power. In principle, this balancing would vary from one type of industry to another. For example, long-lived synergies might be more important in a growing market, suggesting a willingness to tolerate more short-term consumer in order to achieve them through merger. However, future benefits to consumers based on such synergies may need to be heavily discounted relative to immediate consumer harm in a dynamic industry subject to the arrival of a disruptive technology.

3. Should antitrust law be concerned with "innovation markets"? If so, how should antitrust enforcers analyze innovation markets? How often are "innovation markets" analyzed in antitrust enforcement?

I believe there is a consensus that antitrust law should be (and is) very much be concerned about *innovation competition*, i.e., competition to engage in research and development directed towards

new or improved goods or processes. The classic instances of innovation competition arise when two or more firms race to obtain a patent or to introduce new and improved products into the marketplace. The role of competition in spurring innovation is especially strong in markets with significant first-mover advantages.

Therefore, I interpret the Commission to be asking about the proper role of the “innovation market” construct, which is controversial, in antitrust analysis designed to protect and promote innovation competition, a mission that I believe is *not* controversial.

The DOJ/FTC “Antitrust Guidelines for the Licensing of Intellectual Property” at §3.2.3, state: “An innovation market consists of the research and development directed to particular new or improved goods or processes, and the close substitutes for that research and development.”

Taken at face value, this definition is peculiar: normally a “market” consists of a set of buyers, a set of sellers, and some goods or services that the buyers purchase from the sellers. In contrast, “innovation markets” are defined in terms of certain activities (research and development efforts) that are performed by certain organizations and involve no market transactions. Indeed, if the fruits of the R&D are licensed, i.e., if there is a market transaction associated with the relevant R&D, the “innovation market” concept does not apply. Instead, the applicable concept is a “technology market.” As stated in §3.2.2 of the IP Guidelines: “Technology markets consist of the intellectual property that is licensed (the ‘licensed technology’) and its close substitutes.”

The IP Guidelines motivate the “innovation market” construct by stating, at §3.2.3: “A licensing arrangement may have competitive effects on innovation that cannot be adequately addressed through the analysis of goods or technology markets. For example, the arrangement may affect the development of goods that do not yet exist.” Concerns that licensing agreements or mergers will retard innovation and thus adversely affect competition in product markets that do not yet exist have arisen most frequently in the pharmaceutical industry, where companies typically engage in a long development process to obtain FDA approval for new drugs. In principle, however, licensing agreements and mergers can affect future product markets in many industries. For example, a merger between two defense contractors with overlapping capabilities can adversely affect future competition for weapons systems that have not yet even been designed.

For expositional purposes, the remainder of my discussion of innovation markets will focus on horizontal mergers between firms pursuing R&D programs that might result in competing products in the future.

As best I can determine, as applied to mergers, the “innovation market” construct is primarily a way of evaluating potential future product-market competition by looking at current R&D efforts rather than at the future product-market competition itself. In principle, this is a useful and sensible approach: evidence about recent and planned R&D activities is likely to be more concrete and complete than evidence about future competition in a the market for a product that does not yet exist. So long as the analysis is rooted in reasonably foreseeable impacts on future product-market competition, this approach seems both justified and useful.

Still, there are some rather tricky points that frequently arise in conducting this type of future-looking analysis. I now comment on several of these points.

Identifying Innovation Rivals: Identifying today's innovation rivals, and tomorrow's product-market rivals, may be difficult. In a normal merger analysis, important rivals typically will be making significant sales to customers and thus will be easy to identify. When current rivalry is at the innovation stage, it may be much more difficult to identify the firms that are engaging in relevant R&D today and/or likely to be competitors in the relevant product market tomorrow. Presumably it is for this reason that the IP Guidelines, at §3.2.3, state: "The Agencies will delineate an innovation market only when the capabilities to engage in the relevant research and development can be associated with specialized assets or characteristics of specific firms." It remains unclear how often this requirement is met outside the specific institutional setting of the FDA approval process.

Uncertainties About Research Outcomes: The effect on actual product-market competition of a merger of two firms who are innovation rivals is inevitably somewhat uncertain and delayed. Such effects only arise in the future, when their innovative efforts lead to actual goods or services that customers might buy. And such effects will not arise unless at least one of the firms is in fact able to bring such products to market. For early-stage or highly risky innovation, some discounting of product-market effects is appropriate.

However, these observations do not imply that antitrust concerns in such cases lack merit. To illustrate, suppose that Firm A has an 80% chance of success and Firm B has a 40% chance of success (and one firm's success is independent of the other's). Then there is a 32% chance (80% times 40%) that both firms will succeed. I see no reason why antitrust law should be indifferent to consumer harm just because it will only occur with a 32% probability. Furthermore, competition between the two firms may cause both of them to press harder to be the *first* to succeed. If this is true, then competition also benefits consumers by speeding up the introduction of new products. The probability that at least one of the firms will succeed is 88% (the 80% chance that Firm A will succeed plus a 40% that Firm B will succeed in the 20% of the time that Firm A fails), so consumers will benefit from competition not only in the 32% of the time that both firms would succeed but also in the 56% of the time (80% times 60% that Firm A succeeds and Firm B fails, plus 20% times 40% that Firm A fails and Firm B succeeds) that one of the firms succeeds and the other fails to introduce a product into the market.

As a general rule of thumb, if the merging firms are expending significant resources on their R&D programs, they must believe that there are significant commercial returns, even recognizing that success is uncertain, so the potential impact on consumers also can be significant. In other words, if one is going to establish priorities for antitrust enforcement in this area, it makes more sense to base these priorities on the *magnitude* of the firms' R&D programs than on an assessment of the *probability* that those programs will bear fruit in terms of commercial products.

Presumption of Harm to Innovation Competition: In a typical horizontal merger case, the government can build a *prima facie* case based on market concentration. This approach is based in part on theoretical and empirical evidence that substantial increases in concentration caused by horizontal mergers tend to lead to diminished pricing competition and consumer harm. However, there is no consensus among industrial

organization economists about the general relationship between concentration and innovation competition. Still, I believe that a presumption of harm to innovation competition is warranted at the very least in situations where the merger involves the only two firms who are pursuing research that will allow them to enter a future product market. (Of course, in any given case, a fact-based inquiry which also accounts for merger synergies is required. My remark here only addresses the basis for a rebuttable presumption of harm to competition based on a merger to monopoly.)

For example, in the case of Genzyme Corporation's acquisition of Novazyme Pharmaceuticals, it appears that Genzyme and Novazyme were the only two firms pursuing drugs to treat Pompe disease.³ Therefore, a rebuttable presumption that Genzyme's acquisition of Novazyme diminished Genzyme's incentives to bring those drugs to market appears to have been warranted. Chairman Muris did not apply such a presumption. He observed that Genzyme would still have *some* incentive to bring Novazyme's treatment to the market, even if its own treatment were already available, because Novazyme's treatment promised to be superior in several respects. However, this observation does not rebut the key economic point that Genzyme's incentives would be *diminished* because the Novazyme product would cannibalize revenues from Genzyme's own product.

Going beyond mergers to monopoly, how much weaker should the presumption of harm to competition based on an increase in concentration be in cases involving innovation competition rather than traditional pricing competition? At the risk of over-simplifying a large and complex literature, one key question that takes on special importance in innovation cases (as opposed to more traditional cases based on pricing competition) is that of *appropriability*: if one firm successfully innovates, to what extent will that firm be able to appropriate the benefits of its innovation? If appropriability is high, as it may be with strong patent rights or first-mover advantages, then the normal presumption retains merit: eliminating one of several strong firm may well retard innovation or reduce the diversity of research paths that are explored, to the detriment of consumers. However, if appropriability is low, e.g., due to weak intellectual property rights and significant spillovers to rival firms who engage in imitation, then increased concentration can improve appropriability and promote innovation, weakening the link between concentration and competition.

5. Patent Reform

I am very pleased that the Commission is interested in the operation of the patent system. Much of my recent research involves the intersection of antitrust and patent policy. I urge the Commission to consider the proper antitrust treatment of *settlements* of patent litigation,

³ See <http://www.ftc.gov/opa/2004/01/genzyme.htm>. I had no involvement in this case and do not claim familiarity with the facts, beyond those reported in the statements of Chairman Muris and Commissioner Thompson. The statement by Chairman Muris provides a valuable discussion of the use of innovation markets by the FTC.

including so-called “reverse payments” from patent holders to alleged infringers, especially in the light of the March 2005 decision by the Eleventh Circuit Court of Appeals in *Schering-Plough Corp. and Upsher-Smith Laboratories vs. Federal Trade Commission*. Rather than prolong this statement, I refer the Commission to my recent writings on these issues:

Carl Shapiro, “Antitrust Limits to Patent Settlements,” *Rand Journal of Economics*, Summer 2003, available at <http://faculty.haas.berkeley.edu/shapiro/settle.pdf>.

Carl Shapiro, “Antitrust Analysis of Patent Settlements Between Rivals,” *Antitrust Magazine*, Summer 2003, at http://faculty.haas.berkeley.edu/shapiro/settle_am.pdf.

Carl Shapiro, “Patent System Reform: Economic Analysis and Critique,” *Berkeley Technology Law Journal*, 2004, available at <http://faculty.haas.berkeley.edu/shapiro/patentreform.pdf>.

Mark A. Lemley and Carl Shapiro, “Probabilistic Patents,” *Journal of Economic Perspectives*, Spring 2005, at <http://faculty.haas.berkeley.edu/shapiro/patents.pdf>.

Joseph Farrell and Carl Shapiro, “How Strong Are Weak Patents?” U.C. Berkeley, October 2005, available at <http://faculty.haas.berkeley.edu/shapiro/weak.pdf>.

This last paper, while somewhat technical, reaches three strong conclusions: (1) payments of fixed fees from patent holders to alleged infringers as part of licensing agreements pose grave dangers to competition, especially for weak patents, i.e., those unlikely to be found valid if litigated; (2) such payments are not justified as a reward to innovation; and (3) even if such payments are prohibited, weak patents can command royalties far in excess of a reasonable, normative benchmark, especially if those patents are licensed to downstream rivals, each of whose profits is driven more by its relative competitive position than by its absolute cost level.

The research described in this last paper gives considerable support for two policy conclusions. First, the Eleventh Circuit’s decision in the *Schering* case, if it becomes an important precedent, may greatly exacerbate the harmful effects of weak patents that are issued by the Patent and Trademark Office. Second, even if “reverse payments” are prohibited, weak patents can command surprisingly large running royalties, at least in certain commercial settings. These running royalties are not warranted based on the innovative contributions associated with these weak patents, yet they raise downstream prices and harm consumers. Therefore, reforming the patent system to reduce the number of weak patents would generate substantial benefits.