RULE OF REASON ANALYSIS OF HORIZONTAL ARRANGEMENTS: AGREEMENTS DESIGNED TO ADVANCE INNOVATION AND COMMERCIALIZE TECHNOLOGY

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I. INTRODUCTION

The development, commercialization, and diffusion of product and process technologies have long been the most fundamental competitive forces in advanced industrial economies, generating economic growth, enhancing consumer welfare, and in the process, constantly challenging and frequently overturning the established order within and among industries. If one calibrates competition by the intensity of rivalry among industry participants, then innovation is unquestionably the major force driving competition.

Despite the injection of economic thinking into antitrust analysis in recent decades, legal scholarship and judicial action have been slow to recognize the primary importance of innovation to the competitive process. The main reason for this, as we will explain, is not so much a lack of awareness of the importance of innovation (though, of course, there are exceptions); rather, it is more a reflection of the conceptual difficulty of theorizing about economic activity where innovation is the driving force. However, it is our conviction that analysis which ignores the innovation process cannot be tolerated in antitrust jurisprudence because there is simply too much at stake.

Indeed, antitrust analysis of complex business arrangements which ignores the primacy of innovation will frequently fail. New intellectual paradigms are necessary to understand how competition takes place in many industries today. These paradigms must move beyond a narrow

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focus on market structure as the determinant of competitive considerations. Frames of analysis must be broadened far beyond the market structure-conduct-performance paradigm to include appropriability regimes, capital markets, the market for know-how, and the market for what we will call complementary assets. Traditional market structure analysis will yield reliable results only in limited circumstances that have become increasingly rare in today's global economy.

In this article we look at only one area of antitrust inquiry: horizontal arrangements. Like others before us, we are cognizant of Adam Smith's warning that, "People of the same trade seldom meet together, even for merriment and diversion, but the conception ends in a conspiracy against the public or in some contrivance to raise prices." However, we also believe that Smith, writing in the eighteenth century, did not fully recognize the organizational challenges which the first, second, and third industrial revolutions would subsequently provide. In a modern world experiencing global competition and rapid technological change, Smith's remark simply fails even to hint at the complex, procompetitive reasons that may drive competitors to meet together and to cooperate. To be sure, antitrust law must remain vigilant in prohibiting naked horizontal agreements to fix prices, rig bids, or divide territories or customers; but it is also important not to become fixated on naked restraints and static price competition. The most important kind of competition—at least the competition that society should really care about—is driven by innovation and technological change, leading to the introduction of new products, processes, and technologies.

Fifty years ago, Joseph Schumpeter recognized the central importance of innovation to competition. But only recently are scholars and practitioners beginning to pay attention to the ways in which innovation and the successful commercialization of technology frequently require cooperation and occasional horizontal linkages among competitors. Indeed, the failure to forge such agreements and alliances may lead to long-run economic decline.

In our view, when thinking about horizontal cooperation, a quote more applicable than Smith's is Nobel Laureate Robert Solow's observation, made as part of MIT's recent Industrial Productivity Commission findings, that, "Undeveloped cooperative relationships between individuals and between organizations stand out in our industry studies as obstacles to technological innovation and the improvement of industrial perfor-


mance" and "interfirm cooperation in the U.S. has often, though not always, been inhibited by government antitrust regulation."

To ensure that government does not impede innovation, courts evaluating communication and cooperation among competitors must be especially careful to take account of the requirements of innovation and the needs of firms to cooperate in order to innovate and successfully commercialize innovation. It is also critical that courts pay attention to questions of economic organization and the types of arrangements among firms that can benefit innovation and change. We believe this can be accomplished through a properly structured rule of reason analysis.

In this article, our goal is to articulate the procompetitive and efficiency reasons for which competitors may choose to cooperate, and then outline how rule of reason analysis ought to be applied to horizontal arrangements. Our special focus is upon firms competing in industries characterized by rapid technological change.

II. UNDERSTANDING INNOVATION AND ITS IMPORTANCE TO SOCIAL WELFARE

A. THE NATURE OF INNOVATION

Few would dispute that innovation is important to economic growth, economic development, and economic welfare. Yet antitrust analysis largely ignores it. The reason is not that Congress and the courts dismiss its importance. Rather, it is that economists and legal scholars have been slow to incorporate technological change and its consequences into antitrust analysis. Lawyers and economists know very little about innovation, and as they do begin to understand it, there is a tendency to despair because taking it into account impairs—if not destroys—the validity of the simple model that many use to deal with antitrust policy issues. We believe that much of the accepted analytical apparatus should be modified to reflect a conceptual framework which explicitly takes innovation and its organizational requirements into account.

We view innovation as the search for, and the discovery, development, improvement, and adoption of new processes, new products, and new organizational structures and procedures. It is generally a collective social process involving risk-taking and uncertainty, probing, reprobing, experimenting, and testing. "Dry holes" and "blind alleys" are the rule and not the exception. It is a cumulative activity that involves building on what went before, whether it is inside the organization or outside the organiza-
tion, whether the organization is private or public, whether the knowledge is proprietary or in the public domain.

Innovation is also characterized by sunk costs and strong irreversibilities. One form of irreversibility occurs once a new product displaces the old. It is unlikely that the old product will ever reappear in the market, regardless of the relative factor price\(^5\) swings that might occur. One reason is that innovation often brings forward such tremendous performance and cost advantages that no change in factor prices in the future is likely to reincarnate the old product. Another reason is that learning is cumulative. Once a technology is selected and used, it is likely to generate further learning by user-developed enhancements, while the old technology will have no user interaction and thus will remain relatively stagnant. For example, natural ice-making is unlikely to reemerge to challenge the refrigerator, vacuum tubes are unlikely to challenge the transistorized integrated circuit, and the steam engine is unlikely to challenge the internal combustion engine.\(^6\)

Technological innovation involves much more than research and development (R&D). Innovation is an interactive, reiterative, and interdependent process in which design, manufacturing, and product development all drive research and, at the same time, are highly dependent on research. These later-stage activities can be referred to as commercialization. Products must be rapidly advanced to the marketplace so that customer feedback can be factored into research and manufacturing. Also, profits must be taken before the next generation displaces the current product in the market.

Technological innovation is also accompanied by powerful free-rider and public good characteristics. The implications of this for antitrust policy are considerable, as we point out later. Know-how leakage and spillovers\(^7\) impair incentives to innovate by redistributing benefits to others, particularly competitors and users. To maintain adequate incentives to invest in innovative activity, without providing government subsidies, free-riding must be curtailed, either by private action or public policies.

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\(^5\) A "factor price" refers to the price of one of the various components ("factors") involved in producing a product, such as land, labor, capital, etc.

\(^6\) There may be exceptions to this rule. For example, with new advances in turbines and propellers, propeller-driven jets may reemerge to challenge the fan jet. However, these exceptions occur infrequently and do not significantly undercut the general learning regarding irreversibilities.

\(^7\) A spillover—or what an economist would call an externality—occurs when the investment activity of one business benefits (or burdens) another business which is not part of the activity. For example, when the telecommunications industry developed fiber optics it provided a spillover to the medical products industry.
The degree to which free-riding activity is constrained by the mechanisms of intellectual property law (patents, trade secrets, copyright) in a particular industry or field of technological development is what we refer to as the appropriability regime in an industry. The appropriability can be strong (free-riding is constrained; patents are available and inventing around them is difficult) or weak (free-riding is unconstrained; patents are not available or inventing around them is easy).

Surveys show that intellectual property law has a limited ability to protect technologies from free-rider activity. Despite recent efforts by the courts to tighten intellectual property enforcement, most industries in the United States are characterized by weak appropriability.

The limitations of intellectual property protection require that commercialization activities be conducted effectively and efficiently in order to extract wealth from intellectual property. Since much intellectual property can be copied, success in the marketplace often depends on who is first to commercialize and who has the lowest manufacturing, marketing, and distribution costs. However, commercialization is both costly and risky, perhaps even more so than R&D activity. Even Karl Marx recognized "[t]he greater cost of operating an establishment based on a new invention as compared to later establishments arises ex suis ossibus [from its bones]. This is so very true that the trail-blazers generally go bankrupt, and only those who later buy the buildings, machinery, etc., at a cheaper price make money out of it." We want to underscore that the process of innovation is not over but has only just begun when the idea or prototype emerges.

B. Social Returns from Innovation

Most innovative activity takes place in appropriability regimes that are weak. Additionally, business strategy has limited effectiveness as a device...
to channel profits toward innovators and away from imitators. Therefore,
there are typically large positive spillovers from innovation, and a corres-
ponding underinvestment in innovative activities. Empirical studies have
established that these spillover effects are very large indeed, so much so
that anyone familiar with the evidence has to be puzzled by the failure
of both theorists and policymakers to pay more attention to them.\footnote{12}

A brief survey of the available empirical evidence strongly supports
the proposition that the social returns to innovation are markedly greater
than the private returns. This suggests that antitrust policies should
permit firms, in certain circumstances, to engage in business practices
that might, in the short-run, inhibit consumer price reductions. One
likely consequence of permitting foreclosure conduct will be more vigor-
ous competition; firms will be willing to invest more in R&D and new
product introductions.\footnote{13} Without such private arrangements, further
public subsidy of the innovation process, including its commercialization,
may be required to enable U.S. business to compete internationally.

Although the evidence is incomplete, it indicates that the positive social
welfare impact of innovation is significant across a wide variety of indus-

\footnote{12} We first comment upon a line of argument that runs the other way. There are various
theoretical conditions under which it can be shown that a market system will provide
incentives for too much investment in innovation. Dasgupta and Stiglitz have developed a
model in which, with some appropriability and competitive conditions, competition may
result in excessive expenditures on R&D relative to the social optimum (which is set by the
equating of marginal benefits and costs). Patha Dasgupta & Joseph Stiglitz, Uncertainty,
Industrial Structure and the Speed of R&D, 11 BELL J. ECON. 1 (1980). For related literature
on patent races, see Patha Dasgupta & Yoram Barzel, Optimal Timing of Innovations, 50 REV.
ECON. & STAT. 348 (1968); Patha Dasgupta & Joseph Stiglitz, Industrial Structure and the
Nature of Innovative Activity, 90 ECON. J. 266 (1980). These authors stress that with effective
patenting, firms may collectively overinvest in R&D in their race to secure the
patent and the monopoly rights it entails.

Hirschleifer has made a different argument that also leads to the private returns being
greater than the social returns. Hirschleifer argues that in a complete contingent claims
economy, firms can take short positions in assets that will decline in value as a result of the
innovation, and long positions in assets that will increase in value. By trading on what
amounts to insider information on the economic impact of the innovation, innovators can
conceivably secure private returns greater than the social returns to innovation. See Jack
Hirschleifer, The Private and Social Value of Information and the Reward to Inventive Activity,
61 AM. ECON. REV. 561 (1971).

These arguments, while logically correct, are built on unrealistic assumptions. The patent
race literature is at best only applicable to the limited instances discussed above where
patents are of some moment. And the perfect foresight-complete contingent claims model
of Hirschleifer is clearly not very applicable, although innovating firms undoubtedly par-
tially implement this strategy where possible. However, not an iota of empirical evidence
exists to suggest that they have any policy relevance. This revisionist theoretical literature
has nevertheless served to muddy the policy debate unnecessarily and may serve to check
economists' enthusiasm for policies that promote innovation.

\footnote{13} This point is akin to the now widely understood proposition that a firm might engage
in intrabrand restraints in order to prevent free-riding and enhance its interbrand competi-
tiveness.
tries and is independent of the methodologies used to measure impacts. For instance, Mansfield and his researchers have generated estimates of the social and private rates of return to innovation in a firm operating in petroleum refining, an industry that has been identified as possessing strong appropriability. The methodology he uses to measure returns to society is quite conservative. Yet the private rates of return in Mansfield's sample vary from 214 percent to less than zero percent, with a median return of 25 percent, while social rates of return are in the range from 209 percent to less than zero percent with a (lower bound) median return of 56 percent. In particular, Mansfield found that in 30 percent of the cases the private rate of return was so low that no firm, with the advantage of hindsight, would have invested in the innovation, but the social rate was so high that from society's point of view the investment was well worthwhile. Interestingly, Mansfield's analysis of the differences between social and private rates of return suggests that the more radical as well as the more easily imitated innovations showed the greatest differences between rates of return.

Economic historians have provided an equally insightful stream of literature on the social returns to innovation. Several authors have attempted to analyze the impact of major technological innovations on an economy's performance. Social savings from a new technology have been defined as the loss that would be imposed on an economy if a more efficient known technology had not been available. In the case of railroad technology, this would comprise the extra cost of transporting commodities by alternative, less efficient modes. For freight transport only, Fishlow estimates that without the invention and building of the railroads, these costs for the United States in 1859 would have been $134 million; Hawke estimates these costs for England and Wales in 1865 would have been around 28 million pounds; Metzer estimates these costs for Russia in 1907 would have been 890 million rubles. These are the extra costs estimated to have arisen if the commodities actually shipped by the railways in the specified year had to be shipped by other means.

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15 Mansfield compares the welfare gains to innovation with a counter-factual path on which innovation still occurs, but at a later date. The costs involved in generating the innovation are essentially the R&D costs, capitalized to the date of innovation. Rates of return are calculated relative to these costs. Specifically, private rates of return are calculated as the increase in the innovator's revenues relative to its R&D expenditure. Id.

16 Mansfield's work supports and extends earlier work of Griliches, Fellner, and others. For a layman's review of earlier studies, see Edwin G. Mansfield, Contribution of R&D to Economic Growth in the U.S., 175 Science 477 (1972).

17 The magnitude of social savings come into focus when expressed as a percentage of GNP. These are 3.3%, 4%, and 4.6% for the three studies cited above. Fogel's independent
A related stream of research has attempted to measure the effect of a nation's rate of technological change on its rate of economic growth. Several influential studies carried out in the 1950s, including Fabricant and Solow, indicate that about 90 percent of the long-term increases in output per capita in the United States is attributable to technological change, increased educational levels, and other factors not directly associated with increases in the quantity of labor and capital. A subsequent and more exhaustive study stated that "advances of knowledge" contributed about 40 percent of the total increase in national income per person employed during 1929–57.

Quite recently, a new stream of research has emerged on interindustry spillovers. Levin and Reiss, with a cross-section sample of manufacturing firms, estimated that a 1 percent increase in R&D spillover from one industry caused average costs to decline by 0.05 percent. Jaffe, also using cross-section data, estimated that when the spillover increased by 1 percent, profit increased by 0.3 percent. Bernstein and Nadiri investigated the effects of interindustry R&D spillovers in five high technology industries where each industry was treated as a separate spillover source. The authors found, among other things, that the scientific instrument industry generated spillovers for the chemical products industry. These spillovers caused the industries' variable costs to decline. Chemical products, electrical products, and transportation equipment all caused positive spillovers for the nonelectrical portion of the machinery industry, while electrical products were influenced by R&D spent on scientific instruments. Every industry examined in the study was a source of spillovers for at least two other industries.

estimates for the U.S. in 1890 come to 4.7% of GNP. William R. Fogel, Railroads and American Economic Growth, in Essays in Econometric History 223 (1964). These percentages seem small but they refer solely to the "loss in GNP" that the absence of railways for one year would effect. O'Brien argues that had railways existed for the whole of 1859–90, the GNP in 1890 would have been some 10% lower. Patrick O'Brien, The New Economic History of the Railways (1977).


The existence of such interindustry R&D spillovers implies, to the extent that the different industries are not under common ownership, that the social return to investment in R&D is greater than the private return. This was borne out by the average rates of return found in the Bernstein and Nadiri study.\textsuperscript{24} Interestingly, the social rates of return to chemical products are not especially high, averaging 26 percent for the three years studied. This is consistent with the findings of the Yale survey, which indicates that patents are relatively effective here.\textsuperscript{25} By contrast, the scientific instruments industry has low appropriability,\textsuperscript{26} and the spillovers were tremendous—ten times the private rates. The Bernstein and Nadiri findings are extremely provocative in that they not only show high social rates of return, but also considerable variation across industries—variations seemingly related to the degree of tightness of the appropriability regime.

The studies mentioned here have examined different aspects of innovation. The social rates of return literature focuses on rates of return to investment in innovation; the economic historians look at the question of the impact of a new technology on users; the macrostudies look at the impact of technology on economic growth, and the spillover studies look at how innovation in one industry impacts costs in another. Yet, they all reach the same unambiguous conclusion: investment in innovation and its commercialization generates strong positive externalities. Policies that hinder innovation by focusing on short-run static efficiencies and inefficiencies, as well as welfare gains and losses, will likely have strong negative impacts on economic welfare (especially in industries characterized by weak appropriability regimes) and further opportunities for innovation.\textsuperscript{27} The evidence overwhelmingly indicates that if policymakers must

\textsuperscript{24} The average social rates of return for five industries and three years—1961, 1971, and 1981—were as follows: chemical products 26%; nonelectrical machinery 54%; electrical products 24%; transportation equipment 13%; and scientific instruments 134%. Id. at 25. These rates of return are biased downwards, as they only consider spillovers to user industries and omit gains to final consumers.

\textsuperscript{25} Levin, \textit{supra} note 8.

\textsuperscript{26} "Scientific instruments" coincides roughly with "measuring devices" in the Yale study. This industry scored less than moderately effective with respect to managers' views of the efficiency of product and process patents.

\textsuperscript{27} This possibility has not gone unnoticed by others. Professor William Baxter notes:

The contribution of technological advances to our economic well-being is very substantial when compared with the damage that could be caused by restrictive behavior antitrust laws seek to halt. If our antitrust laws were to impede technological development to any substantial degree, the net effect of those laws on our well-being would surely be negative.


Schumpeter, of course, recognized this logic half a century ago when he noted:
choose between static and dynamic efficiencies, they should choose the latter.\textsuperscript{28}

C. ORGANIZATIONAL REQUIREMENTS OF INNOVATION

Innovation requires the coordination of various activities. It is frequently but incorrectly viewed as a rather simple organizational problem involving a stepwise (serial) pattern of activities. In reality, simultaneity is its hallmark. Simultaneity often requires various forms of nonstandard contracting. To the extent that economists or courts employ just the serial model, they greatly oversimplify the organizational challenges which innovation provides and may underestimate the need for contractual restraints. Also, they probably exaggerate the importance of research and downplay the importance of other factors. Except in special cases, a firm's R&D capability is for naught if it cannot organize the rest of the innovation process efficiently and effectively, particularly if that innovation is taking place in an already-established industry.

1. The Traditional Serial Model

The traditional description of the innovation process reflected in theoretical treatments of R&D in industrial organization commonly break it down into a number of stages which proceed sequentially. According to this view, the innovation process proceeds in a linear and predictable fashion from research to development, design, production, and then finally to marketing, sales, and service. In simple models, there is not even any feedback or overlap between and among stages.

If the serial model adequately characterizes innovation today, then it is mainly the innovation which occurs in some scale-intensive industries. The initial development of nylon at du Pont may partially fit this model. The Manhattan Project during World War II might also be partially illustrative. The serial model does not address the many small but cumulatively important incremental innovations that are at the heart of technological change in many industries, especially well-established industries.

A system—any given, economic or other—that at every given point in time fully utilizes its possibilities to the best advantage may yet in the longer run be inferior to a system that does so at no given point of time, because the latter's failure to do so may be a condition for the level of speed of long-run performance.

\textit{Schumpeter, supra} note 3, at 83.

The social returns literature, practically all of which has been developed in the post-Schumpeterian period (Schumpeter lived from 1883–1950), provides a convincing empirical underpinning for this aspect of Schumpeter’s hypothesis.

\textsuperscript{28} While the evidence is never as good as one would like, the fact is that there is no evidence supporting the notion that returns to innovation in the U.S. economy are too large.
like semiconductors, computers, and automobiles. The serial model of innovation is an analytic convenience which no longer adequately characterizes the innovation process, except in special circumstances.

The serial model has enabled economists to model innovation as a vertical process. Inasmuch as antitrust policy toward vertical restraints is very permissive, many economists and legal scholars do not understand how U.S. antitrust laws could stand in the way of the various kinds of standard and nonstandard contracting often needed to support the commercialization of innovation. But as we shall see, matters are not so simple.

2. The Simultaneous Model

The simultaneous model of innovation recognizes the existence of tight linkages and feedback mechanisms which must operate quickly and efficiently, including links among firms, within firms, and sometimes among firms and other organizations like universities. From this perspective, innovation does not necessarily begin with research; nor is the process serial. But it does require rapid feedback, midcourse corrections to designs, and redesign. This conceptualization recognizes aspects of the serial model—such as the flow of activity, in certain cases through design to development, production, and marketing—but also recognizes the constant feedback between and among activities, and the involvement of a wide variety of economic actors and organizations that need not have a simple upstream-downstream relationship to each other. It suggests that R&D personnel must be closely connected to the manufacturing and to marketing personnel and to external sources of supply of new components and complementary technologies, so that supplier, manufacturer, and customer reactions can be fed back into the design process rapidly. In this way new technology, whether internal or external, becomes embedded into designs which meet customer needs quickly and efficiently.

29 This process has also been termed "cyclic" by Ralph E. Gomory, Dominant Science Does Not Mean Dominant Product, 29 Res. & Dev., Nov. 1987, at 72, 73. The popular press has begun to recognize and discuss the simultaneous nature of innovation and effective commercialization. See A Smarter Way to Manufacture, Bus. Wk., Apr. 30, 1990, at 110-17 (discussing "concurrent engineering").

30 Moreover, the linkage from science to innovation is not solely or even preponderantly at the beginning of typical innovations, but rather extends all through the process. "Science can be visualized as lying alongside development processes, to be used when needed," Stephen J. Kline & Nathan Rosenberg, An Overview of Innovation, in THE POSITIVE SUM STRATEGY 275-85 (Ralph Landau & Nathan Rosenberg eds., 1986). Design is often at the center of the innovation process. Research is often spawned by the problems associated with trying to get the design right. Indeed, important technological breakthroughs can often proceed even when the underlying science is not understood.
The simultaneous model visualizes innovation as an incremental and cumulative activity that involves building on what went before, whether it is inside the organization or outside the organization, and whether the knowledge is proprietary or in the public domain. The simultaneous model also stresses the importance of the speed of the design cycle and flexibility. IBM followed this model in developing its first personal computer, employing alliances with Microsoft and others to launch a successful personal computer system. Sun Microsystems and NeXT Computer launched themselves in this way and have remained in this mode for subsequent new product development. Microprocessor development at Intel often follows this logic too.

When innovation has this character, the company that is quickest in product design and development will appear to be the pioneer, even if its own contribution to science and technology is minimal, because it can be first to “design in” or otherwise take advantage of science and technology already in the public domain. Both small and large organizations operate by this model, reaching out upstream and downstream, horizontally and laterally to develop and assemble leading edge systems.

3. Cooperative Agreements and Innovation

In short, much innovation today is likely to require lateral and horizontal linkages as well as vertical ones. Particularly for small firms, innovation may require accessing complementary assets that lie outside the organization. If innovating firms do not have the necessary capabilities in-house, they will need to engage in various forms of restrictive contracts with providers of inputs and complementary assets. The possibility that antitrust laws could be invoked, particularly by excluded competitors, thus arises. But behavior which may appear to be anticompetitive in the static context may in fact be procompetitive in a dynamic one. Because the study of innovation is largely outside the mainstream economic research and antitrust jurisprudence, the possibility of expensive and distracting litigation followed by judicial error is significant. Later in this article we propose a structural rule of reason approach that is designed to avoid such error.

Paradoxically, the giant integrated enterprises are not most heavily at risk. Instead, most at risk are midsized enterprises that have developed and commercialized important innovations. These firms are likely to have some market power (under orthodox definitions). However, they are also likely to cooperate because they typically do not have all the requisite capabilities already in-house. As a result of the risks associated with antitrust sanctions, those firms needing to engage in complex forms of interfirm cooperation may choose to forgo socially desirable arrange-
ments and investments, thereby limiting innovation and the competition it engenders.

For innovations to be commercialized, the economic system must somehow assemble all the relevant complementary assets and create a dynamically-efficient interactive system of learning and information exchange. The necessary complementary assets can conceivably be assembled by either administrative or market processes, as when the innovator simply licenses the technology to firms that already own or are willing to create the relevant assets. These organizational choices have received scant attention in the context of innovation. Indeed, the serial model relies on an implicit belief that arm’s-length contracts between unaffiliated firms in the vertical chain from research to customer will suffice to commercialize technology. In particular, there has been little consideration of how complex contractual arrangements among firms can assist commercialization—that is, translating R&D capability into profitable new products and processes. The one partial exception is a tiny literature on joint R&D activity, but this literature addresses the organization of R&D and not the organization of innovation.

If innovation takes place in a regime of tight appropriability—that is, if the technological leader can secure legal protection—and if technology can be transferred at zero cost as is commonly assumed in theoretical models, the organizational challenge that is created by innovation is relatively simple. In these instances, the market for intellectual property is likely to support transactions enabling the developer of the technology to simply sell its intellectual property for cash, or at least license it to downstream firms that can then engage in whatever value-added activities are necessary to extract value from the technology. With a well-functioning market for know-how, markets can provide the structure for the requisite organization to be accomplished.

But in reality, the market for know-how is riddled with imperfections. Simple unilateral contracts where technology is sold for cash are unlikely to be efficient. Complex bilateral and multilateral contracts, internal

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organization, or various hybrid structures are often required to shore up obvious market failures and create procompetitive efficiencies.\textsuperscript{33}

4. Technology Transfer and Vertical Agreements

The transfer of technology among the various activities that constitute innovation is not costless, especially if the know-how to be transferred cannot be easily bundled and shipped out in one lot. This is clearly the case when the development activity must proceed simultaneously and when the knowledge has a high tacit component.\textsuperscript{34} In these instances, the required transfer of technology cannot be separated from the transfer of personnel, which is typically difficult if the contractual relationship is arm's-length and nonexclusive.

Besides the problems of getting technology-driven concepts to market, there is the converse problem of getting user-driven innovations to developers. In some industries, users other than the manufacturers conceive of and design innovative prototypes. The manufacturers' role in the innovation process is to become aware of the user innovation and its value, and then to manufacture a commercial version of the device for sale to other users. User-dominated innovation accounts for more than two-thirds of first-to-market innovations in scientific instruments and in process machinery used in semiconductor and electronic subassembly manufacture.\textsuperscript{35} Clearly, user innovation requires two kinds of technology transfer: first from user to manufacturer, and then from the manufacturer to the developer-user and other users.

In stimulating downstream innovation, suppliers mirror the role that users play in stimulating innovation upstream. For example, a good deal of the innovation in the automobile industry, including fuel injection, alternators, and power steering, has its origins in upstream component suppliers. For example, Bendix and Bosch developed fuel injection and Motorola the alternator. The challenge to the manufacturer then becomes how to "design in" the new components and how to avoid the problems of sole source dependency. As discussed below, deep and enduring relationships, supported by contracts, need to be established between component developer-manufacturers and suppliers to ensure

\textsuperscript{33} Oliver E. Williamson, The Economic Institution of Capitalism, Firms, Markets, Relational Contracting (1985); Teece, supra note 1, at 290–91.

\textsuperscript{34} For a review of the characteristics of know-how, see Sidney Winter, Knowledge and Competence as Strategic Assets, in The Competitive Challenge (David J. Teece, ed., 1987); David J. Teece, The Strategic Management of Intellectual Property (unpublished Manuscript, Center for Research in Management, University of California at Berkeley).

\textsuperscript{35} See Eric von Hippel, The Sources of Innovation (1988).
adoption and diffusion of the technology.\textsuperscript{36} These relationships, while functionally vertical, could well turn out to be viewed as horizontal by a court. Unless the courts have an adequate model of innovation and competition presented to them, beneficial contractual arrangements with attendant restraints could well be viewed negatively.

5. Scale, Scope, and Horizontal Agreements

Successful new product and process development innovation often requires horizontal as well as vertical cooperation. It is well understood that horizontal linkages can help overcome scale barriers in research; they can also assist in defining technical standards. But it is common to assert that if firms need to engage in joint research to achieve these economies, the maintenance of competition requires that firms participating in joint research work part ways with respect to related activities such as manufacturing. Requiring firms participating in a joint research arrangement to commercialize the technology independently can impose an unnecessary technology transfer burden, notwithstanding the fact that there may be sufficient independent sources of competition to ensure adequate rivalry. As discussed above, if antitrust law imposes a market interface between "research" and "commercialization" activities, it will most assuredly create a technology transfer challenge, a loss of effectiveness and timeliness, and higher costs.

Collaborative research also reduces what William Norris, Chief Executive Officer of Control Data Corporation, refers to as "shameful and needless duplication of effort."\textsuperscript{37} Independent research activities often proceed down identical or near-identical technological paths. This is sometimes wasteful and can be minimized if research plans are coordinated. The danger of horizontal cooperation, on the other hand, is that it may reduce diversity. This concern is legitimate and is commonly

\textsuperscript{36} A related set of vertical relationships involving innovation has been remarked upon by Rosenberg in his treatise on technology and American economic growth. See Nathan Rosenberg, Technology and American Economic Growth (M.E. Sharpe ed., 1972). The machine tool industry in the nineteenth century played a unique role both in the initial solution of technical problems in user industries, such as textiles, and as the disseminator of these techniques to other industries, such as railroad locomotive manufacture. Rosenberg's description suggests that the users played a role in the development of new equipment. He notes that before 1820 in the United States, one could not identify a distinct set of firms that were specialists in the design and manufacture of machinery. Machines were either produced by users or by firms engaged in the production of metal or wooden products. Machinery-producing firms were thus first observed as adjuncts to textile factories. However, once established, these firms played an important role as the transmission center in the diffusion of new technology.

stressed by economists.\textsuperscript{38} Unquestionably, a system of innovation that converges on just one view of the technological possibilities is likely to close off productive avenues of inquiry.

However, a private enterprise economy, without horizontal coordination and communication, offers no guarantee that the desired level of diversity is achieved at the lowest cost. In addition, cooperation need not be the enemy of diversity. If firms or groups of firms are able to coordinate their research programs to some degree, duplication can be minimized without the industry converging on a single technological approach. Indeed, Bell Labs has been noted for the very considerable internal diversity it has been able to achieve, at least in the predivestiture period.

6. Rent Dissipation and Horizontal Restraints

Innovation has well-known free-rider exposure and public good characteristics. Know-how leakage and other spillovers impair incentives to innovate by redistributing benefits to others, particularly competitors and users. To maintain adequate incentives to invest in innovative activity, without providing government subsidies, free-riding must be curtailed. This is how economists justify patents, copyrights, trade secrets, and other aspects of intellectual property law which restrict competition.

The organizational form in which innovation takes place, interacting with the protection provided by intellectual property law, will affect the degree of rent dissipation which the innovator experiences. If the innovation has value and intellectual property protection is effective, an innovator specializing just in early stage activity is in a good position to capture a portion of the returns from innovation. Unfortunately, intellectual property law has a limited ability to provide protection from imitation.

A "research joint venture" may not do enough to overcome appropriability problems, unless many potential competitors are in the joint venture. Thus, a single firm or even a consortia with good intellectual property protection will often need to bolster its market position and its stream of rents by other strategies and mechanisms. These mechanisms include

\textsuperscript{38} Nalebuff and Stiglitz argue that the gains from competition may more than offset the losses from duplication. Barry Nalebuff \& Joseph Stiglitz, Information, Competition and Markets, 72 Am. Econ. Rev. 278 (1983). Also, Sah and Stiglitz show that in a model with ex post Bertrand competition where there is knowledge of which research projects others are undertaking, the number and range of research projects undertaken will be a constrained Pareto optimal. Raaj Kumar Sah \& Joseph Stiglitz, Technological Learning, Social Learning and Technological Change, in The Balance Between Industry and Agriculture in Economic Development 285 (S. Chakravarty ed., 1989).
building, acquiring, or renting (on an exclusive basis) complementary assets and exploiting first-mover advantages. We use the term *complementary assets* to refer to those assets and capabilities that need to be employed to package new technology so that it is valuable to the end user.\(^{39}\) Broad categories of complementary assets include complementary technologies, manufacturing, marketing, distribution, sales, and service.

It is essential to further distinguish between generic and specific complementary assets. Generic assets include general-purpose facilities and equipment and nonspecific skills; they tend to be disembodied and codified and hence easy to transfer. Specific assets, on the other hand, include highly differentiated system and firm-specific assets and skills. Specific assets and capabilities are typically embedded in the organization; or even if not embedded in the organization (like a specialized machine) are of reduced value in a different organizational context. In a sense, specific assets represent the firm’s particular assemblage of physical assets and prior learning. Accordingly, they are difficult for competitors to replicate.

Thus, when imitation of aspects of a firm’s technology is easy, it is essential for firms to be world-class—or to be linked to partners who are world-class—in the less imitable complementary activities. Accordingly, the best defense against product imitators are the development of a less easily imitable superior manufacturing process to make the product. Or it may be the firm’s superior service capability. In short, because a firm’s comparative advantage in research does not necessarily coincide with an advantage in the relevant complementary assets, the expert performance of the innovator’s contractual partners in certain key activities complementary to the easily imitable activities is often essential if the innovator is to capture a portion of the profits that the innovation generates.

In this regard, many British and American firms responsible for important product innovations have captured very little value from innovations for which they have been responsible because of their weaknesses in manufacturing. Often competitors can quickly reverse-engineer new products. Once the new product design is apparent to competitors, success in the marketplace is determined by manufacturing costs and quality. In these circumstances, firms that are excellent at manufacturing—and this excellence is often harder to replicate than a new product is to reverse-engineer—can garner practically all of the profits associated with the new product designs. Thus, it is critical that innovating firms protect

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\(^{39}\) There has been almost no treatment in the economic literature of the concept of complementary assets. It does not map easily into the familiar concept of indivisibilities, which is perhaps the closest analogue. For a more complete treatment, see Teece, *supra* note 1.
themselves from such outcomes by developing or somehow uniquely accessing the requisite complementary assets. The antitrust laws must be interpreted so that they do not impair such beneficial linkages.

D. INFORMATION SHARING

1. Benchmarking Issues

Another reason firms competing with each other may seek linkages and communication is to capture the stimulative benefits of benchmarking. Benchmarking is the process by which firms discover the degree to which they are not world-class in their various functional activities and institute programs to emulate best practice. Typically, benchmarking involves collecting information from excellent companies inside the industry as well as outside the industry, either directly or through third parties.

While some aspects of benchmarking are little more than competitive intelligence gathering, what makes benchmarking distinctive is the focus on sharing information. As Robert Camp, an early champion of benchmarking points out, "We're beginning to recognize that sharing benchmarking data benefits everyone," and "getting companies to share information readily is a significant directional change in the corporate culture of this country." It involves a recognition that cooperation in the sharing of information and experiences, even with one's competitors, is generally a stimulus to improvement. So significant is benchmarking as a stimulus to improvement that the Malcolm Baldrige National Quality Award identifies benchmarking as a characteristic of excellent companies.

Benchmarking forces companies to compare themselves with best-in-class companies, quantify differences in performance, explain these differences, and identify steps to catch up and surpass. Various types of benchmarking can be identified. "Strategic benchmarking" involves the comparison of different market strategies and a correlation of those strategies to marketplace success. "Operational benchmarking" focuses on a specific aspect of a company's functional operations and identifies ways to achieve best-in-class status. The analysis generally focuses on one or both of competitive cost and competitive differentiation. Cost benchmarking is perhaps the most common type of operational benchmarking.

According to one observer, "For strategic and certain operational cost benchmarking analyses, only companies within your own industry provide relevant comparisons; there is little sense in trying to compare

the cost of manufacturing a toaster to that of manufacturing a car." Sometimes, however, markets may be geographically separated so that one can share data with firms in the industry that are not direct competitors. However, when best-in-class companies are your competitors, the vigorous pursuit of benchmarking requires direct contacts and information-sharing with best-in-class competitors.

Xerox popularized the process when it used benchmarking to help turn itself around in the copier business. Xerox benchmarked itself against many companies, including companies outside the copier business. For instance, Xerox decided to benchmark itself against L.L. Bean (a mail order company) for its warehouse and shipping function. Ford used benchmarking to reorganize itself to make the Taurus, which became a superlative success. U.S. companies increasingly see benchmarking as a tool to help them learn what is needed to compete against the Japanese and Europeans.

Benchmarking, by bringing in external information to the firm, has a salutary effect in galvanizing companies to compete once they recognize how far behind they are, and what they can do to improve. Benchmarking has helped companies improve performance dramatically over the last decade; there is every reason to believe it will continue to do so in the future.

Benchmarking at the pace and scale now ongoing in the United States is a relatively new phenomenon. To some, benchmarking may appear contrary to sound antitrust policy. In our view, however, there is no evidence to support the notion, common in antitrust thinking, that ignorance of one's competitors' costs and/or internal quality programs is procompetitive. To the contrary, knowledge that one's competitors are ahead can be and has been a tremendous stimulus to action. Moreover, knowledge of how competitors achieved success can help guide a company committed to renovating its structures and systems, lowering costs, and achieving maximum efficiency.

41 Lawrence S. Pryor, Benchmarking: A Self-Improvement Strategy, J. Bus. Strat., Nov./Dec. 1989, at 28. In some cases, however, there may be a great deal to learn from benchmarking against firms outside the industry. Firms operating in a quite different technological and market environment may exhibit structures and systems radically different from one's own. These differences may suggest radically different ways of dramatically improving performance.

42 Practitioners have recognized the potential for antitrust problems. As one practical guide notes, "Some types of data sharing (e.g., with out-of-industry companies) are clearly legal. Other types of data sharing go on all the time, with some corporations considering them proper and legal, and other corporations thinking otherwise. Your own company rules and advice of your corporate attorney should be your guideline." Kaiser Associates, Inc., Beating the Competition: A Practical Guide to Benchmarking, at 41.
By sharing benchmarking information with one or a small number of competitors, a firm might better position itself against other competitors. Sharing information of your own successes may lead to the receipt of information from other firms concerning their successes. Overall, the exchanging firms are likely to be better off. Firms which are better at benchmarking will display better financial performance.

As the number and market shares of the firms in an industry exchanging information increase, antitrust concerns may arise that will require careful assessment and balancing. Rule of reason analysis is the appropriate vehicle. However, our own assessment of the benefits of benchmarking led us to the conclusion that in almost all circumstances there will be no significant anticompetitive harm. Indeed, agency and third-party litigation over information exchange in bona fide benchmarking programs will leave its own long-run anticompetitive effects, because it is likely to throttle one of the major forces for organizational renewal currently at work in America.

2. Identifying Technology Road Maps

The notion that firms should discuss future plans is anathema to standard antitrust thinking. This uneasiness is informed by little more than Adam Smith's superficial adage that discussions among competitors invariably lead to efforts to fix prices or restrict output. While we clearly recognize that agreements to fix prices ought to be and are illegal, we wish to point out that there is much that can be accomplished if firms in an industry agree on a vision, and work with government and external providers of resources and technology to ensure that the vision is accomplished. Ignorance of firms' future actions and technological information creates enormous uncertainties which do not make it easy for competitive markets to allocate resources efficiently.\(^4\) Lack of coordination can also diffuse efforts.

An interesting effort to capture the benefits from cooperation can be seen in the semiconductor industry's efforts to create technical roadmaps through the MICROTECH 2000 Workshop, April 23–25, 1991. "The primary task assigned to the MICROTECH 2000 Workshop participants was to create technical roadmaps that, if followed, would contribute to the U.S. semiconductor industry's efforts to develop advanced technology throughout the next decade, and that would help propel the industry to a world leadership position by the year 2000."\(^3\) To accomplish the tasks

\(^3\) See Tjalling C. Koopmans, Three Essays in the State of Economic Science 146 (1957).

RULE OF REASON ANALYSIS

outlined in the workshop's technical roadmap, it is recognized that hundreds of scientists and engineers will have to be involved for a number of years. It is expected that most of this effort will focus on better coordinating the resources at many different companies, federal government laboratories, and universities, to attack semiconductor technology issues more effectively. "Success in the development of the MICROTECH 2000 technologies depends on learning to share."45

The impetus for MICROTECH 2000 came from the National Advisory Committee on Semiconductors (NACS), which recommended that the Semiconductor Industry Association try to pull together all the various industry technology roadmaps. The industry in this case is, of course, the U.S. semiconductor industry. The rationale is one that we find persuasive in the context of strong competition from Japan, and a multi-institutional infrastructure supporting research. As Gordon Moore, Chairman of Intel, puts it, the industry needs a unified vision. "We must create a common national plan from these separate approaches so the industry is all singing from the same sheet of music, as well as enlisting outside support."46 The industry clearly sees—rightly in our view—that working together on long-run technology issues is completely consistent with the industry being fiercely competitive once products are ready for commercialization.

3. Compatibility Standards

In complex systems, compatibility standards are essential to system performance. In modern capitalist economies, there is no standard way in which technical standards are developed and introduced. In some cases, they are effectuated by dominant firms. In other cases, it falls to the cooperative efforts of smaller firms, with information being exchanged, technologies being altered or adjusted, and side payments being made to effectuate a consensus. In still other cases, standards are mandated by government agencies using administrative processes, as with the FCC and standards for HDTV.

Here we are most interested in standards which are set cooperatively. This can occur in circumstances where the expected gains to the parties from the adoption of a common standard exceed the costs, and where mechanisms exist to facilitate cooperation. Such efforts, of course, are commonly exposed to free-riding, as many standards have public good like characteristics. As Olson explains, free-riding has the potential to

45 Id.
lead to "the exploitation of the great by the small." Even with some free-riding, there may still be sufficient incentive for the standard-setting process to move forward. However, in circumstances where free-riding is egregious, some firms may make strategic moves in the standard-setting process to disadvantage the free-riders. Such behavior may be procompetitive if it generates significant network externalities sooner than would otherwise be the case. Needless to say, there are many possible outcomes. Our point simply is that rule of reason analysis ought to inform analysis, and that such analysis needs to consider implications for the development and introduction of new products and processes.

Clearly, then, standard-setting can yield important network externalities. Sometimes it can be accomplished by firms acting alone. Often it requires cooperation, as with IBM and Microsoft to establish the DOS operating system as a standard for personal computers. Moreover, cooperation is sometimes needed to overturn existing standards when they begin to stand in the way of technical progress and competition. The economics of standard-setting are extremely complicated but, more often than not, standard-setting is necessary to facilitate innovation, and cooperation and information exchange are necessary to establish standards.

III. STRUCTURED RULE OF REASON ANALYSIS OF COOPERATIVE ARRANGEMENTS AMONG COMPETITORS

The societal gains from the development and commercialization of innovation are often enormous and generally far exceed the gains derived from static allocative efficiency. Yet, the focus of traditional antitrust has been upon static, short-run allocative efficiency; i.e., concern for the spread between today's price and cost of a service or good. Such a static orientation often undervalues the long-run benefits that flow from dynamic "innovation-led" competition. To avoid hindering technological progress and the creation of societal wealth, rule of reason analysis must be innovation-sensitive and couched in a forward context. If static allocative efficiency is ever in conflict with dynamic efficiency, the latter ought to prevail.

A. RULE OF REASON SHOULD APPLY—NOT PER SE RULES

In Standard Oil Co. v. United States, the Supreme Court interpreted Section 1 of the Sherman Act to prohibit agreements that are "unreasonably restrictive of competitive conditions." Eventually the Court came

48 221 U.S. 1 (1911).
49 Id. at 58.
to hold that certain agreements were so plainly anticompetitive and lacking in any redeeming virtue that they should be held "per se" illegal without further inquiry into reasonableness. This conclusive presumption of illegality was applied to many agreements, including horizontal and vertical price-fixing, horizontal territory or customer division, and boycotts of customers and suppliers—cases in which, the Court believed, "surrounding circumstances make the likelihood of anticompetitive conduct so great as to render unjustified further examination of the challenged product." Per se rules thus apply to "naked" restraints that raise price or reduce output, while failing to create efficiencies or facilitate productivity.

Rule of reason analysis applies to all agreements not included in the per se illegal category. Beginning in the area of nonprice vertical restraints, with Continental T.V., Inc. v. G.T.E. Sylvania Inc., and broadening into the area of horizontal agreements, with Broadcast Music, Inc. v. Columbia Broadcasting System (BMI), National Collegiate Athletic Association v. Board of Regents of the University of Oklahoma (NCAA), Northwest Wholesale Stationers, Inc. v. Pacific Stationery & Printing Co., and FTC v. Indiana Federation of Dentists, the Court has applied rule of reason analysis to cooperative arrangements that have the potential of producing inte-

57 441 U.S. 1 (1979).
60 476 U.S. 447 (1986).
grative efficiencies, a new market, or other procompetitive benefits. In the Court's view, unless a "practice facially appears to be one that would always or almost always tend to restrict competition and decrease output," the agreement should be analyzed under the rule of reason.

Although none of these recent Supreme Court cases have involved innovation, the opinions permit a confident conclusion that rule of reason analysis rather than per se illegality should apply if there is a plausible claim that cooperation is needed for innovation and its commercialization. Such cooperation permits significant efficiencies and develops obvious procompetitive potential by creating new markets and permitting firms to compete on an equal footing in the world market.

B. RULE OF REASON SHOULD EMPLOY A MARKET POWER-BASED SAFE HARBOR

The relationship between ability to harm competition and possession of substantial market power is obvious. Firms lacking substantial market

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62 BMI, 441 U.S. at 19-20.


64 In Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), the Second Circuit applied rule of reason analysis rather than per se rules to cooperative innovation and product development agreements, specifically rejecting the plaintiff's request for a per se jury charge. Id. at 302. Nevertheless, the court recognized that such agreements may be unreasonably restrictive, particularly when one of the parties has significant market power, and affirmed the jury's verdict that Kodak's separate joint development agreements with Sylvania and GE concerning magicube and flipflash products unreasonably restrained trade in violation of Section 1 of the Sherman Act. Id. For criticism of Berkey's handling of cooperative innovation, see James Langenfeld & David Scheffman, Innovation and U.S. Competition Policy, in EUROPEAN TECHNOLOGY INITIATIVES: CORPORATE AND PUBLIC PERSPECTIVES ON COOPERATIVE R&D IN HIGH TECHNOLOGIES (1989), and in 34 Antitrust Bull. 1 (1989).

See also United States Department of Justice Antitrust Enforcement Guidelines for International Operations 22 (1988), reprinted in 4 Trade Reg. Rep. (CCH) ¶ 13,109; United
power act against their own self-interest when they raise prices, reduce output, or otherwise restrain trade. The marketplace itself will discipline such misguided efforts as buyers switch to substitutes or new sources of supply enter the market.\textsuperscript{65} When market power is lacking, antitrust litigation is not needed to police restraints and maintain competition,\textsuperscript{66} especially in industries experiencing rapid technological change.\textsuperscript{67}

The Supreme Court has recognized that market power is probative, under rule of reason analysis, of whether an agreement is likely to have anticompetitive effects.\textsuperscript{68} However, the Court has not yet stated whether there should be a “safe harbor” in rule of reason analysis for firms that do not possess significant market power.\textsuperscript{69} The courts of appeals have

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\textsuperscript{65} In the words of Judge Easterbrook: “Markets slowly but surely undermine practices that injure consumers. Competition does not undermine judicial decisions, so the costs of wrongly condemning a beneficial practice may exceed the costs of wrongfully tolerating a harmful one.” Chicago Professional Sports Ltd. Partnership v. NBA, 961 F.2d 667, 676 (7th Cir. 1992).

\textsuperscript{66} Naked restraints on price and output are treated as per se illegal without analysis of market power because they offer no redeeming efficiencies or procompetitive virtues. However, even in these cases, when private plaintiffs are involved, market power may become relevant for establishing antitrust injury, see Atlantic Richfield Co. v. USA Petroleum Co., 495 U.S. 328 (1990).


\textsuperscript{68} In FTC v. Indiana Fed’n of Dentists, 476 U.S. 447, 460 (1986), the Court said that “the purpose of the inquiries into market definition and market power is to determine whether an arrangement has the potential for genuine adverse effects on competition. . . .” In NCAA, 468 U.S. at 113, the Court affirmed the rule of reason finding that the NCAA possessed substantial market power in a relevant market.

\textsuperscript{69} To date, the Supreme Court has neither endorsed nor foreclosed the market power-based safe harbor approach. While the Court has stated that “the absence of proof of market power does not justify a naked restriction on price or output,” NCAA, 468 U.S. at 109; Indiana Fed’n of Dentists, 476 U.S. at 460, in our view, the Court’s own words and the facts in recent cases do not foreclose a market power-based safe harbor approach. See Arbitration Between First Tex. Sav. Ass’n and Fin. Interchange, Inc., 55 Antitrust & Trade Reg. Rep. (BNA) 340 (Aug. 25, 1988). First, the Court has only condoned dispensing with proof of market power for naked price and output restraints, and thus appears to have been addressing only restraints so pernicious and without redeeming virtues that per se analysis is almost warranted. Second, in each case in which it has declined to require proof of market power, the Court has found specific evidence of anticompetitive effects, NCAA, 468 U.S. at 106–08; Indiana Fed’n of Dentists, 476 U.S. at 460–61, and held that in such instances, “proof of actual detrimental effects, such as a reduction of output,” can obviate the need for an inquiry into market power, which is but a ‘surrogate for detrimental effects.”
not waited for the Supreme Court. The move toward a market-power-based safe harbor can be seen most clearly in cases involving vertical relationships, where the lack of substantial market power has been used to screen out numerous challenges to vertical restraints. In vertical cases the courts appear to be converging on a 20 to 25 percent market share safe harbor. More recently, courts have begun to apply a market power-effects test. 7

7 See, e.g., Bayley's, Inc. v. Windsor America, Inc., 948 F.2d 1018, 1031–32 (6th Cir. 1991) ("The courts may well be moving toward the view that vertical restrictions on intra-brand competition ought to be legal per se, at least where the defendant lacks 'market power.'"); Ryko Mfg. Co. v. Eden Servs., 823 F.2d 1215, 1231–32 & n.14 (8th Cir. 1987), cert. denied, 484 U.S. 1026 (1988) ("[W]e agree with the approach adopted by other circuits requiring at the threshold that the plaintiff attacking a vertical nonprice restraint prove the defendant's substantial market power in a relevant market. . . . [U]nless the plaintiff can demonstrate an 'actual detrimental effect' on competition (which in a meaningful sense demonstrates the defendant's market power), the threshold market power requirement mitigates an otherwise 'unlimited inquiry' necessary under the rule of reason" (quoting Assam Drug Co. v. Miller Brewing Co., 798 F.2d 311, 316 (8th Cir. 1986)); Assam Drug Co. v. Miller Brewing Co., 798 F.2d 311, 315, 317 (8th Cir. 1986) ("Because a showing of market power is a threshold requirement to challenging a vertical nonprice restraint, a defendant who establishes, in accordance with the rules governing summary judgment, that it lacks market power a fortiori establishes that no genuine issue of material fact exists and is entitled to entry of judgment in its favor as a matter of law."); Hand v. Central Trans., Inc., 779 F.2d 8, 11 (6th Cir. 1985) ("A defendant must have market power before its conduct [an alleged tying arrangement] can be shown to have an adverse effect on competition."); Graphic Prods. Distrib. v. Itek Corp., 717 F.2d 1560, 1568 (11th Cir. 1983) ("We have narrowed the broad-ranging inquiry called for by the rule of reason by insisting, at the threshold, that a plaintiff attacking vertical restrictions establish the market power of the defendant."); Davis-Watkins Co. v. Service Merchandise, 686 F.2d 1190, 1202 (6th Cir. 1982), cert. denied, 466 U.S. 931 (1984) ("Without market power, a firm cannot have an adverse effect on competition."); Valley Liquors, Inc. v. Renfield Importers, Ltd., 678 F.2d 742, 745 (7th Cir. 1982) ("A firm that has no market power is unlikely to adopt policies that disserve its customers; it cannot afford to . . . . Even if there is some possibility that the distribution practices of a powerless firm will have a substantial anticompetitive effect, it is too small a possibility to warrant trundling out the great machinery of antitrust enforcement."); Muenster Butane, Inc. v. Stewart Co., 651 F.2d 292, 298 (5th Cir. 1981) ("A requirement that plaintiff prove market power in this case would have saved the litigants and the courts much expense."). See also O.S.C. Corp. v. Apple Computer, Inc., 601 F. Supp. 1274, 1291 n.8 (C.D. Cal. 1985), aff'd, 792 F.2d 1464 (9th Cir. 1986) ("Absent significant market power, a vertical restriction is reasonable as a matter of law.").

71 See Valley Liquors, Inc. v. Renfield Importers, Ltd., 822 F.2d 656, 666 (7th Cir. 1987) ("Market share analysis in section 1 cases have led to the conclusions that approximately 70%–75% of market share constitutes market power. . . . and that a 20%–25% market share does not constitute market power."); Assam Drug Co. v. Miller Brewing Co., 798 F.2d 311, 318 n.18 (8th Cir. 1986) ("Assam has not provided any basis for an argument, given a market share of 19.1%, that Miller does have market power."); O.S.C. Corp. v. Apple Computer, Inc., 601 F. Supp. 1274, 1291 n.8 (C.D. Cal. 1985) ("Although there is some dispute about whether Apple's market share was 5% or approached 20%, the actual percentage is not material since there is no dispute that competition (and the number of competitors) was intense before, and increased after the mail order prohibition was adopted."); Donald B. Rice Tire Co. v. Michelin Tire Corp., 483 F. Supp. 750, 761 (D. Md.) (the court held that the defendant did not have market power over testimony that defendant..."
based screen in horizontal cases, holding that under rule of reason analysis, plaintiffs must first establish that cooperating defendants possess substantial market power. For example, in *Polk Bros. v. Forest City Enterprises, Inc.*, the Seventh Circuit upheld a noncompetition agreement between two dealers who cooperated to develop and occupy a large

did enjoy a 20–25% market share), aff'd, 638 F.2d 15 (4th Cir. 1980), cert. denied, 454 U.S. 864 (1981). For a case that contains horizontal and vertical elements, see Baxley-DeLamar Monuments v. American Cemetery Ass'n, 938 F.2d 847, 852 (8th Cir. 1991) ("Market share held inadequate to establish market power in Jefferson Parish Hospital Dist. No. 2 v. Hyde, 466 U.S. 2 (1984) coincides exactly with the twenty-nine to thirty-one percent Baxley claims is held by all the defendant cemeteries together.").

*But see Reazin v. Blue Cross and Blue Shield of Kansas, 899 F.2d 951, 967–68 (10th Cir. 1990) ("[C]ourts have not completely agreed on whether a particular market share should be given conclusive or merely presumptive effect in determining market or monopoly power, or whether market share is only a starting point in the inquiry into market or monopoly power. . . . We prefer the view that market share percentage may give rise to presumptions, but will rarely conclusively establish or eliminate market or monopoly power."). See also Phillip Areeda, ANTITRUST LAW ¶ 1507 (1991 Supplement) ("The problem is that there is no clear point at which a market share implies that the defendant's behavior significantly threatens competition. Very small numbers are readily ignored, but little is clear at higher levels."). We have found, however, no opinion in the past decade involving vertical nonprice restraints in which market power was held to exist on the basis of market shares comparable to or lower than this figure. See, e.g., Ryko Mfg. Co. v. Eden Servs., 823 F.2d 1215, 1231–32 & n.14 (8th Cir. 1982) (market share of between 8% and 10% held insufficient to demonstrate market power); JBL Enters. v. Jhirmack Enters., 698 F.2d 1011, 1017 (9th Cir. 1983) (market share of 2.3–4.2% held "too small for any restraint on intrabrand competition to have a significantly adverse effect on interbrand competition."), cert. denied, 464 U.S. 829 (1983). Indeed, the true threshold may be significantly higher than 20%–25%. In the only case which we have found where a court made an express finding of market power based on market shares, the defendant possessed a share of 70–75% in the relevant market. Graphic Prods. Distrib. v. Itek Corp., 717 F.2d 1560, 1570 (11th Cir. 1983). In another recent case, the court held that a decline in the defendant's market share, from 61% in 1985 to 43% in 1987, justified a finding of lack of market power despite the retention of the 43% share. Winter Hill Frozen Foods and Servs. v. Haagen-Dazs Co., 691 F. Supp. 539, 547–48 (D. Mass. 1988).

*See, e.g., Wilk v. American Medical Ass'n, 895 F.2d 353, 359 (7th Cir. 1990) ("the threshold issue in any rule of reason case is market power.") (citing Shachar v. American Academy of Ophthalmology, 870 F.2d 397 (7th Cir. 1989)); Murrow Furniture Galleries, Inc. v. Thomasville Furniture Indus., 889 F.2d 524, 529 (4th Cir. 1989) ("Firms lacking market power, if they wish to survive, cannot adopt restraints that have anticompetitive effects. Thus such firms cannot have an effect on interbrand competition. Consequently, a finding of no market power precludes any need to further balance the competitive effects as a challenged restraint") (quoting Assam Drug Co. v. Miller Brewing Co., 798 F.2d 311, 316 (8th Cir. 1986)); General Leaseways, Inc. v. National Truck Leasing Ass'n, 744 F.2d 588, 596 (7th Cir. 1984) ("With the rule of reason becoming a more popular rule of decision in the wake of *Sylvania*, some progress has been made toward giving it some structure by requiring that the plaintiff first prove that the defendant has sufficient market power to restrain competition substantially."); Rothery Storage & Van Co. v. Atlas Van Lines, Inc., 792 F.2d 210, 217 (D.C. Cir. 1986) ("Analysis might begin and end with the observation that Atlas and its agents command between 5.1 and 6% of the relevant market, which is the interstate carriage of used household goods. It is impossible to believe than an agreement to eliminate competition within a group of that size can produce any evils of monopoly."), cert. denied, 479 U.S. 1033 (1987) (Bork, J.)

*See 776 F.2d 185 (7th Cir. 1985).*
building that housed the independent operations of both businesses, stating:

Cooperation is the basis of productivity. It is necessary for people to cooperate in some respects before they may compete in others, and cooperation facilitates efficient production. . . . When cooperation contributes to productivity through integration of efforts, the Rule of Reason is the norm. . . . The first step in any Rule of Reason case is the assessment of market power. . . . Unless the firms have the power to raise price by curtailing output, their agreement is unlikely to harm consumers and it makes sense to understand their cooperation as benign and beneficial.74

Applying the rule of reason and finding no evidence of market power, the court reversed the district court's judgment of per se illegality.

Under the safe harbor approach to rule of reason analysis that we advance, if plaintiffs fail to prove substantial market power, defendants' cooperative efforts fall within a market-power-based safe harbor, warranting no further antitrust analysis.75 The adoption of a market power threshold—a burden on plaintiffs to demonstrate that defendants possess substantial market power in a relevant horizontal, upstream, or downstream market—would clarify legal treatment of cooperative arrangements by creating an objective test by which firms can prospectively gauge the legality of their plans. A market-power-based safe harbor approach will also bring analysis of cooperative arrangements into alignment with the approach taken in merger analysis.76

74 Id. at 188, 191 (case citations omitted) (emphasis added).
75 The Department of Justice has expressly endorsed a safe harbor approach when evaluating cases under rule of reason standards. See United States Department of Justice, Antitrust Enforcement Guidelines for International Operations, supra note 64, at S-10. ("First, the Department takes a 'quick look' at the degree of concentration in the relevant markets and at the market shares of firms employing the restraint to determine whether the restraint could plausibly have an anticompetitive effect.")


76 Judge Bork recognized the logic of parallel treatment of contractual integration and mergers in Rothev, 792 F.2d at 230 ("Merger policy has always proceeded by drawing lines about allowable market shares and these lines are based on rough estimates of effects because that is all the nature of the problem allows. If Atlas bought the stock of all its carrier agents, the merger would not even be challenged under the Department of Justice Merger Guidelines because of inferences drawn from Atlas' market share and the structure of the market. We can think of no good reason not to apply the same inferences to Atlas' ancillary restraints."); and in his scholarly writings, ROBERT BORK, THE ANTITRUST PARADOX 264 (1978) ("Both internal growth and horizontal merger eliminate rivalry, and they do so more permanently than do cartel agreements. Prices are fixed and markets allocated within firms. The reason we do not make these eliminations of rivalry illegal per se is that they involve integration of productive activities and therefore have the capacity to create efficiency. Contract integration (including those integrations involving price-fixing and market-division agreements) are also capable of producing efficiency. The law of contract integration and of ownership integration should, therefore, be made symmetrical.")
C. Plaintiff's Burden

1. Market Power Beyond the Safe Harbor Threshold

The first step toward proving the unreasonableness of an agreement should require the plaintiff to demonstrate that the defendants possess substantial market power in some relevant market. Defendants not possessing substantial market power should be considered within a "safe harbor" and thus exempt from antitrust prosecution or treble damage litigation. Plaintiffs should have to meet their initial burden either by (1) demonstrating that the cooperating firms together possess more than 20–25 percent share of any relevant market, or (2) demonstrating that the Herfindahl-Hirschman Index (HHI) of any relevant market will be greater than 1800 and increase by more than 100 as a result of the agreement between defendants.

The market share threshold in this range finds ample support in existing practice, other nations' policies, and academic commentary. First, U.S. Department of Justice analysis of R&D joint ventures under the rule of reason provides for a safe harbor if there are "four comparable R&D efforts" in the relevant market. Second, European Economic Community law allows block exemptions to firms with a combined market share of

77 Theoretically, plaintiff might attempt to prove market power directly, by showing that defendants' activities have led to an increase in price or a reduction in output. See Phillip Areeda, Antitrust Law ¶ 1511 (1986) (citing FTC v. Indiana Fed'n of Dentists, 476 U.S. 447, 460–61 (1986)). But in Indiana Dentists, the Court found actual market power and an absence of real efficiency justifications. In cases involving credible efficiency claims, which is likely to include almost all cases involving innovation or the commercialization of technology, proof of actual market power in a defined relevant market should be required. After all, one should expect the complained of restraint to have an output-reducing effect as a natural consequence of the defendants' efforts to create efficiencies or capture value from innovation. The restraint's effects short-run must be balanced against gains from "interbrand" or "intersystem" competition and from long-run dynamic competition. That will require proper market definition and market power assessment.

78 We have suggested a range, recognizing that choosing either 20 percent or 25 percent is somewhat arbitrary. However, if pressed, we would select the 25 percent figure because of the benefits from innovation and the unlikelihood that the resulting market structure would yield less than competitive results.

79 The HHI measures existing market concentration and also measures the extent to which market concentration will increase as a result of a particular merger (or cooperative agreement). The HHI measures existing market concentration by squaring the market shares of all existing firms in a market and then summing the squares. The highest concentration level possible is 10,000. This would occur in an industry where one firm has 100 percent of the market (100 x 100 = 10,000). The increase in HHI resulting from an acquisition (or cooperative agreement) can be calculated by multiplying the market share of the firm by the market share of the other firm and then multiplying the resulting number by two.

80 See United States Department of Justice Antitrust Guidelines for International Operations, supra note 64, at S-23.
of 20 percent or lower in markets for production of products being improved or replaced by innovations. Third, while the Japanese Fair Trade Commission has not issued numerical thresholds for analysis of contractual cooperation, it too has suggested that market shares and structure are preeminent factors determining the reasonableness of joint innovation, and has adopted a 25 percent market share safe harbor for horizontal mergers. Finally, a number of American commentators have suggested market power thresholds approximating the levels mandated by the proposal.

The 1800 HHI threshold approach essentially corresponds to treatment of horizontal mergers under the U.S. Department of Justice and Federal Trade Commission 1992 Horizontal Merger Guidelines. One

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82 See, e.g., FTC (JAPAN), RESEARCH AND DEVELOPMENT ACTIVITIES IN PRIVATE ENTERPRISE AND PROBLEMS THEY POSE IN THE COMPETITION POLICY 37–39 (1984) indicating that evaluation of anticompetitive effects of joint R&D at the product market stage will depend significantly "on the competition and market shares among the participants and the market structure of the industry to which the participants belong. . . . In cases where the market shares of the participants are small, the effects will be small." Although "small" is not defined, Japan's merger guidelines state that the FTC is not likely to closely examine cases in which the combined market share of the merging parties is less than 25 percent. See HIROSHI IYORI & A. UESUGI, THE ANTI-MONOPOLY LAWS OF JAPAN 86–88 (1983).

83 Indeed, the proposal may be cautious in this regard, understating market share thresholds recommended by other scholars. See, e.g., Piranio, supra note 64, at 41 ("The courts could easily justify a safe harbor for unintegrated buying joint ventures or integrated marketing joint ventures in which partners possess a collective market share of less than thirty-five percent."); Sullivan, supra note 64, at 871 n.157 ("Whether measuring by R&D or applications market, one could probably go higher [than a 20 percent market share threshold for antitrust exemptions], though a court should always be open to explanations for a particular venture's perniciousness. . . . The question is whether venture participants account for a significant share of the market to warrant slowing the pace of innovation. In most markets, that would probably require at least a 40 percent share."); William F. Baxter, The Definition and Measurement of Market Power in Industries Characterized by Rapidly Developing and Changing Technologies, 53 Antitrust L.J. 717, 723 (1984) (proposing that R&D joint ventures possessing market shares of lower than 20 percent be considered benign); Joseph F. Brodley, Joint Ventures and Antitrust Policy, 95 Harv. L. Rev. 1523, 1541 (1982) (proposing that a parent of the joint venture should be "presumed to have market power if it possesses 40 percent of a well-defined market"); Robert F. Bork, The Rule of Reason and the Per Se Concept: Price-Fixing and Market Division, 75 Yale L.J. 373, 397 (1966) (suggesting that parties controlling "up to 25 percent of the market" should be permitted to engage in ancillary restraints).

One reason some of these thresholds are higher than the level we advocate is that other commentators consider only narrowly defined R&D markets, whereas we recognize that markets may well carry forward to commercialization. One approach to this difference might be to establish higher safe harbor thresholds for R&D than for product markets where there is commercialization. We prefer instead to keep the threshold the same, but recognize that the relevant market will change depending upon whether a cooperative venture engages only in R&D, in which case the market will be very broad, or in commercialization, in which case the market will be more narrowly defined by the commercialized product or process.
modification is that our proposal extends the safe harbor threshold to 1800 HHI, and thus abandons the Merger Guidelines' middle tier of analysis for horizontal mergers between 1000–1800 HHI.\textsuperscript{4} We believe that the 1800 HHI threshold is justified by the fact that the proposed rule of reason deals with activities less integrative and less permanent (and thus less potentially anticompetitive) than full-fledged mergers.\textsuperscript{85}

2. Market Definition Issues

Market definition must take account of dynamic, performance-based competition. Unfortunately, there is no area where antitrust policy and practice displays so clearly its focus on static competition than in its treatment of market definition. Market definition is the key pillar in antitrust theory and enforcement policy. In the absence of market power, every form of business behavior other than price-fixing and its economic equivalents is legal. If market power is proved, then the reasonableness of business practices must be closely scrutinized.

There are two classes of relevant markets likely to be of importance in the context of innovative conduct: know-how markets and product markets. In defining the scope of the relevant know-how markets, it is necessary to take into account all of the alternative sources of know-how for the endeavor of interest, including those firms presently competing and those that possess the potential and incentive to compete. These markets will generally be global.


\textsuperscript{85} The desirability of parallel treatment of contractual integrations or strategic alliances and mergers finds support in the cases, DOJ enforcement policy, and the academic literature. See, e.g., Rothery Storage & Van Co. v. Atlas Van Lines, Inc., 792 F.2d 210, 230 (D.C. Cir. 1986), cert. denied, 479 U.S. 1033 (1987) ("A joint venture made more efficient by ancillary restraints is a fusion of the productive capacities of the members of the venture. That, in economic terms, is the same thing as a corporate merger. Merger policy has always proceeded by drawing lines about allowable market share. . . ."); United States Department of Justice Antitrust Enforcement Guidelines for International Operations, supra note 64, at 8 ("Like mergers, legitimate joint ventures and their ancillary restraints are analyzed under a rule of reason standard and are condemned only if they would have an anticompetitive effect that is not outweighed by procompetitive benefits."); Sullivan, supra note 61, at 872 ("[A] venture should be permitted somewhat denser concentration than would a merger between research units."); Bork, supra note 83, at 384 ("Since the Sherman Act attempts to look beyond legal form to economic substance, ancillary restraints and mergers should be treated similarly."); ROBERT BORK, THE ANTITRUST PARADOX 264 (1978). But see Chicago Professional Sports Ltd. Partnership v. NBA, 961 F.2d 667, 671 (7th Cir. 1992) ("[A]greements among business rivals to fix prices are unlawful per se, although a merger of the same firms, even more effective in eliminating competition among them, might be approved with little ado. . . . Such distinctions are not invariably formal. The combined business entity might achieve efficiencies unavailable to the cartelist.") (citations omitted).
Markets for know-how are almost always going to be broader in scope than markets relevant for assessing commercialization endeavors. Participants in a know-how market may well include firms from quite different industries, because the research findings may be generic and the potential applications many. When firms cooperate to commercialize products, the market will narrow and can be defined by more traditional approaches. Thus, the “market share” of cooperating firms is likely to be higher in a relevant end-product market than in a market for know-how.

But even when dealing with actual product markets and commercialization activities, standard approaches to competition can assign market power incorrectly to an innovating firm. Even though the market power associated with innovation is often quite transitory, standard entry barrier analysis—with its one to two-year fuse for entry—will often not undo a finding of monopoly power for an innovator. Accordingly, innovators may believe they must constrain their business conduct in order to avoid violating the antitrust laws or the threat of private treble damage actions.

With a Schumpeterian concept of competition in mind, one finds the current methodology for defining product markets troublesome. Applying a Schumpeterian view of competition, market power can be ephemeral in industries characterized by rapid technological change. Standard analytical frameworks used to define relevant antitrust markets do not incorporate this dynamic, long-run perspective.

For example, consider how the Department of Justice (DOJ) approaches market definition. As explained in the 1992 Guidelines, the DOJ will include in the product market a group of products such that “A hypothetical profit-maximizing firm that was the only present and future seller of those products (‘monopolist’) likely would impose at least a ‘small but significant and nontransitory’ increase in price ... of five percent lasting for the foreseeable future. However, what constitutes a small but significant and nontransitory increase in price will depend on the nature of the industry.” Our focus here is not so much on the five percent threshold, but on the fact that the implicit assumption adopted is that products in a market are homogeneous and competitors compete on price. Such is often not the case. As a result, application of the five percent test in an industry where competition is Schumpeterian (“innovation-based”) rather than neoclassical is likely to create a downward bias in the definition of the size of the relevant product market, and a corresponding upward bias in the assessment of market power.

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86 See 1992 Guidelines §§ 1.32 & 3.2.
87 1992 Guidelines § 1.11.
Consider the minicomputer industry. In this industry, a variety of systems compete on price and performance while exhibiting price differences of several 100 percent. Too literal an application of the DOJ's five percent test would suggest that each manufacturer is in a different market, otherwise product substitution would occur that would stimulate pressure for price equalization.

Such an interpretation, however, would ignore the realities of competition in the computer industry. A variety of systems with quite different price-performance attributes successfully occupy the same market at a given point in time. As new systems are introduced and the prices of existing systems change, it takes some time for resulting price-performance implications to be digested and understood by the market. One reason is that it takes time for users to experience and test the products. Moreover, to the extent that the product is durable and a replacement for existing equipment, purchase decisions are complicated by the need to retire existing equipment. In addition, new computer systems usually require new support systems, including applications software, so that even computer systems that are consensually superior on price and performance dimensions will take time to diffuse and be adapted. In such situations, 5 percent or even 25 percent price increases may be met with no substitution until the performance of the products can be assessed and existing equipment can be economically replaced. Even a 25 percent price increase may seem insignificant if accompanied by a performance enhancement. In such circumstances where competition is performance based, the DOJ's five percent rule is not likely to identify markets that are in any way meaningful. We next outline a brief and preliminary version of one approach to this problem.

When competition proceeds primarily on the basis of features and performance, the pertinent question to ask is whether a change in the performance attributes of one commodity would induce substitution to or from another. If the answer is affirmative, then the differentiated products, even if based on alternative technologies, should be included in the relevant product market. Furthermore, when assessing such performance-induced substitutability, a one year period for supply re-

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sponses\textsuperscript{90} or a two-year period for new entry\textsuperscript{91} is simply too short because enhancement of performance attributes involves a longer time to accomplish than price changes. While it is difficult to state precisely (and generally) what the length of time should be, it is clear that the time frame should be determined by technological concerns. As a result, it may be necessary to apply different time frames to different products and technologies.

When assessing performance-based competition among existing producers, the product changes to be included as a metric should involve the re-engineering of existing products using technologies currently known to existing competitors. Product changes, which depend on anticipated technologies and are not currently commercial, should be excluded. Thus, if firm A, by modifying its product X using its existing proprietary product and process technology and public knowledge, could draw sales away from product Y of firm B, such that B would need to improve its products to avoid losing market share to A, then X and Y are in the same relevant market.

When assessing potential competition and entry barriers, the two-year-five-percent rule must also be modified to include variations in performance attributes of existing and potentially new technologies. In high-technology innovative industries, it is this potential competition that is often the most threatening. It is also the most important from a welfare standpoint,\textsuperscript{92} takes the longest time to play out, and is the most difficult to fully anticipate. A more realistic time frame must be determined over which the new products and technologies may be allowed to enter. The precise length of time allowed for the entry of potential competitors must also reflect technological realities. Hence, it too may vary by product and technology.

The need to assess performance competition argues for the use of "hedonic methods." A growing body of hedonic literature has addressed the importance of product attributes in economic behavior. This literature has been both theoretical and empirical and has focused on product

\textsuperscript{90} 1992 Guidelines § 1.32.

\textsuperscript{91} 1992 Guidelines § 3.2.

\textsuperscript{92} As noted earlier, Schumpeter stressed that potential competition from new products and processes is the most powerful form of competition, stating "in capitalist reality, as distinguished from its textbook picture, it is not that kind [price] of competition that counts but the competition that comes from the new commodity, the new technology, the new source of supply.... This kind of competition is as much more effective than the other as bombardment is in comparison with forcing a door, and so much more important that it becomes a matter of comparative indifference whether competition in the ordinary sense functions more or less promptly." Schumpeter, supra note 3, at 84.
demand and production cost (hence supply). The demand literature has addressed the importance of product attributes in determining prices and market share. The cost literature demonstrates and measures the impact of product attributes on production costs.

Thus assume that several firms offer various products with different attributes. Assume that one producer improves the performance of a certain attribute, holding price and other attributes constant. If a decrease in the demand of a similar product results, there exists a performance cross-elasticity between the two products. If this cross-elasticity is high enough, the products are in the same market. However, if the producer were to improve the performance of a certain attribute, while simultaneously raising the product's price such that no substitution occurs, this does not necessarily mean that the products are in different markets.

This framework allows one to analyze and quantify both price and performance (attribute) competition. Using it, one can retain the five percent rule while extending the DOJ approach to incorporate performance competition. For example, analogous to the five percent price rule, one could assess the effects of percentage changes in performance. However, such an extension is far from straightforward. One needs to specify rules of thumb carefully regarding the threshold size of perfor-


mance competition and the time period over which such competition is allowed to unfold.

In general, performance changes are more difficult to quantify than price changes because performance is multidimensional. As a result, quantification requires measuring both the change in an individual attribute and the relative importance of that attribute. Unlike price changes, which involve altering the value of a common base unit (dollars), performance changes often involve changing the units by which performance is measured. Nonetheless, rough quantification is possible, based on the pooled judgments of competent observers, particularly product users.

In terms of threshold effects, we tentatively suggest introducing a 25 percent rule for a change in any key performance attribute. This threshold implies the following. Assume that an existing manufacturer lowers the quality of a key performance attribute of an existing product up to 25 percent, ceteris paribus. If no substitution to other products occurs, then the original product constitutes a distinct antitrust market. If substitution to other products does occur, then those other products share the market with the original product. Conversely, assume that a new product is introduced that is identical to an existing product in all ways except that it offers up to a 25 percent improvement in a key performance attribute. If there is no substitution to the new product, then the products represent distinct markets. If there is substitution from the existing product to the new product, then the two products share the same antitrust market.

The criterion of 25 percent performance improvement for a single key performance attribute is conservative. Not only is a 25 percent improvement small compared with those that commonly occur in industries experiencing rapid technological change, but a 25 percent improvement in a single attribute is likely to imply an overall performance improvement of considerably less than 25 percent. This performance threshold must be judged in terms of feasibility. While it is always feasible to raise prices, it is not always feasible to increase performance. This problem is most severe in the case of quantum changes, such as the introduction of a specific application for a device. Following introduction, however, most product changes take place along a relatively continuous trajectory of technological improvement. Many product users are familiar with the key development programs of their suppliers and are able to assess the likelihood that a particular product change will emerge in the near future.

An effective measurement procedure, therefore, would be to rely on the informed judgments of users of existing products. This procedure
would involve identifying market experts, asking them to list key performance attributes, and then asking them to assess the substitutive effects of changes in the attributes. The sample of product users could be supplemented by a corresponding sample of commercial participants, although care would be required to avoid introducing competitive bias into the judgments. A sample of such participants could be asked whether a 25 percent change in the performance of any one attribute would lead to product substitution.

In addition to threshold rules regarding performance changes, market definition requires an identification of a time frame for the competitive product changes—that is, the definition of the "near future." We argued above that the DOJ one year and two-year rules are too short for almost any case of serious technological advance. Indeed, because there is significant variation among products, no single number will be appropriate for all cases. Nonetheless, we suggest that a four-year period be established as a default time frame, with the option of adjusting the period if strong evidence suggests that it would be appropriate in an individual case. Like the DOJ's one year rule or the patent law's seventeen-year grant, a fixed four-year rule will not be optimal in all cases. It could provide too broad a market definition in some cases and too narrow a definition for others; however, its unambiguous nature has the advantage of being easily understood and not requiring negotiation or litigation to determine an appropriate time frame.

Finally, one needs to address the question of the appropriate HHI thresholds. The 1992 Merger Guidelines selects critical HHIs at 1000 and 1800. It is difficult to hypothesize and propose alternative HHIs for technologically dynamic markets. However, the inclusion of performance competition and the extension of the time frame of competitive response may mean that it is not necessary to change these critical HHIs. Furthermore, we believe that with technologically dynamic markets, the dynamics of market structure in the past should provide some guidance to assessing market definition and predicting likely changes in market concentration. Key factors are the change in concentration and the trend in the number of competitors.

The methodology described above is a very preliminary attempt to incorporate innovation- and performance-based competition into market

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96 If an employee of a competitor of a firm for which market power was being determined was included in the sample, for instance, that person would have incentives to overestimate the difficulty of performance improvement. The need to inform these economic decisions with technological reality would argue for a closer working relationship between the Antitrust Division of the United States Department of Justice and the National Science Foundation or the Office of Technology Assessment.
definition. There may be other methods and approaches that also help courts achieve this important goal; and all are indeed welcome. The important point is that a failure to recognize that competition is often on the basis of performance attributes and not price will lead courts and the antitrust agencies to underestimate the breadth of product markets in industries characterized by rapid technological change. This process, in turn, will lead courts and agencies to exaggerate antitrust problems. As a consequence, technological development may be retarded.

D. Defendants' Rebuttal

The defendants have the burden of rebutting or responding to the evidence introduced by plaintiff. The defendants' burden should vary in degree according to how much market power they are shown to possess. For the purposes of balancing anticompetitive harms against procompetitive virtues, it is probably necessary to recognize a rough sliding scale between market power and benefits. Thus, the greater plaintiff's proof of defendants' market power, the greater defendants' burden of establishing procompetitive benefits. The defendants' burden, varying as it may in weight, may be fulfilled in several complementary ways.

1. Lack of Market Power

The defendants may attack possession of market power by demonstrating that the plaintiff defined the relevant market incorrectly or in a manner inconsistent with appropriate market definition criteria, and that the error led to an unwarranted conclusion that the defendants possess substantial market power. If the defendants are able to make such a showing, the plaintiff must introduce new evidence of market power in order to avoid summary judgment.

2. Potential Competition

The defendants may show the existence of potential competition in the relevant market to negate the potential anticompetitive harms inferred from market power.

3. Procompetitive Benefits

The defendants may introduce evidence of procompetitive benefits and efficiencies created by the cooperative arrangement. Rule of reason


analysis should be focused as specifically as possible on the benefits of innovation, and on the special operational and strategic coordination needs of innovation. Thus, in addition to the traditional elements of rule of reason analysis, defendants should be permitted to show that:

(1) The innovation sought by the cooperative arrangement will, if achieved, be inadequately protected under the patent, trade secret, or other intellectual property laws, and that specific contractual restraints have been adopted in order to secure appropriability and prevent free-riding and opportunistic behavior;

(2) The innovation sought by the arrangement is of such a character or magnitude that a cooperative arrangement will help achieve the economies of scale and scope necessary to mount a successful research and commercialization effort and will reduce overall risk;

(3) Successful innovation sought by the arrangement will be aided by cooperative or integrated commercialization, including specific contractual restraints;

(4) The arrangement will compete in a market or markets that are characterized by rapid technological change;

(5) The innovation sought by the arrangement will compete with other technologies designed (or in the process of design) to satisfy the same or similar customer needs; and

The Supreme Court usually speaks in only the most general terms concerning factors to be considered. For example, the Court has said that the basic inquiry under rule of reason analysis is "whether or not the challenged restraint enhances competition," NCAA, 468 U.S. at 104; whether the restraint is "designed to 'increase efficiency and render markets more, rather than less, competitive,'" BMI, 441 U.S. at 20 (quoting United States v. United States Gypsum Co., 438 U.S. 422, 441 n.16 (1978)), or whether there is any "countervailing procompetitive virtue—such as, for example, the creation of efficiencies in the operation of a market or the provision of goods and services," Indiana Fed'n of Dentists, 476 U.S. at 459. When greater detail seems warranted, the Court usually goes no further than a citation to a list of general factors, which include:

[T]he Court must ordinarily consider the facts peculiar to the business to which the restraint is applied; its condition before and after the restraint was imposed; the nature of the restraint and its effect, actual or probable. The history of the restraint, the evil believed to exist, the reason for adopting the particular remedy, the purpose or end sought to be obtained, are all relevant facts. This is not because a good intention will save an otherwise objectionable regulation or the reverse; but because knowledge of intent may help the Court to interpret facts and to predict consequences.

Id. at 458; Chicago Bd. of Trade v. United States, 246 U.S. 231, 238 (1918), cited in GTE Sylvania, 433 U.S. at 49 n.15. In the end, the fact finder is directed to "weigh all of the circumstances of a case in deciding whether a restrictive practice should be prohibited as imposing an unreasonable restraint on competition," GTE Sylvania, 433 U.S. at 49.
(6) An exchange of information helps achieve competitive "catch-up," lowering of costs, convergence on technology roadmaps, establishes beneficial industry standards, or other benefits which assist the innovation process.

Whether or not such procompetitive benefits or efficiencies exist, and whether they bear a logical relationship to challenged contractual restraints, will play a large role in the ultimate determination of whether the arrangement is reasonable.

E. ULTIMATE BURDEN OF PROOF

If the defendants introduce satisfactory evidence of justifications, the final burden of proof—to show that the arrangement or any part thereof is "unreasonable"—remains upon the plaintiff. The plaintiff may of course rebut evidence introduced by the defendants, bolster its showing of market power or actual anticompetitive effects, and/or introduce evidence that justifications shown to exist by the defendants could be achieved (1) by an existing firm or viable combination of firms with substantially less market power than that exercised by the arrangement in any relevant market; or (2) by the parties to the arrangement in an obviously and substantially less restrictive manner.

The last of these showings is not meant to be a separate "less restrictive alternative" analysis, which we disfavor. If plaintiffs are able to demonstrate that the benefits of a cooperative arrangement obviously could have been achieved with substantially fewer participants or a substantially less restrictive contractual provision, in such case a trier of fact might appropriately find the original cooperative agreement was an "unreasonable" restraint of trade. Thus, the existence of an obvious and substantially less restrictive alternative may be a factor considered in overall rule of reason balancing, but it should not be elevated to a separate stage of analysis nor be available as a "trump" card.

The Third Circuit stated the test in this manner: "Whether the restriction exceed[s] the outer limits of restraints reasonably necessary to protect the defendant." American Motors Inns v. Holiday Inns, 521 F.2d 1230, 1249 (3d Cir. 1975) (emphasis added). See also Berkey Photo Inc. v. Eastman Kodak Co., 603 F.2d 263, 303 (2d Cir. 1979); Areeda, supra note 98, at 388 ("Some courts wisely ask only that the challenged restraint be 'reasonably necessary' to achieve a legitimate objective. It would not be if equal benefits could be obtained through substantially less restrictive routes").

One problem we see in Professor Areeda's rule of reason approach is that it can be read to give undue weight to less restrictive alternative analysis. See 7 Phillip Areeda, Antitrust Law ¶¶ 1502 & 1505 (1986).
restrictive alternatives reduces the possibility that determination of reasonableness will turn on minute or trivial distinctions.\footnote{2}

Ultimately, if a cooperative arrangement designed to advance innovation is shown to both possess procompetitive benefits and cause anticompetitive harms, the plaintiff bears the burden of proving that the net balance is negative and that the arrangement or its contractual restraints are unreasonable.

To be sure, the ultimate balancing remains an imprecise operation. But at least if the steps outlined here are incorporated by courts, the parties will better understand the role of market power, the factors that are to be balanced, and the procedural burdens involved within the rule of reason analysis. Summary judgment will then become a more effective tool for terminating litigation before trial when parties fail to meet their burdens,\footnote{3} and rule of reason analysis will unfold in a manner that is sensitive to the benefits and requirements of innovation. Certainly this is a goal that is both attainable and worthy of our attention.

\footnote{2} We believe that the Court's discussion of less restrictive alternatives in NCAA is not inconsistent with our approach. Although the Supreme Court has not expressly addressed this area of rule of reason analysis, in rejecting the NCAA's argument that the regulation of all television of intercollegiate football was necessary to provide a competitive balance, the Court discussed many alternatives that were not selected that might equally have provided competitive balance, and affirmed the district court's findings that many other restrictions imposed by the NCAA were "better tailored to the goal of competitive balance than is the television plan, and which are 'clearly sufficient' to preserve competitive balance to the extent that is within the NCAA's power to do so." NCAA, 486 U.S. at 119. In fact, the Court does not appear to have actually engaged in less restrictive alternative analysis at all. Prior to the quoted language, the Court held that: "[T]he television plan is not even arguably tailored to serve a competitive balance interest." \textit{id.}, finding that the restraints bore no logical relationship to the NCAA's goals—the sine qua non of the reasonableness of a restraint. Less restrictive analysis was unnecessary to the Court's holding that the restraint was unreasonable.

\footnote{3} If plaintiff \textit{fails} to demonstrate sufficient market power in a relevant market, i.e., above safe-harbor levels, then defendants are entitled to summary judgment. On the other hand, if plaintiff does meet its market power burden, and defendants then \textit{fail} to demonstrate substantial procompetitive benefits or efficiencies, then plaintiff is entitled to summary judgment. "\textit{Failure} should be judged by the evidentiary standards the Court recently articulated in Eastman Kodak Co. v. Image Technical Servs., Inc., 112 S. Ct. 2072, 2083 \& n.14 (1992) ("\textit{Matsushita} demands only that the non-moving party's inferences be reasonable in order to reach the jury, a requirement that was not invented, but merely articulated in that decision.
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