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ACCEPTABLE COOPERATION AMONG COMPETITORS IN THE FACE OF GROWING INTERNATIONAL COMPETITION

Thomas M. Jorde* and David J. Teece*

I. INTRODUCTION

Nobel Laureate Robert Solow and his colleagues on MIT's Industrial Productivity Commission recently noted 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 performance" and that "interfirm cooperation in the U.S. has often, though not always, been inhibited by government antitrust regulation." These conclusions are striking and they warrant further exploration. Yet the role that cooperative relationships play in facilitating the commercialization of technological innovation—that is, converting new technology into marketable products and processes—and industrial performance is barely addressed in the theoretical or empirical literature on the economics of technical change.

Indeed, the notion that cooperation among firms classified as competitors is beneficial is viewed with great skepticism among economists and antitrust scholars alike. This is in part due to the static nature of microeco-

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1 M. Dertouzos, R. Lester, & R. Solow, Made in America: Regaining the Productive Edge 7 (1989).

2 Id. at 105.

3 Fortune characterized the MIT Report's conclusions on cooperation as its most sweeping and most striking. Fortune, May 22, 1989, at 93.

4 This is an embarrassing omission, especially since "considerable evidence suggests that America is failing to commercialize the kinds and quality of technology that the market demands." See Council on Competitiveness, Picking Up the Pace: The Commercial Challenge to American Innovation 13 (1988).
nomic analysis, and it is static microeconomic analysis that is now the basis of so much antitrust analysis. This is the main reason why the law has been slow to accommodate the needs of innovating firms.

In this article we describe characteristics of the innovation process, explore socially beneficial forms of cooperation that can assist the development and commercialization of new technology, and suggest modifications to current U.S. antitrust law that would remove unnecessary impediments to organizational arrangements that can support innovation and stimulate competition. The modifications we propose would create "safe harbors" for various forms of cooperative activities among competitors in unconcentrated markets, and they would permit cooperation in concentrated markets if commercialization and appropriability were facilitated.

Many of these proposed changes have now been incorporated into legislation introduced by Representatives Boucher, Campbell, Edwards and Fish. Not surprisingly, we support these legislative efforts, but we also argue that much of what we propose can and should be adopted by the courts through rule of reason analysis. The changes we propose would have the effect of eliminating substantial uncertainties with respect to the way in which cooperative ventures are currently evaluated by the courts. If accomplished, these modifications would bring U.S. antitrust laws closer to what is already in place in Europe and Japan and create a legal and business climate encouraging innovation.

II. THE NATURE OF INNOVATION

Innovation is the search for, and the discovery, development, improvement, and adoption of new processes, new products, and new organizational structures and procedures. It involves uncertainty, risk taking, probing and reprobing, experimenting, and testing. It is an activity in which failure is common. "Dry holes" and "blind alleys" are the rule and

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5 Stiglitz has remarked:

While it is the dynamic properties of capitalism, the increases in the standards of living to which it has given rise, that constitute the basis of our confidence in its superiority to other forms of economic organization, the theory—at least the version we teach to students—is based on a model that assumes an unchanging technology.


6 For an excellent review of the innovation literature, see Dosi, Sources, Procedures, and Microeconomic Effects of Innovation, 26 J. Econ. Lit. 1120 (1988).
not the exception. These aspects are well known and have been frequently analyzed in the economics literature.

Less frequently recognized is that innovation is a 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. Because of the cumulative nature of technological development, once a new technology is selected and used there is no going back to the old. The old technology will have no user interaction and thus will remain relatively stagnant, while the new technology will forge ahead because of cumulative learning. 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.\(^7\)

Also frequently neglected is the fact that 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. Products must be rapidly advanced to the marketplace and organizational mechanisms must exist to allow customer needs to be factored into research and manufacturing decisions. For innovation to continue in a particular organizational setting, economic rents must be secured before the next generation of product displaces the current product in the market. These later stage activities can be referred to as commercialization.

Innovation is also accompanied by well-known free rider and public good characteristics. Know-how leakage and 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, either by private action or by public policies. This is how economists justify patents, copyrights, trade secrets, and other aspects of intellectual property law.

However, in most theoretical treatments of these issues there is usually an implicit assumption that intellectual property law works uniformly across industries. The evidence suggests otherwise. We identify "appropriability regimes" according to the degree to which free riding activity is constrained by the mechanisms of intellectual property law (such as

\(^7\) 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. These exceptions, however, occur infrequently.
patents, trade secrets, and copyright) in a particular industry or field of technological development. Appropriability can be strong (such as when patents are available and inventing around them is difficult) or weak (such as when 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.

Since much intellectual property can be copied, success in the marketplace with new technology often depends on other factors, such as who can supply at lowest cost. However, commercialization is both costly and risky, perhaps even more so than R&D activity. We want to underscore that the process of innovation is not over but has only just begun when a prototype comes out of R&D. It is in part because we view innovation as including commercialization, and thus involving much more than R&D activity, that we have a different perspective on the managerial and policy issues than is commonly found in most standard treatments. Moreover, we are deeply concerned by mounting evidence that U.S. firms are failing at commercialization, despite their excellence in research and the excellence of research in the nation's universities. As Charles Sporck, CEO of National Semiconductor, put it: "This country is full of starters. There are damn few finishers.”

III. ORGANIZATIONAL REQUIREMENTS OF INNOVATION

The organizational requirements of innovation are both complex and considerable. Unfortunately, the economic analysis of organizational

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9 See Levin, Klevorick, Nelson, & Winter, Appropriating the Returns from Industrial Research and Development, in Brookings Papers on Economic Activity, 783 (1987) [hereinafter Levin & Klevorick]. Yale researchers surveyed R&D managers in various industries. The survey shows that, on a seven-point scale (1 = not at all effective, 7 = very effective) for 18 industry categories with 10 or more respondents, managers in only chemical (specifically drugs, plastic materials, inorganic chemicals, and organic chemicals) and petroleum refining rated process patents effectiveness higher than 4 on the scale, and only these same chemical industries and steel mills rated product patents higher than 5. The survey underscores what many have suspected: patents possess limited effectiveness as a means of capturing value from innovation. These findings make very clear that managers have little confidence that patents suffice as mechanisms to protect intellectual property from free rider.

For a recent discussion of the importance and difficulties of profitable commercialization, see Council on Competitiveness, supra note 4.

questions has received scant attention since Arrow's seminal essay almost three decades ago. Arrow explored the impact of two separate organizational regimes—pure monopoly and perfect competition—on the allocation of resources to innovation. He concluded that for optimal allocation of resources "it would be necessary for the government or some other agency not governed by profit-and-loss criteria to finance research and invention." This conclusion is not novel now and was not then. But Arrow did begin to frame organizational issues. More recent efforts to study the sorts of social institutions that can sustain an efficient level of inventive and innovative activity unfortunately have not significantly advanced our understanding of the governance structures that can support innovation. In particular, there has been almost no consideration of how private contractual arrangement can shore up market failures. The one exception is the tiny body of literature on joint R&D activity.

Despite recent developments, industrial organization textbooks still almost exclusively discuss horizontal cooperation and competition in terms of standard cartel theory. On the other hand, vertical cooperation/contracting is viewed differently, and some textbooks provide treatments of supplier-buyer relationships in which cooperation is viewed as efficiency enhancing. However, in both the textbooks and in policy discussions among economists, cooperation among competitors is viewed as highly suspect, being perhaps the last bastion of what was once referred to as the "inhospitality tradition" in antitrust. The result is that there is very little literature that addresses how cooperation among competitors can promote competition.

Nevertheless, cooperation among competitors can not only promote competition, but may be essential if innovating firms are to compete in today's increasingly global markets. The global economy of the 1970s

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15 Cooperation has been very important in Europe as well as in Japan. For instance, cooperative R&D and related activities have been important to the success of the West German machine tool industry. The industry formed a strong association that has a research and teaching institute at Aachen. The West German industry has been described as "groups of clubs" because of the nature of the cooperation displayed. See Collis, The Machine Tool Industry and Industrial Policy, 1955-1982, in International Competitiveness 95 (A. Spence & H. Hazard eds. 1988). The Italian machine tool industry around Modena is similarly
and 1980s is characterized by continuous innovation supported by inter-
action and linkages across and within the boundaries of particular indus-
tries. Successful firms in high technology industries must use coopera-
tion affirmatively. Our conclusion is drawn not only from observing
successful players in today’s market, but also from a reconceptualization
of the innovation process.

A. “Serial” vs. “Simultaneous” Views of Innovation

Because of the complexity of the innovation process, it is first necessary
to break down the process in order to understand the relationship among
various stages of innovation.

1. The Serial View

The traditional view of innovation has its origins in the description
and analysis of “big technology” projects. These descriptions of the inno-
vation process commonly break it down into a number of stages that
proceed sequentially. Theoretical treatments in industrial organization
and in antitrust economics have followed right along. According to this
view, the innovation process proceeds in separable stages from research
to development, design, production, and then finally to marketing, sales,
and service. In this simple world, there is no feedback or overlap be-
tween and among stages. This representation is an analytic convenience,
but it no longer accurately characterizes the innovation process, except
in rare instances. Indeed, the innovation process does not necessarily
begin with research; nor is the process serial. At the center of the innova-
tion process is design, not science. Research is often spawned by the
problems associated with trying to get the design right. Moreover, techno-
logical developments draw on an array of sciences. Indeed, important
technological breakthroughs can often proceed even when the underly-
ing science is not understood.

The serial view also underemphasizes the importance of process inno-
vation—innovation with respect to the manner in which a product is
organized, as is the Italian textile industry and the Danish furniture industry. (A review of
examples of cooperative activity abroad is part of the authors’ ongoing research.)

16 See Ken-ichi Imai & Yasunori Baba, Systemic Innovation and Cross Border Networks,
Paper presented at Seminar on the Contributions of Science and Technology to Economic
Growth, OECD, Paris (June 1989).

17 For a fuller description, see Teece, Interorganizational Requirements of the Innovation
Process, 10 Managerial & Decision Econ. 1 (1989); Teece, The Strategic Management
of Intellectual Property, unpublished manuscript, Center for Research in Management,
University of California at Berkeley (July 1989) [hereinafter Teece, Strategic Management].

18 See, e.g., Grossman & Shapiro, supra note 14, at 319; J. Tirole, The Theory of
produced rather than innovation in the product itself. Indeed, if the serial view fits innovation at all, it fits perhaps only for a very small class of product innovations. Process innovations often do not require marketing, and may not even require new tooling. Nor does the serial view address the many small but cumulatively important incremental innovations that are often at the heart of technological change. The serial view has a macro project orientation; but this is not the way in which most innovation proceeds.

2. The Simultaneous View

In reality—with uncertainty, learning, and short product life cycles—innovation requires rapid feedback, mid-course corrections to designs, and redesign. Feedback and trials are essential, especially if incremental rather than radical innovation is at issue. Furthermore, incremental improvement is of critical importance. In order to succeed at innovation, a team designs a new version of the product and, working closely with manufacturing and marketing, brings it to market. Development speed is critical, as the prior product generation is already in the marketplace, open to reverse engineering and imitation. Hence, the firms that can get out the next generation product in the shortest time and at a competitive price are likely to expand their market share or shares.

We term this view "simultaneous." It has aspects of the serial view—such as the flow of activity, in certain cases through design to development, production and marketing—but also recognizes continuous and simultaneous feedback between and among "stages." 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."

The identification of user needs is critical to the profitable expenditure of R&D dollars. Therefore, R&D personnel must be closely connected to the market and to marketing personnel. Knowing what to develop and design, rather than just how to do it, is essential for commercial success. Developing this understanding involves a complex interplay between science, engineering, manufacturing, and marketing in order to specify product functions and features. It is not just a matter of identifying user

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19 Gomory, however, uses the term "cyclic." Gomory, Dominant Science Does Not Mean Dominant Product, RES. & DEV. 72 (Nov. 1987).

needs and assessing engineering feasibility. One must also separate those user needs that are being met by competition and those that are not. This may not become clear until the product is introduced, in which case the ability to redesign quickly and efficiently is critical.

The simultaneous view of innovation recognizes the existence of tight linkages and feedback mechanisms that must operate quickly and efficiently. These linkages must exist interfirm, intrafirm, and also between firms and other organizations, such as universities. Of course, the firm's level of vertical integration determines in part whether the required interactions are intrafirm or interfirm.

B. Linkages

For an economy to support and be invigorated by innovating firms, it must have sufficient institutional and organizational flexibility to enable firms to quickly and efficiently form the arrangements necessary to permit new products and processes to be designed, developed, manufactured, distributed, and serviced. As the simultaneous view makes clear, a technological breakthrough is neither a necessary nor a sufficient condition for innovation to occur, let alone to occur in a fashion that is profitable to the innovator. Thus, if an innovating firm conceives and develops a new product, it is commonly the case that its commercialization will require new investment in complementary capacities, such as manufacturing, marketing, sales, and service. Even if new investments are not required, assets will need to be reconfigured. In short, innovation requires what Schumpeter referred to as "new combinations." The assets, institutions, and groups so combined must also be closely connected so that the necessary information flows and interactions can occur. Sometimes reshuffling existing assets will suffice; at other times new investment in facilities and capabilities will be required.

The economic system can accomplish this in a number of ways. Conceivably it could all take place administratively inside large firms. Alternatively, and at the other extreme, it could take place contractually among completely unaffiliated enterprises. As it turns out, administrative processes are sometimes the most efficient approach; at other times contractual and hybrid arrangements work better for the innovator and the economy. As we explain later, the antitrust laws should not interfere with the selection of the correct organizational approach, except in unusual circumstances.

I. Interaction and Technology Transfer Efficiency

Innovation requires interaction among individuals and organizational units and the transfer of technical and business information. Clearly the transfer of technology\textsuperscript{22} is not a cost-free activity. This is especially true if the know-how to be transferred cannot be easily bundled and shipped out in one lot.\textsuperscript{23} In these instances, the required interaction and transfer of technology cannot be separated from the transfer of personnel. This typically can proceed more easily inside an organization than across organizations. For this reason it is often essential for innovating firms or consortia to integrate forward into the key complementary activities, like manufacturing, if commercialization is to proceed in an efficient and timely fashion.

Besides the transfer costs associated with getting technology-driven concepts to market, there are also costs associated with bringing user requirements to the attention of the developers of new products and processes. Customers and other users play an important role in new product development.\textsuperscript{24} The vertical cooperation this requires generates situations that are contrary to the usual assumption that product manufacturers are responsible for the entire innovation process from finding to filling the need.\textsuperscript{25} Indeed, researchers have found that user-dominated innovation accounted 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{26}

Mirroring the role that users play in stimulating innovation upstream is the role that suppliers play in stimulating downstream innovation. 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.\textsuperscript{27} The challenge to the manufacturer

\textsuperscript{22} We are referring here to the transfer of technology among the various activities that constitute innovation.

\textsuperscript{23} For a review of the characteristics of know-how, see Winter, \textit{Knowledge and Competence as Strategic Assets, The Competitive Challenge} (D. Teece ed. 1987); Teece, Strategic Management, \textit{supra} note 17.

\textsuperscript{24} See E. von Hippel, \textit{The Sources of Innovation} 13 (1988).

\textsuperscript{25} Note that user innovation requires two kinds of technology transfer: first from user to manufacturer, and then from manufacturer to the developer-user and other users.

\textsuperscript{26} For example, Bendix and Bosch developed fuel injection and Motorola the alternator.

\textsuperscript{27} A related set of vertical relationships involving innovation has been remarked upon by Rosenberg in his treatise on technology and American economic growth, N. Rosenberg, \textit{Technology and American Economic Growth} 98–102 (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
then becomes how to "design in" the new components and how to avoid sole source dependency. As discussed below, deep and enduring relationships need to be established between component developer-manufacturer and supplier to ensure adoption and diffusion of the technology.

2. Scale and Duplication Issues

For efficient commercialization, successful new product and process development innovation often requires horizontal as well as vertical cooperation. Horizontal linkages can help overcome scale barriers in research, and they help reduce unnecessary duplication of research efforts. They can also assist in the definition of technical standards for innovation. However, contrary to standard treatments in the economics literature, horizontal "research" linkages rarely capture the full value of the benefits of innovation because the set of firms with the technical ability to take advantage of technological spillovers in today's global economy is likely to include a very large number of firms—typically much greater than the number we could imagine in any single research consortium.

One property of horizontal cooperation is that it may reduce diversity. We recognize that diversity of approaches among firms is important. Unquestionably, an economic system that converges on just one view of technical and market opportunities is likely to close off productive avenues of inquiry. However, in a private enterprise economy without horizontal coordination and communication, there is no guarantee that the desired level of diversity is achieved at the lowest cost. If firms are able to coordinate their research programs to some degree, duplication can be minimized without the industry converging on a single technological approach. In short, cooperation need not be the enemy of diversity. Indeed, Bell Labs has been noted for the very considerable internal diversity it has been able to achieve, at least in the pre-divestiture period.

3. Capturing Value from Innovation

Cooperation not only facilitates the efficient and speedy commercialization of new technology, it also helps keep imitators and other followers

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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.

28 Collaborative research reduces, if not eliminates, what William Norris, CEO of Control Data Corporation, refers to as "shameful and needless duplication of effort." David, R&D Consortia . . ., HIGH TECH. 42 (Oct. 1985).

29 Independent research activities often proceed down identical or near-identical technological paths. This is often wasteful and can be minimized if research plans are coordinated. Needless to say, uncertainty often requires that multiple (but not identical) technological
at bay. It helps build defensible market positions that enable innovators with weak intellectual property protection to survive, thereby stimulating competition.

If firms have strong intellectual property protection, they do not need to be very strategic in the way they commercialize their technology. Indeed, if they simply license it there is some chance that they can capture through licensing fees some portion of the added value or cost savings that the innovation provides to customers. Generally, however, intellectual property protection is weak. For instance, in a sample of forty-eight patented product innovations in the chemical, drug, electronics and machinery industry, one group of researchers found that within four years of their introduction, sixty percent of the patented successful innovations in the sample were imitated.

In instances where intellectual property protection is weak, a research joint venture does little to prevent free riding. An innovating firm, or an innovating consortium, must behave more strategically if it is to capture value from technology and sustain its innovative activities.

When imitation of aspects of a firm's technology is easy, it is essential for firms to be unexcelled at the less imitatable complementary activities. Thus the best defense of an imitatable new product may well be a less easily imitatable superior manufacturing process to make the product, or it may be the firm's superior service capability. The expert performance of the innovator or its alliance partners in certain key activities complementary to the easily imitatable activities may thus enable the innovator 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 paths be pursued simultaneously. See, e.g., R. Nelson, High Technology Policies 6-16 (1984).

In some cases it is non-existent, such as for certain kinds of pharmaceutical innovations in Italy and Brazil.


There has been almost no treatment in the economic literature of the concept of complementary assets. For a more complete treatment, see Teece, Profiting from Innovation, supra note 8, at 285-305.

As technical advances create new requirements with respect to complementary assets, innovating firms everywhere are facing a "capability squeeze" since they often do not have the requisite complementary assets. As explained below, this is one factor driving interfirm cooperation.
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. Hence it is critical that innovating firms protect themselves from such outcomes by developing or somehow accessing the requisite complementary assets. To accomplish the latter, cooperation is often essential.

IV. GOVERNANCE ALTERNATIVES

Cooperation can be effectuated by a variety of organizational mechanisms. Theoretical treatments of the price mechanisms assume that the requisite cooperation can be achieved by the "invisible hand." In textbook treatments of the operation of a market economy, efficient investment levels in complementary assets become selected because the information necessary to set efficient levels of the right investment at the right time is provided instantaneously and without cost.

In reality, of course, there is no special means to ensure that investment programs are made known to all concerned at the time of their inception. Additionally, it is the area of development and commercialization of new technology where uncertainty is highest and the need to coordinate greatest.

In the traditional textbook treatment, the price system somehow allows all of the necessary coordination to occur smoothly and efficiently. This

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31 Tjalling Koopmans has been rather critical of what he calls the "overextended belief" of certain economists regarding the efficiency of competitive markets as a means of allocating resources in a world characterized by ubiquitous uncertainty. This uncertainty, according to Koopmans, is primarily due to the ignorance which firms have with respect to their competitors' future actions, preferences, and states of technological information. T. Koopmans, THREE ESSAYS IN THE STATE OF ECONOMIC SCIENCE 146 (1957). Relatedly, if competing firms do communicate investment plans to each other directly, they might well be in violation of the antitrust laws.

32 In Walrasian systems, innovators, together with the auctioneer, act as coordinators to bring harmony to the competitive pursuit of self-interest. The prices of goods and services are set by the auctioneer, who adjusts them according to the Law of Supply and Demand. Given a system of prices, the excess of sales price of entrepreneurial output over the cost of production may be either positive, null, or negative. This excess is termed benefice de l'entreprise by Walras. A positive or negative benefice is a sign of disequilibrium, and entrepreneurs respond to this signal according to the Law of Cost Price; that is, they increase their scale of production when the benefice is positive and reduce it when the benefice is negative. The presumption that firms strive for higher incomes and lower losses through entry and exit is implicit. However, entrepreneurs in their purely functional roles are only catalytic agents, who accelerate combinations of atomistic factors of production only when the benefice is positive. Thus, in a state of equilibrium, entrepreneurs make neither profit nor loss. "Profit in the sense of benefice de l'entreprise . . . depends upon exceptional and not upon normal circumstances." L. Walras, ELEMENTS OF PURE ECONOMICS 423 (1984).
simple view, which seems to inform much of antitrust thinking today, holds that the only information firms and households need is provided by the price system. However, the innovators' informational requirements are usually greater than that which is embedded simply in price. Accordingly, innovating firms need to achieve greater coordination than the price system alone can effectuate. The need for coordination has led some economists to advocate a role for government planning of resource allocation. Indeed, the case for indicative planning and industrial policy is often made at least in part on the basis of the arguments just outlined. But there are other mechanisms for enhancing cooperation among competing firms that do not require government planning.

Internal (within the firm) administrative processes are one obvious mechanism to effectuate coordination. A company's internal organization, possibly augmented by interfirm agreements, can serve to shore up some market imperfections and provide some of the necessary coordination.36

Lying in between pure market and full administrative solutions are many other arrangements, including interfirm agreements. Interfirm agreements can be classified as unilateral (where A sells X to B) or bilateral (whereby A agrees to buy Y from B as a condition for making the sale of X, and both parties understand that the transaction will be continued only if reciprocity is observed).37 An especially interesting interfirm agreement is the strategic alliance, which can be defined as a bilateral relationship characterized by the commitment of two or more partner firms to reach a common goal,38 and which entails the pooling of specialized assets and capabilities. Thus a strategic alliance might include one or more of (1) technology swaps, (2) joint R&D or co-development, and (3) the sharing of complementary assets, e.g., one party does manufacturing, the other distribution, for a co-developed product.

Strategic alliances can be differentiated from exchange transactions, such as a simple licensing agreement with specified royalties, because in an exchange transaction, the object of the transaction is supplied by the

36 As Alfred Chandler has explained, the modern multidivisional business enterprise "took over from the market the coordination and integration of the flow of goods and services from the production of raw materials through the several processes of production to the sale to the ultimate consumer . . . administrative coordination replaced market coordination in an increasingly large portion of the economy." A. CHANDLER, THE VISIBLE HAND: THE MANAGERIAL REVOLUTION IN AMERICAN BUSINESS 11 (1977). Oliver Williamson has developed a framework to explain the relative efficiencies of markets and administrative processes. O. WILLIAMSON, THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING 43-162 (1985).

37 Williamson, supra note 36.

38 If the common goal was price fixing, or "naked" market sharing decisions without any efficiency effects, such an agreement would constitute a cartel, and not an alliance.
selling firm to the buying firm in exchange for cash. Exchange transactions are unilateral and not bilateral. A strategic alliance by definition can never have one side receiving cash alone. Nor do strategic alliances include mergers, because by definition alliances cannot involve acquisition of another firm's assets or controlling interest in another firm's stock. Alliances need not involve equity swaps or equity investments, though they often do. Strategic alliances without equity typically consist of contracts between or among partner firms that are nonaffiliated. Equity alliances can take many forms, including minority equity holdings, consortia, and joint ventures.

Strategic alliances, including consortia and joint ventures, are often an effective and efficient way to organize for innovation, particularly when an industry is fragmented. Some of the objectives that national planning sets out to provide can thus be accomplished by private agreements. Whereas full-blown national planning entails the abolition of the market as an organizing mechanism—techniques of production and new technologies are not selected by competition but instead are consciously, deliberately decided upon by government officials, inserted into a "scientific" plan, and then carried out by fiat—interfirm cooperation still preserves market selection but augments selection processes with private, bilateral, interfirm cooperation. In one sense, it is the pure, private enterprise solution.

As compared to the full administrative solution, as entailed by merger, alliances and other forms of interfirm agreements are of course far less restrictive. They are also different from cartels. First, interfirm agreements may be temporary by design, and are assembled and disassembled as circumstances warrant. Second, they are less comprehensive as typically only a limited range of the firm's activities are enveloped in such agreements, and many competitors are excluded. Most importantly, they are driven by efficiency concerns. Cartels, by contrast, are driven by the objective of enlarging profits through price fixing or output reduction strategies. Accordingly, it is unfortunate that, as explained below, U.S. antitrust laws treat some cooperative agreements less permissively than mergers. Moreover, they are sometimes equated with cartels.

V. ANTITRUST TREATMENT OF INTERFIRM AGREEMENTS

A. The United States

Current antitrust law in the United States needlessly inhibits interfirm agreements designed to develop and commercialize new technology.39

First, the legal standards for interfirm agreements are ambiguous. While it is generally true that rule of reason analysis—rather than per se rules—will be applied to contractual arrangements designed to advance innovation, the elements of rule of reason analysis are quite muddled. Some clarity exists for vertical arrangements, but horizontal and hybrid (elements of both vertical and horizontal) cooperative arrangements face greater uncertainty. This is primarily because the economics literature has not hitherto provided the courts with plausible theories of horizontal cooperation other than cartels. While simple "scale economy" or "risk reduction" theories are often discussed, these notions do not capture but a fraction of the variety of the circumstances where social benefit can arise from interfirm agreements.


See, e.g., Assam Drug Co. v. Miller Brewing Co., 798 F.2d 311, 315 (8th Cir. 1986) ("The vertical nonprice restraint at issue in this case is plainly subject to evaluation under the rule of reason (citing Continental T.V. Inc. v. GTE Sylvania Inc., 433 U.S. 36 (1977)). The rule of reason, however, is a vacuous standard and as such it provides little concrete direction for evaluating the competitive effects of a challenged restraint."); Graphic Prods. Distrib. v. Itek Corp., 717 F.2d 1560, 1568 n.10 (11th Cir. 1983) ("Not called upon to apply the rule of reason to the facts at hand, the Court merely recited the classical articulation of the rule by Justice Brandeis in Chicago Bd. of Trade v. United States, 246 U.S. 231 (1918). The exceedingly general nature of these factors, and the absence of an analytical framework for applying the rule of reason, has been discussed by commentators of every persuasion (references omitted)"); Valley Liquors Inc. v. Renfield Importers Ltd., 678 F.2d 742, 745 (7th Cir. 1982) ("The plaintiff in a restricted distribution case must show that the restriction he is complaining of was unreasonable because, weighing effects on both intrabrand and interbrand competition, it made consumers worse off. Admittedly, this test of illegality is easier to state than to apply.").

Numerous commentators have reached the same conclusion. See, e.g., Zelek, Stern, & Dunfee, A Rule of Reason Decision Model After Sylvania, 68 CALIF. L. REV. 893 (1980) ("[N]either Sylvania nor previous decisions offer much practical guidance to lawyers who must advise clients or to judges who must decide cases under the rule of reason, leaving the question of what analytical methods are appropriate largely unresolved."); Sullivan, The Viability of the Current Law on Horizontal Restraints, 75 CALIF. L. REV. 835, 843 (1987). (In Broadcast Music, "the majority give little guidance for balancing efficiency and harm once the record is expanded."); Arthur, Farewell to the Sea of Doubt: Jettisoning the Constitutional Sherman Act, 74 CALIF. L. REV. 263 (1986); Clark, Antitrust Comes Full Circle: The Return to the Cartelization Standard, 38 VAND. L. REV. 1125, 1131 (1985) ("In practice... the Rule of Reason has provided little coherency or guidance."); Easterbrook, The Limits of Antitrust, 63 TEX. L. REV. 1, 10 (1984) (simplicity of per se rule has been undercut by requirement of showing of absence of procompetitive benefits to quality for per se condemnation); Brodley, Joint Ventures and Antitrust Policy, 95 HARV. L. REV. 1523 (1982) (Under rule of reason, "the ultimate question remains of such broad scope and generality that little predictive guidance is possible. The ultimate legal result continues to turn on judicial characterization of a complex factual transaction, a situation that leads to uncertainty and costly proceedings."); Ginsburg, Antitrust, Uncertainty, and Technological Innovation, 24 ANTITRUST BULL. 635, 674 (1979) ("the published sources of guidance to business people and their lawyers planning joint R&D ventures provide little basis upon which to plan with confidence that no adverse antitrust consequence will ensue.").
Moreover, current law does not recognize a market power-based safe harbor for horizontal contractual arrangements among firms with less than twenty percent market share, though it does for mergers and acquisitions. A market power threshold—a burden on plaintiffs to demonstrate that defendants possess substantial market power in a relevant horizontal, upstream, or downstream market—that we propose below would clarify the 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 would also bring analysis of cooperative arrangements into alignment with the approach taken in merger analysis and articulated in the Department of Justice's Merger Guidelines. But as long as the parameters of rule of reason analysis are ambiguous and unstructured, the result is that uncertainty and unpredictability surround interfirm agreements, thereby chilling investment and cooperative arrangements to bring new products and processes to market.

Second, antitrust law permits private plaintiffs to engage in treble damage litigation against cooperative commercialization arrangements, even when the government has "signed off" on a venture. The Clayton Act permits private parties to sue for treble damages for alleged antitrust injuries, and allows state attorneys generals to recover treble damages on behalf of persons residing in the state. To date, the Supreme Court has neither endorsed nor foreclosed a market power-based safe harbor approach. See In Re Arbitration Between First Texas Savings Ass'n and Financial Exchange, Inc., 55 Antitrust and Trade Reg. Rep. (BNA) at 340 (Aug. 25, 1988). The courts of appeals have not waited for the Supreme Court. The move toward a market power-based safe harbor can be seen most clearly in the cases involving vertical relationships, where the lack of substantial market power has been used to screen out numerous challenges to vertical restraints. In the vertical cases, the courts appear to be converging on a safe harbor definition that protects firms possessing less than a 20 to 25 percent market share in a relevant market. See, e.g., Assam Drug Co. v. Miller Brewing Co., 798 F.2d 311, 318 n.18 (8th Cir. 1986); O.S.C. Corp. v. Apple Computer Inc., 601 F. Supp. 1274, 1291 n.8 (C.D. Cal. 1985); Donald B. Rice Tire Co. v. Michelin Tire Corp., 483 F. Supp. 750, 761 (D. Md. 1980), aff'd, 638 F.2d 15 (4th Cir. 1981). See also Ryco Mfg. Co. v. Eden Servs., 823 F.2d 1215, 1231-32 & n.14 (8th Cir. 1987), cert. denied, 454 U.S. 864 (1981). See also Graphic Prods. Distribs. v. Itek Corp., 717 F.2d 1560, 1568 n.10 (11th Cir. 1983).

More recently, courts have begun to apply a market power-based screen in horizontal cases, holding that under rule of reason analysis, plaintiffs must first establish that cooperating defendants possess substantial market power in a relevant market. See, e.g., Polk Bros. Inc. v. Forest City Enters. Inc., 776 F.2d 185 (7th Cir. 1985); General Leaseways Inc. v. National Truck Leasing Ass'n, 744 F.2d 588, 596 (7th Cir. 1984); Rothery Storage and Van Co. v. Atlas Van Lines Inc., 792 F.2d 210, 217 (D.C. 1986); In Re Arbitration Between First Texas Savings Ass'n and Financial Interchange Inc., 55 Antitrust and Trade Reg. Rep. (BNA) at 340, 350 (Aug. 25, 1988). However, the courts have not yet clarified the boundaries of a safe harbor for horizontal cases.

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recover attorneys' fees. These remedies—available only in the United States—provide a powerful incentive for plaintiffs to litigate—and a powerful disincentive for businesses to form cooperative innovation arrangements and strategic alliances.

Treble damages and attorneys' fees are designed to deter anticompetitive conduct by giving plaintiffs an incentive to ferret out anticompetitive conduct, particularly when such conduct might be difficult to detect. In our view, these incentives are unwarranted in the context of cooperative innovation. While it is difficult to measure the missed opportunities for cooperative innovation caused by the threat of treble damage litigation, our judgment is that it is substantial, largely due to ingrained habits caused by a hostile antitrust tradition.

Congress has already recognized some of these concerns and has made small steps toward remedying the situation. Its response thus far has been the National Cooperative Research Act (NCRA) of 1984, which has taken two significant steps to remove legal disincentives to cooperative innovation. First, the NCRA provides that “joint research and development ventures” must not be held illegal per se, and that such ventures instead should be “judged on the basis of [their] reasonableness, taking into account all relevant factors affecting competition, including, but not limited to, effects on competition in properly defined, relevant research and development markets.” Adopting the rule of reason, Congress essentially removed any doubts about the inapplicability of per se rules. Second, the NCRA establishes a registration procedure for joint research and development ventures, limiting antitrust recoveries against registered ventures to single damages, interest, and costs, including attorneys' fees. Thus, Congress eliminated the threat of treble damages for litigation challenging cooperative innovation arrangements, provided that the parties to the arrangement first register their venture.

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17 For a general discussion of the legislative history of the NCRA, see Wright, The National Cooperative Research Act of 1984: A New Antitrust Regime for Joint Research and Development Ventures, 1 HIGH TECH. L.J. 133, 137–44 (1986); See also H.R. REP. No. 1044, 98th Cong., 2d Sess. 14, reprinted in U.S. CODE CONG. & ADMIN. NEWS 3131, 3139 (“a pre-eminent purpose of this bill is to clarify the antitrust analysis of joint R&D ventures.”).
19 See Wright, supra note 47, at 178.
21 15 U.S.C. § 4303(a). The Act allows prevailing defendants to recover attorney's fees only “if the claim, or the claimant's conduct during the litigation of the claim, was frivolous, unreasonable, without foundation, or in bad faith.” 15 U.S.C. § 4304(a)(2).
Unfortunately, the substantive protection provided by the NCRA—guaranteed rule of reason treatment and reduction of damages—extends only to research and downstream commercial activity "reasonably required" for research and narrowly confined to marketing intellectual property developed through a joint R&D program. Treatment of commercialization agreements is thus left uncertain, to be determined only by interpretation of the "reasonably required" standard.

In our view, the NCRA is not sufficiently permissive. The NCRA unwisely precludes joint manufacturing and production of innovative products and processes, which is often necessary to provide the cooperating ventures with significant feedback information to aid in further innovation and product development, and to make the joint activity profitable. Unfortunately, the NCRA seems to have adopted—at least implicitly—a "serial" view of the innovation process.

Moreover, the NCRA gives little guidance concerning the substantive content of its rule of reason approach. While the Act did require that markets be defined in the context of research and not the products that might result from it, the NCRA fails either to create a market power-based safe harbor or to specify factors to be considered within rule of reason analysis. It simply requires consideration of "all relevant factors affecting competition," paying no special attention to the special characteristics of the innovation process in a quickly changing industry.

Finally, while the NCRA's elimination of treble damages for registered ventures is an important step forward, cooperating firms are still not

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52 The NCRA's substantive protections extend only to "joint research and development ventures," defined as "any group of activities" undertaken for the purpose of theoretical analysis, experimentation, development or testing of engineering techniques, conversion of scientific or technical theories into practical applications, or collection or exchange of research information. 15 U.S.C. § 4301(a)(6).

53 15 U.S.C. § 4302. The legislative history of the NCRA contains statements both that ancillary restraints are not covered, see 130 Cong. Rec. H10566 (Oct. 1, 1984) (statement of Rep. Rodino), and that they should be, see S. Rep. No. 427, 98th Cong. 2d Sess. 16, reprinted in 1984 U.S. Code Cong. & Admin. News 3105, 3112-13 ("Marketing this intellectual property may be the ultimate goal and a key financial aspect of a joint R&D program and is rightfully viewed as an integral part of it."). See Wright supra note 47, at 161, 180-81. The NCRA expressly excludes from coverage (1) exchanges of information about costs, sales, profitability, prices, marketing or distribution that are "not reasonably required to conduct the research and development," 15 U.S.C. § 4301(b)(1); (2) agreements regarding production or marketing of any product, process or service other than "proprietary information" developed through the venture, 15 U.S.C. § 4301(b)(1); and (3) agreements (if not "reasonably required to prevent misappropriation of proprietary information") restricting or requiring participation in other R&D in the sale of developments not developed through the venture. 15 U.S.C. § 4301(b)(3).

54 See Grossman & Shapiro, supra note 14, at 316 ("Although Congress undoubtedly has diminished the antitrust risks facing potential venturers, considerable uncertainties remain,
protected from antitrust litigation. The cost of defending antitrust suits is not materially reduced by the exceedingly narrow circumstances in which the Act permits an award of attorneys' fees to prevailing defendants. Moreover, single damages are still available. We believe that if an approval procedure existed under which procompetitive arrangements could obtain exemptions from further antitrust exposure to private damage actions, then many more competitively beneficial ventures would utilize the NCRA.

In contrast to the picture we have sketched of United States antitrust law, Japan's and Europe's antitrust environments are more hospitable to strategic alliances and cooperative arrangements for innovation.

B. JAPAN

The basic Japanese attitude is that joint R&D activities are procompetitive and thus should not be touched by the Antimonopoly Act. Significantly, the term "R&D" in Japan includes joint commercialization. The Fair Trade Commission is responsible for executing and enforcing the Antimonopoly Act of 1947, which, like the Sherman Act, broadly prohibits unreasonable restraints of trade. While there is no specific legislative exemption for joint innovation arrangements under the Act, the FTC has been able to exempt cooperative innovation efforts from the scope of the law by virtue of its power as the primary enforcer of the Act.

not the least of which concerns the interpretation of the new law's broad rule-of-reason approach").

See note 51, supra.

Businesses seem to have recognized the limited nature of the steps taken by the NCRA. Not surprisingly, only 111 separate cooperative ventures registered under the NCRA between 1984 and June 1988. Our review of these filings indicates that they are very modest endeavors that are aimed at solving industry problems and are not of great competitive moment.

Indeed, the literal Japanese translation of "R&D"—Kenkyu Kaihatsu—implicitly includes commercialization; there is no semantic distinction between the concepts of R&D and commercialization.

The basic administrative policy outlining the standards by which such joint innovation efforts are to be scrutinized is contained in Fair Trade Commission (Japan), Minkan Kigyo Ni Okeru Kenkyu Kaihatsu Katsudo No Jitai To Kyoso Seidaku Jo No Kaidai [Research and Development Activities in Private Enterprises and Problems they Pose in the Competition Policy, 37-39 (1984)] (hereinafter FTC (Japan), Research and Development Activities). The report states that the evaluation of the anticompetitive effect 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 in the report, 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 H. IVORI & A. YESUGI, THE ANTIMONOPOLY LAWS OF JAPAN 86-88 (1983). Our discussions with MITI and FTC officials confirm that
FTC policy states that if there are cases presented where competition allegedly is negatively impacted, the procompetitiveness benefits of innovation must be balanced against any anticompetitive effects. Balancing will take place not only within a particular market but also across markets, because "there is a possibility of the emergence of competition at the intersection of industrial sectors as a result of joint R&D between firms in different sectors."

In considering anticompetitive effects of cooperative innovation arrangements, Japan's FTC analyzes market shares and market structure. The FTC specifically recognizes the needs of innovators and articulates procompetitive justifications that include: (1) the difficulty of single-firm innovation; (2) the abbreviation of the time needed for innovation by cooperation and specialization between joint participants; (3) the pursuit of innovation in new fields by utilizing shared technology and know-how; and (4) enhancement of the technological level of each participant through the interchange of technology.

When MITI seeks to promote cooperative R&D activities (for example, as authorized by the Act for Facilitation of Research in Key Technology, or the Research Association for Mining and Manufacturing Technology Act), the FTC is consulted in advance concerning competition problems. Once the activities are cleared by the FTC, it is extraordinarily unlikely that the FTC would pursue antitrust remedies at a future time. Significantly, treble damages are not available to private parties seeking to enforce Japanese antitrust laws. Moreover, even private suits for single damages under the Act are very rare and usually unsuccessful. Thus, Japanese firms cooperating on innovation and commercialization of innovation have little to fear from Japanese antitrust laws.

the horizontal merger safe harbors would be equally applicable to cooperative contractual arrangements.

50 FTC (Japan), Research and Development Activities, supra note 58.
51 Id.
52 Kiban Gijutsu Kenkyu Enkatsuuka No Law, No. 65 of 1985 (Japan).
53 Kokogyo Gijutsu Kenkyu Kumiai No Law, No. 81 of 1961 (Japan).
54 See supra, note 58.
55 A recent case shows the difficulty of private suits. A group of consumers sued oil refining companies for damages caused by the formation of an oil cartel that had been successfully sued by the FTC for pricing-fixing. See Japan v. Itemitsu Kosan Co Ltd., 38 Case 1287 (Sup. Ct. 2d P.B., Feb. 24, 1984). The Supreme Court rejected the private claim on the grounds that there was no proof that lower prices would have prevailed in the absence of the cartel. See also Kai v. Cosmo Oil Co. Ltd., 1239 Hanrei Jiho 3 (Sup. Ct. 1st P.B., July 2, 1987).
Under this type of antitrust environment, it is not surprising that there is frequent collaboration for innovation. Although regular statistics are not kept in Japan because there is no reporting requirement for collaborative research and commercialization activities, the Federal Trade Commission report on "Research and Development Activities in Private Enterprise and Problems They Pose in Competition Policy" issued in 1984 contain statistics suggestive of the quantity and variety of joint innovation activities in Japan. The survey results indicate that joint R&D projects among corporations in the same industrial sector, which might be classified as horizontal collaboration, represent 19.1 percent of total projects.

C. THE EUROPEAN COMMUNITY

The antitrust environment shaping cooperation in the European Community is also markedly different from the United States. In 1968, the European Commission issued a Notice of Cooperation between Enterprises which indicates that horizontal collaboration for purposes of R&D normally is outside the scope of antitrust concerns as defined in Articles 85 and 86 of the EEC Treaty. The Commission has consistently taken a favorable position on R&D agreements unless the large entities involved imply serious anticompetitive consequences.

In 1984, the European Commission adopted Regulation No. 418/85 (Reg. 418) expanding the favorable antitrust treatment of R&D. It provides blanket exceptions for horizontal R&D arrangements, including commercialization—which the Commission views as "the natural consequence of joint R&D"—up to the point of distribution and sales, for firms whose total market share does not exceed twenty percent. In addition,
VI. PROPOSED MODIFICATIONS TO U.S. LAW

A. Desirable Changes in the U.S. Antitrust Laws

To insure that antitrust law is responsive to the needs of innovation and does not inhibit U.S. firms from competing effectively in global markets experiencing rapid technological change, we believe the following changes are in order:

(1) The NCRA should be amended to include joint commercialization efforts to exploit innovation.

(2) The rule of reason should be clarified to take specific account of the appropriability regime, the pace of technological change, the diversity of sources of new technology, the need to access complementary assets, and the need to have cheek by jowl cooperation to manage the innovation process cyclically rather than serially.

(3) A market power-based safe harbor should be expressly adopted that would shield from antitrust liability interfirm agreements that involve less than twenty to twenty-five percent of the relevant market.

(4) Market definition should be tailored to the context of innovation and should focus primarily on the market for know-how; specific product markets become relevant only when commercialization is included within the scope of the cooperative agreement. Even then, the appropriability regime should be factored in when analyzing product market issues.

(5) Antitrust law should not bias the selection of interfirm organizational forms; at a minimum, integration by contract or alliance should be treated no less favorably than full mergers.

(6) Private antitrust suits challenging cooperative innovation arrangements should be limited to equitable relief, and attorneys' fees should be awarded to the prevailing party.

(7) An administrative procedure should be created, permitting the Department of Justice or the FTC, in consultation with the Department of Commerce, to evaluate and certify cooperative arrangements among firms with higher market shares, when dynamic efficiency gains are promising and competition is not threatened.  

manufacturing and licensing to third parties. Joint distribution and sales, however, are not covered and require individual exemptions pursuant to Art. 85(3).

We favor providing the opportunity for firms either to register and receive relief from treble damages as provided by the NCRA approach, or to apply for a certificate of exemp-
The first five of these proposals could be accomplished by courts interpreting the rule of reason and the National Cooperative Research Act. We hope courts will not hesitate to employ the tools of evolutionary, common law interpretation and development to achieve these changes. However, to achieve the complete package of substantive and procedural changes most quickly, and thus assure certainty and predictability, legislation is the best overall solution.\footnote{Our own legislative proposal along these "melded" lines was distributed at the Berkeley conference on Antitrust, Innovation and Competitiveness in October 1988.}

B. EVALUATION OF CURRENT LEGISLATIVE PROPOSALS

Congressman Edwards (H.R. 1025) and Congressman Fish (H.R. 2264) have advanced a "registration" approach to cooperative commercialization efforts. Congressmen Boucher and Campbell (H.R. 1024) propose a "certification" approach. We support both types of approaches and believe they should be melded into a single, two-track approach that will provide cooperating firms a choice of deciding what level of protection is needed from the threat of antitrust liability.\footnote{See Jorde & Teece, Statement to the Subcommittee on Economics and Commercial Law, House Judiciary Committee, re Legislative Proposals to Modify the U.S. Antitrust Laws to Facilitate Cooperative Arrangements to Commercialize Innovation (H.R. 1024, H.R. 1025, and H.R. 2264) (July 26, 1989).}

A registration procedure operates with modest government involvement, but provides modest relief as well, i.e., reducing antitrust exposure to single damages instead of treble damages if the venture is sued by private parties. The proposed certification procedure would involve review by the Department of Justice or FTC, in consultation with the Department of Commerce, to insure that the cooperative arrangement does not create substantial market power. A cooperative innovation arrangement among firms whose combined market shares are less than twenty percent would be automatically approved. When combined shares are greater than twenty percent, the arrangement would be approved only if it improved competitive performance, and the combination was warranted on account of scale, complementary capabilities, and a demonstrable need for operational and strategic coordination. If a certificate of exemption is obtained, the threat of antitrust damages is completely eliminated and private antitrust challenges would be limited to injunctive relief only.

A certificate procedure is a necessary companion to registration because it provides a mechanism for evaluating and approving cooperative
arrangements and consortia involving firms with large market shares. The proposed U.S. Memories, Inc. consortium and probable HDTV alliances are likely to fall within this category, as did MCC and Sematech. A registration procedure alone simply will not provide the certainty needed to encourage large-scale consortia. If Congress adopts only a registration approach, we believe undesirable case-by-case, industry-specific petitioning for antitrust exemptions will continue. That alternative is expensive, time-consuming, and unpredictable. The time is ripe for a more generic approach that will not require Congress to get involved every time a new technology is discovered that requires large-scale cooperation for commercial exploitation.

If Congress decides to proceed only with a registration procedure, we urge an additional amendment to the NCRA that clarifies the rule of reason analysis that courts are expected to perform when analyzing a challenged cooperative arrangement. Specifically, a market-power-based safe harbor should be included and criteria for analysis should be identified along the lines that we have previously described and that are presently incorporated in the Boucher-Campbell bill.

VII. POSITIVE CONSEQUENCES OF THE PROPOSED CHANGES IN U.S. ANTITRUST LAWS

The case for change rests on three fundamental pillars. The first is that the innovation process is terribly important to economic growth and development, because it yields social returns in excess of private returns. Hence, antitrust policy, if it is going to err, ought to do so by being on the facilitating rather than on the inhibiting side of innovation. This principle is well understood in Europe and Japan, but not in the United States. Second, economic theory tells us that if certain organizational arrangements are exposed to governmentally imposed costs while others are not, firms will substitute away from the burdened forms (in this context interfirm agreements) and in favor of the unburdened forms (in this context mergers), even if the former are potentially economically superior. Third, cartelization of high technology industries open to international trade and investment is highly unlikely, and thus antitrust concerns are minimal so long as these industries remain open. These three contentions alone, if accepted, provide the foundation for our legislative proposals.

71 According to Aoki, the slowdown in total factor productivity can be attributed in large part to a mismatch between organizational form and the requirements of new technology. In particular, he is concerned that hierarchical solutions are overused, at least in the U.S. Aoki, Global Competition, Firm Organization, and Total Factor Productivity: A Comparative Micro Perspective, Paper presented at the International Seminar on Science, Technology, and Economic Growth, OECD, Paris, (June 1989), at 6.
There are opportunity costs associated with the existing law, which we believe are considerable, and are likely to increase in the future. Unfortunately, it is impossible to describe the counterfactual with any degree of precision. We believe that there are at least three classes of circumstances where beneficial cooperation will sooner or later take place if antitrust laws are revised along the lines we propose.

A. COOPERATIVE COMMERCIALIZATION AND MANUFACTURING

There are a number of circumstances where cooperative activity beyond early stage activity is beneficial. Sometimes this is true because of scale, risk, and appropriability considerations. Sometimes it is true, as we have discussed, because prohibition of cooperative commercialization imposes a significant technology transfer problem, for instance, from the research joint venture (if there is one) back to the parent companies. In most cases firms will not wish to cooperate all the way from research through to commercialization. But in some instances they will, and when cartelization of the industry is not a threat, we see no reasons for antitrust restraints. The proposed U.S. Memories, Inc. consortium wants to invest $500 million to $1 billion to develop and manufacture advanced dynamic random access memories (D-RAMs). With fabrication facilities costing hundreds of millions, acting alone is beyond the financial resources of many companies in this industry that might otherwise wish to have some control over their D-RAM supply. Such a consortium will probably be exposed to antitrust threats under existing law, depending on how the courts defined the relevant market and how they count and assess Japanese D-RAM production capacity. A certification procedure will provide important certainty to this venture, and others like it. A registration procedure will provide less certainty, but still would be a significant advance over current antitrust law.

Similarly, in the area of superconductors, it is likely that the real challenges will come not so much in developing superconductors, but in their commercialization. Application of superconductors in systems, like railroads, computers, and electricity distribution, will require great amounts of time, resources, and capital—probably greater than any single business can muster internally. Accordingly, a public policy stance that treats only early stage activity as potentially requiring cooperation is misguided and will thwart both early and later stage activities. The reason is that most firms will not have much incentive to engage in early stage, joint development if later stage, stand-alone commercialization appears too expensive to accomplish profitably.

B. COOPERATIVE INNOVATION DESIGNED TO ACHIEVE CATCH-UP

Cooperative activities in Japan and Europe have frequently been motivated by a desire to catch up with the world's technological frontier, which in the post-war years was usually the technology of U.S.-based firms. Increasingly, however, U.S. firms are slipping behind the frontier. For instance, U.S. firms are now behind in areas like ceramics and robotics, and in products like VCRs, facsimiles, and HDTV. Just as foreign firms have found cooperative ventures useful for catch-up in the past, U.S. firms could utilize cooperation for this purpose. For example, American firms, acting together, may still have a slender chance of competing in the market for high definition televisions (HDTV) expected to evolve in the 1990s. In the absence of cooperative interfirm agreements, we doubt that development of HDTV systems is possible in the United States. If American potential "reentrants" to the consumer electronics business combine to attempt reentry, they cannot be sure of avoiding serious antitrust problems involving treble damages, particularly if they are successful.

At minimum, the legislative changes proposed would facilitate unfettered information exchange and strategic coordination with respect to reentry strategies. If such efforts facilitated profitable reentry into high technology businesses when reentering would otherwise not occur, or would occur in a more limited and unprofitable way, we do not see why antitrust concerns ought to interfere, since cooperation in rapidly developing businesses poses few anticompetitive threats.

C. STRATEGIC COORDINATION IN RESPONSE TO FOREIGN INDUSTRIAL AND TECHNOLOGY POLICY

In high technology industries, both European and East Asian nations have active industrial and technology policies that significantly impact market outcomes both in their own countries and abroad. Airbus is a case in point. The dominant U.S. attitude is one of laissez faire, and indeed many economists are of the view that the United States should send a letter of thanks to foreign governments that subsidize exports to the United States. Such a view is insensitive to the dynamics of technological change, to the importance of cumulative learning, and to reentry costs.

Some policy makers in the United States recognize the declining American competitiveness and favor some form of retaliation. We support, inter alia, a modification of U.S. antitrust laws, which in some circumstances would permit a full competitive response by U.S. industry acting collectively. The proposals we favor to encourage greater cooperation
among U.S. firms do not require government expenditures nor do they involve the government picking winners. But they would soften the tension that is emerging in the United States between technology policy and antitrust policy.

VIII. CONCLUSION

Competition is essential to the competitive performance of the American economy, but so is innovation. The United States is a nation with tremendous innovative capacity. Innovation is what Americans do well, whether it be in technological, organizational, cultural, or political spheres. It is what has brought us wealth historically, and it is what underlies our wealth today.73

However, changes in the post-war economy, including the globalization of markets, increased pluralism in the sources of new technology, and enhanced foreign capacity to utilize technology developed here, create new challenges. In particular, innovating firms confront increasing difficulty capturing value from new ideas, products, and processes which they originate or fund. The mechanisms of intellectual property law—patents, copyrights, and trade secrets—in theory provide protection, but in practice are often unavailable or easily circumvented.

There is no easy remedy to this predicament. Declining American competitiveness in the world market has many causes, including a whole raft of practices and policies that favor present consumption over future consumption. Also detrimental is the hesitancy of the nation to question its ideology and to overhaul its institutions. One such institution is the antitrust laws, crafted in a different era for different problems.

The legislative proposals advanced by Congressmen Boucher, Campbell, Edwards, and Fish are designed to promote innovation and successful product commercialization and strengthen the competitiveness of U.S.-based firms in world markets by clarifying the legal standards applicable to cooperative innovation arrangements and by eliminating the threat to private treble damage actions.

The proposals reflect not only the changing conditions of global competition, but a deeper understanding than currently exists in antitrust law of the special requirements of innovation and the importance of strategic coordination to success in global markets. Innovation requires cooperation as well as competition. Our antitrust laws have evolved so that they permit cooperation achieved administratively within a firm

but often not contractually between firms. We should now forthrightly acknowledge that cartelization is a remote possibility in industries experiencing rapid technological change, and that firms without significant market power should not be handicapped by antitrust concerns.

We recognize that these antitrust law changes are not going to remedy U.S. relative decline in key technologies. But at least they will bring the United States closer to the antitrust policies of Europe and Japan. In time, we are confident that reduced antitrust exposure will encourage successful cooperative commercialization of innovation. Society will be the ultimate beneficiary.