
Innovation, Dynamic Competition, and Antitrust Policy

Thomas M. Jorde and David J. Teece

The centennial of the Sherman Act affords us the opportunity to assess the relevance of antitrust law for the global economic environment of the future. Antitrust law has undergone significant changes since the passage of the Sherman Act in 1890, but the U.S. and world economies have undergone far greater changes. Although we do not advocate its abolition, we suggest that antitrust may be anachronistic in certain contexts, and, indeed, may inhibit effective competition. Specifically, we suggest that if society wishes to promote competition, the best way to do so is to promote innovation. That may require dismantling portions of our antitrust laws, which are largely based on neoclassical microeconomic analysis that aspires to a kind of competition—perfect competition—that may not really matter if enhancing long-run economic welfare is the goal of antitrust. Rather, it is dynamic competition that really counts.

Dynamic competition is the competition that comes from the development of a new product or process. There are at least two types of innovative regimes that stimulate rivalry—incremental

innovation and radical innovation. With incremental innovation new products are introduced in rapid succession, the new product drives out the old one, and established firms will fall into decline if they do not keep up with changing technology. Such is the case with the aircraft, chemical, and VCR industries. Radical innovation requires a clean break with the past. Few industries are characterized by radical innovation for long periods of time. Yet the invention of the transistor did more to invigorate competition and to provide economic benefits than did any rivalry among manufacturers of vacuum tubes.

Recognizing these forms of dynamic competition would not cause any tension with existing antitrust laws if the world of competition envisaged in the textbook and so often reflected in the antitrust law was the ideal structure from which innovation and its successful commercialization would emerge. There is, however, no evidence that perfect competition is, in fact, ideal for promoting innovation. The weight of the evidence appears to suggest that the structure of markets—whether competitive or monopolistic—has little effect on innovation. The evidence does suggest that current monopoly is usually transitory, that most truly radical innovations emerge from outside an established industry, and that access to the infrastructure provided by

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existing firms is usually not critical to ultimate success. In addition, market structure has little effect on incremental innovation.

What, then, does innovation require? Although the evidence is sketchy, factors that are important include: the availability of a labor force with the requisite technical skills; economic structures that permit considerable autonomy and entrepreneurship; economic systems that permit and encourage a variety of approaches to technological and market opportunities; access to "venture" capital, either from a firm's existing cash flow or from an external venture capital community; good connections between the scientific community, especially the universities, and the technological community, and between users and developers of technology; strong protection of intellectual property; the availability of strategies and structures to enable innovating firms to capture a return from their investment; and, in fragmented industries, the ability to quickly build or access cospecialized assets inside or outside the industry.

Antitrust policy does little to enshrine these factors. Moreover, antitrust negatively affects the ability of innovating firms to cooperate in

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developing and commercializing innovations or to engage in business strategies or interfirm agreements to keep "me too"-type imitators at bay.

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Innovation and its rapid and profitable com-

mercialization and diffusion are the key factors driving productivity improvement in the economy. Accordingly, the focus of antitrust on short-run consumer welfare is possibly misplaced. Consumer welfare is enhanced in the long run only if productivity increases, and that requires technological innovation. If consumer welfare is to be the goal of antitrust, it needs to be couched in a forward-looking, innovation-centered context. Otherwise, antitrust policy may unwittingly diminish a nation's economic welfare.

We believe that adopting dynamic competition and innovation as the goal of antitrust would serve consumer welfare over time more assuredly than does the current focus on short-run consumer welfare. To stimulate dynamic competition and innovation, U.S. antitrust policy must reconsider how it assesses market power and how it treats cooperative agreements among competitors.

Assessing Market Power

There is no area where antitrust policy and practice display so clearly their adherence to textbook notions of perfect competition than in defining markets and assessing market power. Market definition, normally the first step in assessing market power, is a critical element of antitrust theory and enforcement policy. As a general rule, in the absence of significant market power, every form of business behavior other than price-fixing and its economic equivalents is legal. Prove market power, however, and the reasonableness of all business practices will be closely scrutinized. Market power is often proved if "dominance" exists, if prices are above full costs, or if profits are above "competitive levels."

Using accepted methodologies for establishing markets such as the Justice Department's test described in the *Merger Guidelines*, one can easily but incorrectly assign market power to an innovating firm. Although the monopoly power associated with innovation is often quite transitory, standard entry barrier analysis—with its one- to two-year time fuse for entry—will often not undo a finding of monopoly power for an innovator. Accordingly, innovators may need to constrain their business conduct severely to avoid violating the antitrust laws. In today's global economy with low or nonexistent tariffs, however, one of the few ways one can attain

market dominance in the United States is through an innovative success.

We should not be concerned if innovating firms gain market dominance. If their technological contribution is significant, we should applaud the firm's ability to commercialize its technology successfully. Properly interpreted, the antitrust laws do not condemn the possession of monopoly power that results from a superior product, good business acumen, or technological innovation. Possession of market power (or dominance) will, however, trigger careful scrutiny of business conduct under Sherman Act rule-of-reason analysis. Firms must be careful not to prevent others from competing on the merits. And while defenses are available to firms with market power to demonstrate that their conduct is efficient and procompetitive, ultimately the question of "reasonableness" is decided by a jury of lay persons. As a practical matter that means that firms with market power face some uncertainty about how their conduct will be evaluated. The costs of this uncertainty are heightened in the United States because treble damages are available to private antitrust litigants. Ultimately, such uncertainty dampens the incentives to innovate and market new technologies.

There are a number of ways to adjust market definition and market power assessment to measure correctly the competitive impact of new products and processes. One would be to lengthen the entry time in weighing the existence of substitutes. For example, to analyze entry barriers in the semiconductor industry, which is characterized by rapid technological change, we could use a different time dimension than we would for the automobile industry, where innovation is less significant. A second approach would involve using higher market concentration thresholds for establishing market power. A third approach would be to abandon the implicit and sometimes explicit use of price elasticity of demand as the dominant criterion for deciding upon the presence or absence of close product substitutes. As an alternative, one would look at the responsiveness of the demand for a product to variations in its performance, not to variations in its price.

The reason for emphasizing performance is that in the early stage of the product life cycle, competition typically proceeds on the basis of product performance, not price. For example, in

the early days of the automobile industry, steam cars competed with internal combustion-powered cars. Thus, if changing a product or process with respect to one or more key attributes would affect the consumption of products outside of a provisional product market, then differentiated products, even if based on alternative technologies, should be included in the relevant product market. Of course, product changes that depend on technology not currently developed should be excluded.

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In its *Merger Guidelines*, the Department of Justice considers the likelihood and probable

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magnitude of entry in response to a small but significant and nontransitory increase in price over a period of two years. Yet orthodox approaches, including the merger guidelines, do not devote a great deal of attention to measuring entry barriers, despite their recognized importance. The guidelines do not provide criteria for discriminating among entry barriers that are high as opposed to those that are low. In short, received theory provides little guidance as to how one should measure and assess potential competition.

It is especially in assessing potential competition that a departure must be made from orthodox approaches when new technologies and new products are at issue. The reason is that potential competition from new technologies can destroy a firm's position in a particular market and

its underlying competences. Price competition, on the other hand, may erode profit margins but is less likely to completely destroy the value of a firm's underlying technological, physical, and human assets. Accordingly, potential competition from new products and processes is the more powerful form of competition.

Hence, potential competition from new products and processes is most likely to spur an established firm to action. In most instances potential competition can be more important than actual competition in industries experiencing or expected to experience rapid technological change. We recognize, however, that in some emerging industries, assessing the extent of potential competition may be difficult. But even in nascent industries we believe that potential competition, and hence entry barriers, can be assessed through a detailed analysis of entry requirements and the market for know-how. The important point to recognize is that new product introductions are simply the result of R&D activities, so that the speculative dimension to assessing potential competition can be eliminated

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or greatly reduced by looking upstream in the new product development process. While this involves assessing research activity that is often proprietary, it is sometimes surprising how much information is commonly available on new product and process development activities.

New technologies sometimes stem from public research, such as that sponsored in universities and government laboratories. Such was the case in solid-state electronics two decades ago; such is the case in biotechnology and computer soft-

ware today. In other industries, such as jet engines for civilian and military aircraft, innovations tend to be based upon proprietary knowledge.

In the case of technologies that build upon a public knowledge base, barriers to entry into R&D are usually low, and the proliferation of start-up companies is often the result. Where the knowledge base is more proprietary, higher barriers to entry are likely to exist. Still, to the extent that an active venture-capital market coupled with low barriers to the mobility of scientific and technical manpower is in evidence, barriers into R&D are still likely to be remarkably low.

As we noted earlier, an emerging technology often requires a wide array of capacities in addition to technology to effectuate commercialization. Sometimes these capacities are in manufacturing, sometimes they are in marketing, and sometimes they are in distribution. Other firms may possess complementary technologies, as when a computer hardware innovation requires the support of new software. If innovating firms lack these capabilities in-house, they may be able to access them through collaborative arrangements of one kind or another. If there is a tradition of such activity in an industry or technological area, then it speaks to the facility with which firms with new technologies can quickly become a new and significant competitive force. Hence, in assessing potential competition and barriers to entry, the ability and proclivity of potential competitors to access complementary assets on competitive terms become important factors.

Thus, assessing product market competition in industries experiencing rapid technological change is incomplete unless it explores new products already in the pipeline and those that can easily be put into the new product development pipeline. This leads one to explore markets for know-how in a fashion similar to that which is necessary for the antitrust assessment of R&D joint ventures.

Cooperative Agreements among Competitors

The second area in which traditional antitrust policy may impede innovation is in analyzing cooperative agreements among competitors. The problem arises because the naive view of innovation embedded in current antitrust economics

and jurisprudence fails to recognize that innovating firms may wish to cooperate to promote innovation.

While innovation is traditionally considered to occur in stages that proceed sequentially from research to development, design, production, and then finally to marketing, sales, and service, a more appropriate view of the process would be one that recognizes the existence of tight linkages and feedback mechanisms that must operate quickly and efficiently, including links between firms, within firms, and sometimes between firms and other organizations such as universities. From this more "simultaneous" 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. R&D personnel must be closely connected to manufacturing and 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. New technology, whether internal or external, must become embedded into designs that meet customer needs quickly and efficiently. Simultaneous innovation is an incremental and cumulative activity that involves building on what went before, whether it is inside or outside the organization and whether the knowledge is proprietary or in the public domain. IBM followed this model in developing its first personal computer by building alliances with Microsoft and others to launch a successful system. Sun Microsystems and NeXT Computer launched themselves in this way and have remained in this mode for subsequent new product development.

Thus, 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 administrative processes, or by market processes, as when the innovator simply licenses the technology to firms that already own the relevant assets or are willing to create them. These organizational choices have received scant attention in the context of innovation. In particular, there has been little consideration of how complex contractual arrangements among firms can assist commercial-

ization by translating R&D capability into profitable new products and processes.

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tion (as when it obtains an ironclad patent) and if technology can be transferred at zero cost (as is commonly assumed in textbooks), then the organizational challenge that is created by innovation is relatively simple. But in reality, simple unilateral contracts—where technology is sold for cash—are unlikely to be efficient very often.

Because innovation often requires firms to create complex contracts and relationships with other firms to bring technology to the market and to hold "me too"-type imitators at bay, we should consider organizational alternatives available to the innovator to generate, coordinate, and control complementary assets. These include the price mechanism, internal organization, and strategic alliances.

Economic theory generally assumes that the requisite coordination and control can be achieved by the invisible hand. Efficient levels of investment in complementary assets are brought forward at the right time and place by price signals. Entrepreneurship is automatic and costless. This textbook view seems implicit in U.S. antitrust economics. But market failures are likely to arise because of firms' ignorance of their competitors' future actions, preferences, and states of technological information. This uncertainty is especially high for the development and commercialization of new technology. Accordingly, innovating firms need to achieve greater coordination than the price system alone appears to be able to effect.

A second mechanism for effecting coordination uses the administrative processes within the



"Given the downward slope of our demand curve and the ease with which other firms can enter the industry, we can strengthen our profit position only by equating marginal cost and marginal revenue. Order more jelly beans."

firm. A company's internal organization can serve to shore up some market imperfections and provide some of the necessary coordination. But large integrated structures may become excessively hierarchical and less responsive to market needs. Accordingly, at least for some as-

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pects of innovative activity, smaller organizations are often superior. Unfortunately, antitrust law appears to favor mergers over interfirm agreements and thus burdens innovation by at-

taching disincentives to otherwise appropriate organization forms.

Lying between pure market and full administrative solutions are various forms of agreements between or among firms. An especially interesting one is the strategic alliance characterized by the commitment of two or more partner firms to a common goal. A strategic alliance might include technology swaps, joint R&D or codevelopment, and the sharing of complementary assets, such as where one party manufactures and the other distributes a codeveloped product. Of course, if the common goals were simply price-fixing or market-sharing, then such an agreement would constitute a cartel, especially if the agreement included substantially all members of an industry.

By definition strategic alliances can never have one side receiving cash alone, nor do they include mergers, because alliances by definition cannot involve the acquisition of another firm's assets or the controlling interest in another firm's stock. Alliances need not involve equity swaps or equity investments, although they often do. Strategic alliances without equity typically consist of contracts between or among partner firms that are not affiliated. Equity alliances can take many forms, including minority equity holdings, consortia, and joint ventures. Such interfirm agreements are usually temporary and are assembled and disassembled as circumstances warrant. Typically, only a limited range of the firm's activities are enveloped in such agreements, and many competitors are excluded.

Strategic alliances, including consortia and joint ventures, are often an effective and efficient way to organize for innovation, particularly when an industry is fragmented. Whereas full-blown national planning entails abolishing the market as an organizing mechanism, and large hierarchies are exposed to bureaucratic limits, interfirm cooperation preserves market selection and responsiveness. In a sense, interfirm cooperation is the pure private enterprise solution.

Antitrust Treatment of Agreements among Competitors

The U.S. antitrust treatment of agreements among U.S. competitors puts the United States at a competitive disadvantage compared with Japan and the European Community. Current

U.S. antitrust law inhibits agreements among competitors to develop and commercialize new technology because the legal standards for inter-firm agreements are ambiguous. Although it is generally true that “rule-of-reason” analysis—rather than *per se* rules—are applied to contractual arrangements designed to advance innovation, the elements of rule-of-reason analysis are muddled. In addition, although current law, as a practical matter, recognizes a “safe harbor” for mergers between firms that will have less than a 20 percent market share, it does not recognize a similar safe harbor for horizontal contractual arrangements among firms.

The Clayton Act also permits private parties to sue for treble damages for alleged antitrust injuries and allows state attorneys general to recover treble damages on behalf of persons residing in the state. Successful plaintiffs can also recover attorneys’ fees. These remedies are available only in the United States. They provide a powerful incentive for plaintiffs to litigate, and given the current state of the law, a powerful disincentive for businesses to form cooperative innovation arrangements and strategic alliances. While it is difficult to measure the missed opportunities for cooperative innovation caused by the threat of treble damage litigation, we believe that they are substantial. Moreover, treble damage litigation works to the particular detriment of small and medium-sized innovative firms in industries where the innovative process is simultaneous.

Congress has recognized that these provisions may inhibit technological innovation, and the National Cooperative Research Act of 1984 took two significant steps to remove legal disincentives to cooperative research. First, the act 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.” Second, the act establishes a registration procedure for joint R&D 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 R&D arrangements, provided that the parties to

the arrangement first register their venture. But R&D is only a small piece of the innovation puzzle.

In our view the National Cooperative Research Act is not sufficiently permissive. The substantive protection provided by the act—guaranteed rule-of-reason treatment and reduction of damages—extends only to research and downstream commercial activity “reasonably required” for research and is narrowly confined to marketing intellectual property developed through a joint R&D program. The treatment of

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other agreements designed to facilitate innovation is thus left uncertain, to be determined only by interpretation of the “reasonably required” standard. The act unwisely precludes joint manufacturing and production of innovative products and processes, which are often necessary to provide the cooperating ventures with significant feedback to aid in further innovation and product development and to make the joint activity profitable. The act implicitly rejects simultaneous innovation.

In addition, the National Cooperative Research Act 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 act fails to specify factors to be considered within rule-of-reason analysis. It simply requires consideration of “all relevant factors affecting competition” and pays no particular attention to the special characteristics of the innovation process in a quickly changing industry.

Finally, while eliminating treble damages for registered ventures is an important positive step, the act still does not protect cooperating

firms from antitrust litigation. Even after the act, antitrust law continues to permit private plaintiffs to engage in treble damage litigation against cooperative arrangements facilitating commercialization. Moreover, single damages are still available even against those registered

In contrast to U.S. antitrust law, the anti-trust and business environments in Japan and the European Community are more hospitable to strategic alliances and cooperative arrangements for innovation. Japan believes that joint R&D activities are pro-competitive and should not be touched by the Antimonopoly Act.

under the act. 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, the threat of litigation, with attendant managerial distraction, can be extremely damaging to the competitive performance in a fast-paced industry.

Businesses seem to have recognized the limited nature of the steps taken by the National Cooperative Research Act. Not surprisingly, only 111 separate cooperative ventures registered under the act 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. 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 register under the act.

In contrast to this picture of U.S. antitrust law, the antitrust and business environments in Japan and Europe are more hospitable to strategic alliances and cooperative arrangements for innovation.

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 literal Japanese translation of

"R&D"—*kenkyu kaihatsu*—implicitly includes commercialization; there is no semantic distinction between the concepts of R&D and commercialization.

In Japan the Fair Trade Commission is responsible for executing and enforcing the Antimonopoly Act of 1947, which (as does the Sherman Act) broadly prohibits unreasonable restraints of trade. While there is no specific legislative exemption for joint innovation arrangements under the act, Japan's Fair Trade Commission 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. The commission's policy also states that if anticompetitive effects are alleged, the procompetitive benefits of innovation must be weighed in the balance too. 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 Fair Trade Commission analyzes market shares and market structure. The commission specifically recognizes the needs of innovators and articulates procompetitive justifications that include the difficulty of single-firm innovation, the faster innovation created by cooperation and specialization between joint participants, the pursuit of innovation in new fields by utilizing shared technology and know-how, and the enhancement of the technological level of each participant through the interchange of technology.

When the Ministry of International Trade and Industry seeks to promote cooperative R&D activities, the commission is consulted in advance. Once the activities are cleared by the commission, it is extraordinarily unlikely that it would pursue antitrust remedies at a future time. Significantly, treble damages are not available to private parties seeking to enforce Japanese antitrust laws, and private suits for single damages are very rare and usually unsuccessful. Thus, Japanese firms cooperating on innovation and commercialization of innovation have little to fear from the Japanese antitrust laws.

In this type of antitrust environment, it is not surprising that there is frequent collaboration for innovation. Although the relevant statistics are not kept in Japan, because there is no reporting requirement for collaborative research and

commercialization activities, a Fair Trade Commission report issued in 1984 suggests 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, may represent about 19 percent of total projects.

European Community. The antitrust environment shaping cooperation in the European Community is also markedly different from that in the United States. In 1968 the European Commission issued a "Notice of Cooperation between Enterprises" that indicates that horizontal collaboration for purposes of R&D is normally 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 a regulation expanding the favorable antitrust treatment of R&D. For firms whose total market share does not exceed 20 percent, it provides blanket exemptions 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. In addition, the commission is authorized to grant exemptions for cooperative efforts that do not fall within the automatic safe harbor.

Proposed Modifications to U.S. Antitrust Law Affecting Cooperative Agreements among Competitors

To ensure that antitrust law is responsive to the needs of innovating firms and does not inhibit U.S. firms from competing effectively in global markets experiencing rapid technological change, we believe that seven changes should be considered. First, market definition should be tailored to the context of innovation and should include attention to the market for know-how. Specific product markets become relevant only when commercialization is included within the scope of the cooperative agreement. Second, the rule of reason should be clarified to take specific account of the appropriability of the technology, the pace of technological change, the diversity of sources of new technology, the need to access complementary assets and technologies, and the

need to have close cooperation to manage an innovation process that requires engaging in complex forms of interfirm cooperation. Third, a safe harbor defined according to market power should be expressly adopted that would shield from antitrust liability all interfirm agreements among competitors that involve less than 20 to 25 percent of the relevant market. Fourth, 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. Fifth, the National Cooperative Research Act should be amended to include joint production and commercialization efforts to exploit innovation. Sixth, an administrative procedure should be created, involving both the Justice and Commerce Departments, to allow evaluation and possible certification of cooperative arrangements among firms with market shares higher than 20 to 25 percent when dynamic efficiency gains are likely and rivalry is robust. Finally, private antitrust suits challenging cooperative innovation arrangements should be limited to equitable relief, and attorneys' fees should be awarded to the prevailing party.

In the European Community horizontal collaboration for purposes of R&D is normally outside the scope of antitrust concerns. The European Commission has consistently taken a favorable position on R&D agreements unless the large entities involved imply serious anticompetitive consequences.

The first four of these proposals could be accomplished by courts' reinterpreting the antitrust laws. We hope courts will not hesitate to employ the tools of evolutionary common law interpretation and development to achieve these changes. To achieve the complete package of substantive and procedural changes most quickly, however, and thus to assure certainty and predictability, legislation is the best overall solution. We favor providing the opportunity for firms either to register and receive relief from treble damages under an amended National Cooperative Research Act or to apply for a certifi-

cate of exemption from the Justice and Commerce Departments that would provide even more protection. In exchange for this, however, there would be greater disclosure and scrutiny of business plans. The firms themselves would choose which path to take. Currently, there are

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resolutions in the House of Representatives that have advanced "registration" or "certification" approaches to cooperative commercialization efforts. We support both types of approaches.

Conclusion

The case for changing the way antitrust law analyzes and assesses market power and agreements among competitors rests on three fundamental pillars. The first is that the innovation process is extremely important to economic growth and development, because it yields social returns in excess of private returns and because innovation is a powerful spur to competition. Hence, if antitrust policy is going to err, it 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. Second, economic theory tells us that if certain organizational arrangements are exposed to governmentally imposed costs while others are not, firms will avoid the burdened forms—interfirm agreements—and adopt the unburdened forms—hierarchy—even when the former are economically superior. According to a leading Japanese scholar, the slowdown in total pro-

ductivity in the United States 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 United States. Present laws do not give full recognition to the interorganizational requirements of the innovation process; failure to do so is damaging when innovation requires simultaneous linkages and feedback mechanisms. Third, cartelization of industries experiencing rapid technological change and open to international trade and investment is very difficult. As long as these industries remain open and innovative, antitrust policy should err on the side of permitting rather than restricting interfirm contracts.

There are several classes of circumstances where beneficial cooperation will eventually expand if antitrust laws are revised along the lines we propose. The response may not be immediate, particularly with respect to consortia, because U.S. industry has little experience in this area. Our antitrust history has discouraged consortia, and U.S. firms, at least in the postwar period, have been large relative to their foreign competitors. Accordingly, the need to cooperate has not been so powerful in the past as it is now. Once organizational learning accumulates, however, we expect new organizational arrangements to begin to flourish. We also expect the reinforcement of cooperative alliances already common in U.S. industry.

Selected Readings

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