ANTITRUST LAW AND THE STIMULATION OF TECHNOLOGICAL INVENTION AND INNOVATION

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While it is clear that the United States economy remains a large and productive one, it is equally clear that the economies of some other countries are growing more rapidly and that United States industry is facing increasingly intense competition in international markets. In some low technology industries, such as carbon steel manufacture, comparative advantage has migrated from this country to lesser developed nations. Even in technology-intensive industries, such as semiconductors, where the United States still enjoys a significantly favorable balance of trade, the other major, non-Communist economies are challenging the United States. While United States productivity and competitiveness have appeared to stagnate, the productivity and competitiveness of two of our major trading partners, Japan and West Germany, have improved markedly. 1/

The reasons for the relative decline in this country's competitiveness are myriad and complex. In part, the decline was inevitable. With the exception of Canada, the United States was the only major industrialized country that survived World War II with its industrial base intact. Moreover, it is generally easier to copy and catch up than to develop new technologies and to maintain an unnaturally large competitive advantage.

In part, unwise governmental policies have exacerbated this inevitable decline. The United States economy has been "overregulated." A significant portion of those regulations promulgated in the last two decades simply is not cost-justified. In addition, the public sector has absorbed increasingly larger portions of national income, diverting resouces that the private sector could have used to increase productivity. Similarly, tax policy has stimulated consumption at the expense of saving and investment. Moreover, this country's monetary policy has fueled high inflation, which also acts as a disincentive to long term investments that can improve efficiency. Although inflation now appears to be under control, the failure to control public sector spending has caused inflationary expectations to remain high and has led to extraordinarily high real interest rates. Not only have high real rates made many investments too expensive, but they also have led to extremely unfavorable exchange rates that have exacerbated this country's trade deficits.

Many commentators have also charged that this country's antitrust laws are one source of the decline in the rate of productivity growth. 2/ The antitrust laws, according to these charges, inhibit, if not proscribe, market arrangements that are necessary to improve this country's competitiveness in world markets. The criticism usually focuses on the adverse

deterrent effect the antitrust laws are supposed to have on joint research and development ("R&D") ventures. 3/ According to the argument, potential joint venturers fear that even the most innocuous joint venture may be subjected to antitrust proscription. Claiming that our major trading partners do not suffer under a similar antitrust handicap, these critics charge that United States industry, deterred from entering into joint R&D, is unable to compete effectively in the creation of new technology.

On the one hand, this argument is both an over-simplification and an overstatement of the effect that the United States' antitrust laws have on the process of R&D. The antitrust laws themselves are not hostile to behavior that enhances efficiency. On the other hand, it is true that excessive antitrust remedies and judicial interpretation of the antitrust laws, especially as they relate to intellectual property, have inhibited procompetitive joint ventures in particular and productivity in general. The optimal solution is not, however, to eliminate or to alter drastically the substantive antitrust statutes. Rather, a few minor modifications of the antitrust and intellectual property statutes would alleviate the problem, while enabling the antitrust laws to continue to assure that anticompetitive market activities are not allowed to harm consumer welfare.

This paper examines the relationship between the antitrust laws and technological innovation. The paper first briefly reviews the nature of the creation and exploitation of technology. The paper then analyzes the effect the antitrust laws have on joint R&D ventures and on the exploitation of the the fruits of R&D, intellectual property. Next, the paper argues that minor alterations in the antitrust laws as they relate to joint R&D and intellectual property licensing and in intellectual property law as it relates to the doctrine of misuse are all that is necessary to remove the legal impediments that currently may inhibit technological growth. The paper concludes by arguing that more drastic solutions to this country's productivity problems, which are grouped under the rubric of "national industrial policy," are unsound and would certainly hinder, rather than help, this nation's effort to improve its productivity.

I. ANTITRUST AND TECHNOLOGY

The antitrust statutes 4/ provide a flexible standard for proscribing those commercial activities that are more likely than not to reduce "consumer welfare"--i.e., allocative and productive efficiency. 5/ Properly interpreted, the antitrust laws condemn only market conduct that has as its purpose or effect the accumulation and exercise of market power, which allows its holders to restrict output and thereby adversely to affect resource allocation. Even then, the conduct should not

be condemned it it is likely to increase productive efficiency to a greater extent than it decreases allocative efficiency. To the extent that the statutes are understood and the antitrust operational rules adhere to the underlying rationale of the statutes, the antitrust laws should not inhibit conduct that increases efficiency, including conduct which relates to the creation and exploitation of technology. However, for reasons that this paper will attempt to describe, this is not always the case.

To understand the relationship of the antitrust laws to the creation and exploitation of technology, it is necessary to understand the special characteristics of technology. The essence of technology is information. This information concerns the production of new goods and services and the more efficient production of existing goods and services. The increase in technological information enables society to utilize its existing resources more efficiently, and the advance of technology therefore increases productivity, competitiveness, and consumer welfare.

Information has special characteristics, and it raises some unique economic problems. 6/ Because antitrust analysis has not always been sensitive to these problems, that analysis has at times been improperly applied to activity that involves the creation and exploitation of technology.

First, the creation and development of technology involves a great deal of risk. 7/ At the time a decision is made to invest in R&D, the expected probability that the R&D will be successful is less than one. The technological information may prove too costly to exploit because of related cost constraints, or the information may be worthless because of insufficient consumer demand for the process, product, or service embodying the new technology. Even if the idea can be commercially exploited, it may only be marginally successful, providing the investor with little more than a normal ex post return on capital invested in production.

Moreover, the risk associated with R&D is relatively difficult to reduce. Because of the enormity of the expense of conducting sophisticated R&D, it is likely that only a few individual firms have sufficient internally generated capital to fund on their own a large enough number of R&D projects to diversify away the risk. High transactions costs also impede the market's ability to reduce the risk. Because of "information impactedness," 8/ an inventor may be unable to convey to the market that his inventive efforts have a higher probability of success than average. 9/ Similarly, third parties may be reluctant to assume the risk associated with R&D either through the purchase of equity or through traditional insurance underwriting because of the difficulty involved in monitoring the inventor's efforts. 10/ It will be difficult to

determine whether a failure was inevitable or whether it was due to a failure of the inventor (who is compensated regardless of success) to use his best efforts. Joint R&D ventures may be the most efficient means of overcoming these problems and so of alleviating the risk.

Second, it is generally not easy for the creator of technology to prevent others from using it freely without his consent. 11/ Once the information is divulged to third parties, they can "free ride" on the technology and can thereby deny the inventor the full fruits of his invention. This free-rider phenomenon often can lead to a wide divergence between the social value of technology and the benefits the inventor is able to appropriate. At the extreme, where there is intense competition and information is instantaneously disseminated, the inventor may appropriate nothing. Of course, if this free-rider phenomenon is not counteracted, there will be a serious underinvestment in the creation of new technology.

Third, technology, once created, has zero marginal cost of use, excluding transactions costs. 12/ The consumption or use of technological information by one person does not reduce the amount that others can consume. 13/ Viewed as of the time technology is created, allocative efficiency is optimized if the technology is available to others at its marginal cost--that is, if it can be freely used by everyone. So long as a single positive price, no matter how low, is charged for

the use of the technology, consumer welfare could be increased if potential consumers who place a lesser, though non-negative, value on its use were allowed to use the technology. However, this analysis fails to recognize that although in the very short run consumer welfare would be maximized if technology were freely available to everyone, the market would as a practical matter cease to produce new technology. In the long run, unless the public sector subsidized R&D, free use of technology would reduce consumer welfare by denying society inventions and innovations that increase productive efficiency. 14/

A nation could deal with the problems associated with the creation and exploitation of technology through government subsidization of R&D, combined with permitting everyone free access to technology. The political mechanism, however, does a poor job of allocating resources, including investment capital, to their most valuable use. 15/ With the exception of basic research, the United States has chosen instead to use a market solution. Our society grants the creator of technology limited exclusive rights to use the fruits of his R&D efforts. These exclusive rights, which are embodied in the various regimes of intellectual property, most prominently patents and copyrights, provide inventors and other innovators with rewards for their R&D efforts that reflect the benefits that their technological creations confer on society. 16/ Moreover, patent law, for

example, serves to define a "commodity" that can be transacted in the market. 17/ Through licensing arrangements, the inventor can combine his intellectual property with the goods and services of others and bring the technology to the marketplace more quickly and at lower cost than otherwise would be possible.

The antitrust laws should be conducive to the efficient creation and exploitation of technology inasmuch as technology serves in the long run to increase consumer welfare. The judicial interpretation of the antitrust laws generally has been sympathetic to joint R&D arrangements that do not threaten competition and that enhance efficiency. However, by misperceiving the relationship between the antitrust laws and intellectual property, the courts have inhibited the efforts of intellectual property owners to exploit their property in the most efficient manner. In addition to affecting the allocation of society's resources adversely, this judicially-imposed impediment to the commercial exploitation of intellectual property has reduced the returns to R&D and hence has diminished unnecessarily the incentives to create technology.

A. Joint R&D Analysis Under the Antitrust Laws

The antitrust laws and their judicial interpretation have not been overly hostile to joint ventures in general and joint R&D ventures in particular. Although some cases suggest that under certain circumstances joint ventures are per se

violations of the antitrust laws, 18/ the courts are sensitive to the procompetitive potential of joint R&D ventures. 19/ There can be little doubt that a legitimate joint venture designed to achieve efficiencies in R&D would be judged under the rule of reason. 20/ However, the paucity of reported cases may be the cause of the frequent complaints that there is a great deal of uncertainty as to the antitrust analysis applied to joint R&D. This section of the paper attempts to summarize the appropriate analysis, and to explain preliminarily the reasons why antitrust analysis may inhibit joint R&D.

1. The Procompetitive and Anticompetitive Aspects of Joint R&D

Economic theory provides the means for developing rules that can effectively distinguish between procompetitive and anticompetitive joint R&D. Developing such rules involves a trade-off. As joint ventures increase in size, they are likely to realize economies of scale and so to lower average cost per unit of output. However, as the fraction of all potential joint venturers that actually participate in a joint venture increases, there is an increase in the danger that the joint venture will result in the restriction of output both at the R&D level and at the production and marketing level where the participants compete.

Joint R&D ventures can capture significant economies and so can be procompetitive. Increasing the size of the venture spreads the risk and so reduces cost. Joint ventures also can serve as a risk reduction device that can alleviate the transactions costs problems associated with "information impactedness" and "moral hazard." 21/ Because the providers of capital to the joint R&D venture also participate and so monitor the venture's efforts, a greater pool of internally generated capital is made available for R&D.

Joint ventures also may provide the means for capturing other economies of scale and scope. For example, the unit cost of operating very sophisticated scientific machinery used in experiments generally decreases as the number of units increases. Also, by combining the complementary abilities of different competitors within a single venture, a synergistic effect may be created which further lowers the cost of R&D. Not only can the integration of the participants lower transactions costs associated with combining the various assets necessary to conduct the R&D, but increasing the diversity of participants will also increase the likelihood that the joint venture itself will be able to exploit the technology commercially. Without trying to indentify the multitude of reasons that joint ventures can reduce the cost of R&D, it is sufficient to recognize that the economies are not fanciful and generally will increase as the venture's share of the market increases.

On the other hand, joint ventures, even those involving only research and development, can also be anticompetitive, as a result of the overinclusion of competitors. Overinclusive joint R&D ventures can have two anticompetitive effects both of which become progressively more significant as the fraction of the market participating in the venture increases: overinclusive joint R&D ventures can directly increase the likelihood of collusion among competitors at the production and marketing level and such ventures can indirectly have such an effect as a result of the reduction of innovation.

First, although the debate among economists on the issue has not yet been definitively resolved, there appears to be a very significant statistical correlation between high levels of market concentration and the probability of collusion. 22/ The treatment under the antitrust laws of mergers and acquisitions has been premised on that notion. And the Merger Guidelines of the U.S. Department of Justice clearly reflect the importance of that correlation. 23/

This does not mean that joint ventures should be controlled by merger standards. However, joint ventures, even those designed solely to perform research and development, can facilitate collusion at the production and marketing level. 24/ Joint ventures provide an opportunity for continued contact among competitors and for the exchange of cost and sales data.

This opportunity makes it much easier for competitors tacitly to coordinate their price and output levels. To the extent that a joint venture has the effect of reducing the number of independent decisions concerning price and output in the market, it can have an anticompetitive potential that is similar to that of a merger.

All other things being equal, however, a joint venture between competitors may be less anticompetitive than an outright merger between the same competitors because typically joint ventures involve asset mergers that have limited scope and duration. Research and development joint ventures, for example, generally involve the contribution by the participants of less than all their assets. In fact the joint venture often does not even require the participants to contribute all of their assets devoted to research and development. The participants' assets that are not contributed to the venture remain independent and in competition with one another. Furthermore, if the focus of the joint venture is not on production or marketing, the danger that it will facilitate collusion on price and output diminishes. In research and development joint ventures, there is little, if any, need to exchange sensitive cost and sales data. And the subject of the research and development often may constitute a very small fraction of the inputs of the final product, for the sales of which the participants compete. 25/

A very good argument therefore can be made that because these various factors mitigate the direct danger of price collusion from research and development joint ventures, a greater degree of concentration resulting from joint ventures should be tolerated than would be tolerated if the increase in concentration resulted from merger. For the same reason, it is more difficult to ignore the possibility of efficiencies in the context of joint ventures than it is in the context of mergers. 26/ However, the danger of price and output collusion will vary with the circumstances surrounding the venture. If, for example, the venture involves basic research far removed from current price and output decisions, the danger of collusion is slight. As the objective of the venture moves closer to the development of the technology and to the marketing of the process, product, or service embodying that technology, the danger of facilitating collusion increases. 27/

Collusion at the production and marketing levels, however, is not the only potential threat posed by R&D joint ventures. In addition, there is the possibility that such a joint venture, if too overinclusive, may suppress innovation. Competition is as important in research and development as it is in any other commercial endeavor. The patent system--this country's main institutional stimulus for invention and innovation--is premised on that fact. A number of competitors, motivated by the promise of a limited grant of exclusive rights

and by the threat of being excluded if someone else develops the invention first, race to develop new products and processes. Condoning all-inclusive joint ventures--that is, joint ventures that control all research and development in an industry--would constitute a de facto repeal of our patent system.

The elimination of R&D rivalry by all-inclusive joint ventures presents a significant threat to innovation. 28/ Rather than having a number of decision makers exercising independent judgment as to which avenues of inquiry to follow or abandon, there would be only one or a very few. This failure to diversify R&D decisionmakers would increase the costs of individual mistakes.

Even more troublesome, overly inclusive research and development joint ventures probably reduce the incentive for innovation. Rather than many entities competing to be the sole owner of the fruits of research, the participants of an all-inclusive joint venture would be aware that they will get their share of whatever is developed. And if a member of the joint venture fails to develop the technology, his competitors will fail as well. The benefits of being a winner would be reduced and the costs of being a loser--that is, failing to develop new technology--would also be reduced. 29/

Moreover, a small number of joint ventures conducting research for an industry that is marked by high seller concentration and poor market performance (that is, by some oligopolistic pricing) may purposefully suppress innovation. Even though the development of an innovation might lower costs or increase demands for the whole industry, the joint venturers may view the potential research and development as a threat to the stability of their oligopolistic pricing arrangement. For example, new technology may make it more difficult to tell whether increases in the market share of a competitor are due to the new technology or to price competition. Also, new technology might enable new entry into the market. The benefits of the status quo, therefore, may outweigh the expected benefits of the innovation.

There is a particularly strong motivation for an over-inclusive joint venture to slow the rate of R&D when the joint venture has as its objective the development of technology to comply with government health and safety regulations. 30/ Since the successful development of the technology will raise the industry's costs without a compensating increase in demand, the joint venturers have an incentive to suppress the innovation as long as possible. That is not to say, however, that joint R&D is never a legitimate response to governmental regulatory standards and may never be structured in such a way as to minimize the risk that innovation will be suppressed.

The courts have been sensitive to the benefits and detriments that are associated with joint R&D. 31/ The analysis of those benefits and detriments provide the guiding rationale for devising rules--a structured "rule of reason"--that the courts should use in evaluating the antitrust legality of joint R&D ventures. Because the anticompetitive dangers of a joint R&D venture arise only when that venture includes a large portion of the competitors, the first step in applying the rules is to analyze the market structure within which the joint venture appears. In order to undertake this analysis, one must define the relevant market(s) and determine the joint venture's market share. 32/

2. Market Definitions and Market Shares

In evaluating the anticompetitive potential of a joint R&D venture, one must keep in mind that joint R&D ventures have two related, albeit distinct, potential anticompetitive effects: one on price and output competition among the joint venturers at the production and marketing stage and the other on the competition for the R&D itself. Those two effects generally will manifest themselves in two related, but distinct markets. Each of those markets must be defined and analyzed.

The market in which the possible anticompetitive effect on price and output may occur is the same market that would be relevant in attempting to analyze the potential anticompetitive effect of a complete merger between the joint venturers. There

is no need to describe in the present context the typical procedure for defining markets and evaluating the anticompetitive effects of mergers; on that topic the reader should refer to the algorithm set out in the Merger Guidelines. 33/ It is sufficient to note that with some slight modification the methodology for evaluating mergers is adequate to determine a joint R&D venture's probable effect on price and output competition at the production and marketing level. Modification of standard merger analysis would simply be required in order to take into account the fact that the potential for price and output collusion in the context of joint R&D is less significant than it would be in the context of an outright merger between the same firms. As explained above, the analysis must deal explicitly with the efficiencies realized by the joint R&D venture. The analysis should also recognize that the more basic the R&D the smaller the danger of price and output collusion, and that the danger of such collusion can be mitigated by the form that the joint venture agreement takes. 34/

Because of the unique nature of technology, defining a market and allocating market shares for the purpose of ascertaining the probable effect of joint R&D on innovation (i.e., the competition for R&D) raises special problems that deserve a brief examination. 35/ In evaluating this market, one must consider both the technologies that may compete with

the technology that the joint venture is seeking to develop and the assets that are currently performing, or can rapidly be shifted into, comparable R&D. Because at the time of formation one can only speculate as to the technology that a particular joint R&D venture will develop, it will be difficult, if not impossible, to determine what present and future technologies the venture's technology will ultimately compete against. The further the R&D is from yielding commercially exploitable technology, the more speculative will be the answer to this question. If the technology being pursued by the joint venture is sufficiently understood and developed to evaluate its commercial potential, alternative technologies that clearly would be competitive with the joint venture's technology should be included in the market definition. Technologies that would be at least 90 to 95 percent as efficient (in terms of their ability to provide equivalent consumer utility at equivalent cost) as the venture's technology would counteract the joint venture's ability to suppress innovation. In the likely event that it is impossible to determine clearly whether technologies will be equivalent, one must rely heavily on the identification of commercial entities who are performing, or could relatively rapidly begin to perform, R&D that is similar to that performed by the joint venture.

The relevant R&D market must be defined largely by identifying firms (other than the joint venturers) that are undertaking the same or similar R&D, or that would be willing and able to undertake similar R&D in response to an increase in the expected rate of return on the investment in that R&D. 36/ It is not essential that those commercial entities currently compete with the joint venturers at the production and marketing stage. Rather, what is crucial to evaluating competitiveness are the facilities and technologies to which the commercial entity has access. To be included in the market, entities must have the willingness and ability, either individually or in collaboration with one another, to use their facilities and technologies to undertake R&D comparable to that of the joint venture in response to a small but significant, non-transitory rise in the expected returns to investment in that R&D.

The unique nature of technology also is important in defining the relevant geographic market in which a particular joint R&D venture competes. 37/ Transportation costs generally play a significant role in setting the limits on the geographic scope of a market for products or services. However, transportation costs are largely irrelevant to an analysis involving R&D and technology, and the relevant market generally will be international in scope.

Although a product or service that is made in Japan, for example, might not be competitive in United States markets because of transportation costs, the Japanese technology used to manufacture the products generally could be licensed in the United States and employed to make the products here. There are at present well established channels for the international transfer of technology. Moreover, the United States generally has not erected protectionist barriers to exclude foreign technologies. There may, of course, be special circumstances, such as prohibitions against the export of technology for national security reasons, that will prevent the market for R&D from being truly world-wide. Nevertheless, foreign R&D usually will be in competition with equivalent R&D being performed in the United States.

After the market within which the R&D competes has been defined, the market share of the joint venture must be calculated. 38/ In calculating market shares, one would ideally like to have a measurement that reflects the relative ability of the market participants to engage in successful R&D. Such a measurement might be based on each firm's total investment in R&D weighted in some way to reflect the relative R&D efficiency and effectiveness of each firm. The weighting would reflect the fact that even though two firms spend identical amounts on R&D, one may be a more significant provider of R&D because, for example, it has access to superior technological information.

There is currently no ideal measurement. As a result, a rough proxy, such as absolute expenditures on related R&D or total sales, must be used. Because these proxies are rough, they should be adjusted on the basis of qualitative indicia of the relative ability of the market participants to perform R&D. Such indicia would include past R&D successes, employment of scientists and engineers of proven ability, and ownership of state of the art R&D facilities.

3. Analyzing the Danger of Suppression of Innovation

Because the analysis of the potential for price and output collusion is sufficiently similar to traditional merger analyis and has been discussed above, there is no need to deal further with that subject here. Because of the differences between the price and output collusion on the one hand and suppression of innovation on the other, it is useful to describe the criteria for determining when a joint R&D venture has a significant potential of suppressing innovation.

There is little theoretical or empirical research that provides a basis for determining the minimum number of entities capable of performing R&D that can exist before one becomes concerned about the possibility that innovation will be suppressed. 39/ However, if a joint venture is sufficiently small so that five other commercial entities--either individual firms or other joint ventures--can be formed in that market, then the venture's anticompetitive potential generally will be

de minimis. Regardless of whether the joint venturers can show that their collaboration is necessary to achieve efficiencies, a joint venture that has less than a 15 percent market share is sufficiently innocuous that it should not be proscribed by the antitrust laws. 40/

If the joint R&D venture has a market share in excess of 15 percent, however, the joint venturers should have the burden of demonstrating that a joint venture of that degree of inclusiveness is necessary to achieve significant economies. The joint venture would have to achieve significantly lower costs than a venture that contained a smaller fraction of the market participants.

The burden on the joint venturers to show that efficiencies justify the size of the venture would grow in relationship to the inclusiveness of the venture. 41/ Conceivably, a joint R&D venture that included all competitors might be tolerated when potential economies of scale dictate that no more than one joint venture can efficiently service the market. Theory would suggest that when the average cost of R&D continues to fall significantly even after more than 50 percent of the firms in the market have joined the venture, the joint venture is a natural monopoly. It is inevitable that there will only be a single entity performing R&D. Allowing the inevitable to be attained through a consensual joint venture arrangement would be no more (and may actually be less) costly to society than

waiting for market forces to eliminate all but one competitor. 42/ However, natural monopoly joint ventures are certainly very rare, and it is highly unlikely that a joint venture that is formed by all competitors in the market could be justified on that ground.

Where natural monopoly conditions prevail and a joint R&D venture that includes more than 51 percent of the market is spared antitrust condemnation, a difficult dilemma remains. If other market participants are excluded from the venture, they will have a strong argument on equitable grounds that they should be allowed access to the joint venture. Because, ex hypothesi, the market will not support another entity performing R&D, without access to the joint venture the other market participants may be denied the ability to participate in R&D that is essential to their future competitive viability. On the other hand, if the joint venturers are compelled to accept the remaining firms in the industry as partners, the incentives of the members to invest in R&D may be reduced or even destroyed.

There has as yet been no theoretical resolution of this dilemma. Fortunately, the natural monopoly phenomenon in the context of R&D appears to be very rare, if it exists at all. Nevertheless, in the rare instances where a joint R&D venture is clearly a natural monopoly the antitrust laws might require that access be provided to all market participants so long as

those provided access are required to share fully in the costs and risks of the venture. 43/

Unfortunately, there is some perception that the law goes further and requires that access, either to the joint R&D venture itself or to its fruits, e.g., patents, be provided "on reasonable terms" whenever a joint R&D venture is in some way unique. 44/ Such an interpretation of the law can be devastating to the incentives to form efficient joint R&D ventures. As explained above, problems of risk and "free-riding" create disincentives to investment in creating and exploiting technology. The intellectual property laws provide successful inventors with exclusive rights to their technology. Those rights which allow inventors to enjoy the fruits of their investment and so serve as the incentive for investment in R&D are an efficient solution to these market disincentives. An interpretation of the antitrust laws that destroys or dissipates those rights and that reduces the level of R&D without achieving some clear, off-setting benefits does not promote consumer welfare and so is contrary to the underlying rationale of the antitrust laws.

4. Possible Disincentives Caused by the Antitrust Risk for Joint R&D

There is substantial reason to believe that the antitrust laws would accommodate the rule of reason approach described above, without the generous access provisions that some argue

are part of the law currently. Nevertheless, because of the lack of case law, it remains a possibility, albeit very slight, that some court may apply a per se rule of illegality to joint R&D. Moreover, even if it were clear that a rule of reason approach applies, some uncertainty as to the legality of any given joint R&D venture inevitably would remain. There is some uncertainty in the application of any analysis that is sufficiently flexible to distinguish procompetitive from anticompetitive joint R&D ventures in a myriad of factual circumstances.

Even though the uncertainty will be slight in most cases, the risk is substantially increased by the length, complexity and cost of antitrust suits and by the fact that a successful claimant under the antitrust laws is automatically entitled to three times the damages actually suffered. This risk alone may deter some procompetitive joint ventures.

In addition, because of the possibility that courts may improperly condemn successful joint R&D ventures that exclude competitors, the threat of treble damages represents a formidable lever that competitors can use to force their way into a successful venture. As a result, potential joint venturers may decide that the only way to reduce the treble damage risk sufficiently is through a joint venture that includes all United States competitors. However, because such inclusion will have costs--for example, revealing proprietary

information necessary for R&D to many competitors who contribute no beneficial assets or skills in return--the joint venturers may decide to forego the economies available from a joint venture and to engage individually in less efficient R&D. 44a/

B. Impediments to the Exploitation of Intellectual Property

Although the judicial interpretation of the relationship between the antitrust laws and joint R&D probably has not by itself been a significant impediment to investment in R&D, it is likely that the unjustified hostility exhibited toward intellectual property by the courts and the federal antitrust enforcement agencies has had a significantly more adverse effect on R&D investment. This hostility impairs both the incentives to engage in R&D and the efficiency with which the fruits of R&D can be exploited. By failing to recognize the importance of intellectual property and its efficient exploitation, the courts and antitrust enforcers have impeded this country's short-term and long-term productivity.

1. The Benefits of Intellectual Property Licensing

The ability of the owner of intellectual property to exploit its property by licensing others will directly increase the perceived value of the property. By increasing the expected value of an investment in R&D, the ability to license increases the investment in, and hence output of, intellectual property. Licensing, therefore, over the long run, enhances this country's productivity.

Moreover, in the short run, once the property has been created, licensing enables the intellectual property owner to combine the information embodied in the property with the superior assets and skills of others. Technology thus can be brought to the market more quickly and at a lower cost than otherwise would be possible. At the extreme, if licensing were severely inhibited, the technology might never reach the market.

To protect the intellectual property owner's exclusive rights and so to maximize the output of, and returns to, that property, it is sometimes necessary for the owner of the intellectual property to include in a license certain restrictions on the licensees' actions. Restrictions may also be necessary to induce the licensees to invest in the further development and exploitation of the technology. To understand these procompetitive benefits of licensing, it is helpful to examine several examples of common license restrictions.

First, to exploit efficiently intellectual property that has a variety of uses, intellectual property owners often resort to exclusive field of use licenses. Frequently, a technology has applications in more than one area. For example, transitor technology has uses that range from the simple pocket radio to the most complex computer. It is rare, however, that the inventor of any particular technology also has the wide variety of skills necessary to exploit every

possible use to which the technology may apply. The efficiency of exploitation and the returns to the technology's owner would be maximized if in each field of use in which the technology has some potential and its owner is not itself the optimal exploiter, a license was granted to the firm that could most efficiently develop and exploit the property.

Without some guarantee of exclusivity against other licensees, an owner or a licensee may be unwilling to invest the resources necessary to develop fully the field of use in which he possesses expertise. Once the basic technology is created and sheathed with intellectual property protection, a great deal more "mini-innovations" still must be produced before the technology can be applied to each field for which it holds some promise. 45/ However, without some protection against the ability of others to free-ride on those "mini-innovations," there will be a strong disincentive for the owner and his licensee to invest in the necessary innovation. The exclusive field of use license is, in effect, an efficient device that employs the intellectual property protection afforded underlying technology to overcome the threat that free-riding poses to subsequent "mini-innovations." Field-of-use restrictions thereby induce the investment in further innovation that is necessary to exploit all the potential uses of the technology. The licensee cannot practice the technology outside his field of use and, therefore, may not

free-ride on the innovations of the owner or other licensees that practice the technology in other fields. At the same time, the licensee is guaranteed that other licensees will be prohibited from free-riding on his innovations, and, hence, the licensee generally will invest to assure that the technology's potential in his field of use is fully realized. By using the underlying intellectual property protection to restrict competition among licensees in various fields, the field of use license can induce innovation that further enhances productivity.

Second, where it is necessary to license more than one firm in any particular field of use a patentee could reasonably resort to a price restriction in a non-exclusive license to assure that the technology is exploited efficiently. Even when a technology has only one application, it takes a great deal of time and investment for technology to be transformed from an idea to a marketable good or service. This transformation involves a variety of necessary, often expensive activities, including development of a prototype product, development of a low cost manufacturing process, plant design and construction, development of a distribution system, marketing and advertising. 46/ Often a single firm will be unable to perform all of these functions internally and will have to enlist third party licensees to aid in the development and exploitation of the technology.

As an alternative to licensing a single firm to each of several fields of use or territories, the intellectual property owner may induce his licensees to invest in the development of the technology through the use of licenses that establish a minimum price at which products made pursuant to the license can be sold. Aware that the intellectual property owner has included such a provision in his licenses, the licensee can invest in the development of manufacturing, distribution and/or marketing of the technology without the fear that some other licensee who is not required to sell at the minimum price will be able to free ride on the investment.

So long as the restriction is not used to facilitate collusion and suppress innovation, one can safely presume that as a general matter the license restriction will not reduce efficiency. A license restriction that allows the licensee to charge more than the licensee's marginal cost is probably the quid pro quo for some benefit the licensee is conferring on the patentee. Otherwise, the patentee would be gratuitously aggrandizing his licensee to the patentee's financial detriment. For any technology (or good for that matter) there is a single profit maximizing price (or set of prices if price discrimination is possible). The entity owning the technology generally has the ability and the incentive to appropriate all the profits generated by the technology. So long as the the owner of the technology is a profit maximizer, he will attempt

to ensure that those who must participate in the process of exploiting the technology do so at lowest possible cost. To the extent that downstream participants charge prices that reflect more than the lowest possible cost at their level of participation, the technology owner's profits are decreased. It is unlikely, therefore, that a rational technology owner would purposefully allow the downstream participant to receive more than the absolute minimum possible.

Another license restriction that can increase the efficiency with which the technology is exploited is the requirement that the licensee "grant-back" to the intellectual property owner a license on any improvement of the property developed by the licensee. Although grant-backs can be anticompetitive under certain situations, they also can be a device for the owner of technology to reduce the transactions costs of contracting for development of technology. If the owner of the technology does not include a grant-back in the license, he and the licensee will have to bargain for a grant-back license after the licensee has developed the improvement. At that point, however, the licensee will have some market power vis-a-vis the technology owner, and the transaction will be fraught with the problems generally associated with small numbers bargaining. 47/

In addition, a grant-back is a device for transfering some of the risk associated with development of improvements from the licensee to the owner of the technology. The technology owner generally agrees to a lesser royalty in exchange for the grant-back.

It is true, of course, that a grant-back could dull the incentive for the licensee to make improvements in the technology. However, without a license to use the underlying technology in the first place, a firm often would not be willing to engage in the effort to improve the technology. Practicing the improvements would likely infringe patents covering the basic technology; therefore, before the improver of the technology could use or sell the improvement, he would have to obtain a license for the underlying technology. The patent owner would be able to appropriate a great deal of the returns to the improvement, if he chose to issue a license at all. As a result, there would be very little incentive for non-licensees to invest in the improvement of patented technology.

One final patent restriction which is worthy of note is the "tie-in." A tie-in provision essentially conditions the license of the technology (or the sale of a product or service that embodies the technology) upon the licensee's agreement to purchase from the technology's owner some other good or service that does not embody the technology. As with the other restrictions discussed above, tie-ins can be anticompetitive.

Nevertheless, like the other restrictions, tie-ins also can enhance efficiency.

First, potential licensees might be unwilling to obtain a license for a technology if they are uncertain as to the technology's utility. If, on the other hand, an owner can license his technology at a low price, and charge a price in excess of marginal cost for some item used in conjunction with the technology, the owner and licensee could share the risk that the technology is useless. If the technology is very useful, the licensee will require a large number of the related items, and the owner will receive a large reward for his technology. If, however, the licensee is unable to use the technology, it will require very few of the related items and will have to pay little more than the low license fee for the technology.

Similarly, a tie-in can allow the owner of technology to meter differences in demand among various licensees and to extract higher payments from licensees with more intense demand and lower payments from licensees with less intense demands. 48/ The ability to engage in such metering will increase the appropriable returns to the technology. In addition, it may also increase output of the technology (and thereby increase consumer welfare) by enabling a potential licensee, who has a less intense demand for the technology and who would be unwilling to pay the single price the technology's

owner would charge if there were no metering, to obtain a license. Tie-ins also may be used to ensure that the technology is combined with related inputs in the most efficient manner to produce some end product. 49/ This in turn can also help to ensure that the product that embodies the technology is of optimal quality, which may be important in obtaining the market's acceptance of a new technology. In addition, tie-ins may be the most efficient mechanism to enforce the exclusivity of intellectual property when that property otherwise is easily infringed. 50/

Despite the fact that license restrictions can be used to enhance efficiency, increase the returns to R&D, and so provide an incentive for innovation, licensing of intellectual property can also be used in ways that threaten consumer welfare. For example, a commercially weak patent licensed industry-wide might be used to cartelize a market. 51/ Similarly, a patent owner with few potential competitors might license his patent to those competitors, allow them to share his supra-competitive profits and so induce those competitors not to develop competing technologies. In addition, an intellectual property owner conceivably could use a tie-in to impede the entry of competing technologies into the market.

Whether a licensing arrangement happens to be anticompetitive depends on the surrounding circumstances. As with joint R&D, structured rules can be developed so as to

provide a practicable means for determining whether a particular licensing arrangement is anticompetitive vel non. Although this paper does not provide a forum for setting out those rules, in general the appropriate dichotomy between procompetitive and anticompetitive licensing practices under the antitrust laws can be described with reasonable accuracy by two relatively familiar antitrust terms, "vertical" and "horizontal." 52/ A practice that suppresses rivalry between actually or potentially substitutable technologies can quite accurately be said to have a significant horizontal aspect. Many arrangements between an intellectual property owner and others who wish to use the property, however, raise no competitive concerns, precisely because they have no potential for suppressing rivalry among alternative technologies. Instead, the arrangements are properly characterized as vertical and frequently may have a positive, or at least a neutral, effect on competition.

It should be noted, nevertheless, that the labels "vertical" and "horizontal," should be carefully applied, particularly in the context of intellectual property licensing, so as not to exalt form over substance. For example, where a patentee manufactures the patented product and also licenses others to manufacture the product, the patentee and licensees appear at first blush to be competitors. However, upon

reflection, because the patentee as owner of the technology is upstream from the manufacturing, in the absence of other factors, the relationship is really vertical.

Although intellectual property licensing is largely procompetitive and promotes productivity, the courts and (until recently) the antitrust enforcement agencies of the federal government have frequently been insensitive to this fact. This hostility toward intellectual property has manifested itself in the development of precedents under the antitrust laws and under the related doctrines of patent and copyright misuse.

2. Judicial Misinterpretation of the Antitrust Laws

Although both the intellectual property and antitrust laws serve to promote consumer welfare and productivity, this fact has often been ignored by the courts and the federal government. Rather than judging the competitive merits of intellectual property licensing arrangements solely on the basis of sound economic analysis, all too frequently the courts have focused on the overly simplistic notion that there is an inherent conflict between the antitrust laws and intellectual property law. Supreme Court decisions have depicted the patent system as inherently in conflict with antitrust goals and have depicted the patent grant as a "monopoly," 53/ the limits of which are to be "narrowly and strictly confined," 54/ so as to avoid the "evils of an expansion of the patent monopoly by private engagements." 55/ One lower court recently stated that

the patent grant "is in inevitable tension with the general hostility against monopoly expressed in the antitrust laws . . . . Therefore, courts normally construe patent rights narrowly in deference to the public interest in competition." 56/

The courts are not alone in their misperception of the essence of the antitrust and intellectual property laws. Even sophisticated students of economics and the law seem to suffer under the same delusion. In fact, one commentator, while condemning the inhibitive effect the antitrust laws have had on joint R&D, has stated that "the patent monopoly stands as a solid exception to the antimonopolistic presumption of the antitrust laws." 57/

The courts and commentators, however, have not been especially careful in their analysis. They have confused semantics with analysis. Although it is true that patents are generally referred to as monopolies, in an economic sense they are not invariably "monopolies," any more than tangible assets are monopolies. As explained above, regimes of intellectual property are designed to enable the creators and developers of the property to appropriate some of the benefits generated by that property. In that sense, they have the same objective as any system of property rights. By themselves, those exclusive rights do not enable the intellectual property owner to charge a price above marginal cost--a prerequisite of an economic "monopoly." As in the case of tangible property, the ability

of an intellectual property owner to charge more for his property than its marginal cost (which is zero in the case of intellectual property) depends on the demand and supply conditions its owner faces. It is not infrequent that competition from other technology prevents an intellectual property owner from charging a positive price for its property. Similarly, in the real, as opposed to the theoretical world, it is not infrequent that the owner of tangible property is able to charge more than marginal cost, yet not so much more that one could reasonably characterize the property owner as a monopolist.

Equally important, those who see inherent conflict between the patent and antitrust laws unjustifiably confine themselves to a static view of the world. Without the promise of rewards provided by a system of exclusive rights, the intellectual property would not exist. And of course if the market failed completely to produce the technology, consumers would be worse off than if they were required to pay a price above the technology's marginal cost.

One particularly unfortunate effect of this failure to perceive correctly the true relationship of intellectual property and antitrust law has been the development of the tie-in doctrine as it applies to intellectual property. In the late 19th and early 20th Centuries, the courts were sensitive to the procompetitive benefits of intellectual property

tie-ins. 58/ As a result of a judicial gloss put section 3 of the Clayton Act, however, the courts since that time have indiscriminately condemned intellectual property tie-ins without regard for their underlying competitive merits. 59/

Moreover, the courts have come to treat intellectual property tie-ins even more harshly than other tie-ins. Generally under the antitrust laws, tie-ins are "per se" unlawful whenever three conditions are met, including the condition that the seller have sufficient economic power in the market for the tying product to restrain trade appreciably in the market for the tied product. 60/ Substituting semantics for careful reasoning, the courts irrebuttably presume that when the tying product is intellectual property, there is economic power. 61/ As explained above, that presumption is no more justified in the context of intellectual property than it is with regard to any other property.

The courts have not limited their vitriol to tie-ins alone. Courts have increasingly been inclined to treat price restrictions in patent licenses as per se unlawful. 62/ In addition, even those license restrictions, such as grant-backs, 63/ or field-of-use licensing, 64/ that are not subject to per se proscription may be subjected to undue hostility under an ostensible rule of reason that is not fully sensitive to the procompetitive benefits of licensing. 65/

During the last decade, both the Justice Department and the Federal Trade Commission also embraced enforcement policies that were unduly hostile towards intellectual property. In fact, the Antitrust Division's stated enforcement policy against patent licensing practices surpassed even the courts in its indiscriminate scope and viturperative nature. That enforcement policy consisted of a list of nine licensing practices--the nine "no-nos"--that the Division would challenge as per se violations of the antitrust laws. 66/ Similarly, the FTC manifested irrational hostility toward patents in the complaints, filed against DuPont 67/ and Xerox. 68/ The development of new technologies by those companies apparently was challenged for little reason other than that the companies were so spectacularly successful.

Although the courts and the antitrust enforcement agencies have begun to take a more rational approach to intellectual property, 69/ some misperceptions still exist. The past judicial hostility, combined with the mandatory treble damage remedy provided by the antitrust laws, has surely deterred some procompetitive licensing arrangements and so continues to have an adverse effect on the returns to, and the incentives to invest in, innovation. Moreover, this disincentive has been exacerbated by the even more irrational development of the misuse doctrine under the patent and copyright law.

3. The Misuse Doctrines

The misuse doctrine in patent and copyright law derives from the courts' equitable powers and is invoked to justify a refusal to enforce a valid copyright or patent against infringement. 70/ Because the judicial remedy--refusal to enjoin infringers--is so drastic and because one need not be injured by the misuse to invoke it as a valid defense to a charge of infringement, the misuse doctrine has an even greater potential as a disincentive to innovation than the antitrust laws. Moreover, because the courts have been even more draconian in their unwillingness to countenance license restrictions under the doctrines of misuse than under the antitrust laws, the misuse doctrine likely may be an even more significant deterrent to innovation than the antitrust laws themselves.

The doctrine of misuse was originally developed by the courts to deny legal protection to intellectual property until that property was purged of any taint that resulted from its use by the owner in an anticompetitive manner. By employing the property to anticompetitive ends, the intellectual property owner abused his exclusive rights and thereby was enabled to earn more from his property than the law intended. In refusing to enforce the exclusive rights, the courts in effect were refusing to use their equitable powers to assist someone with "unclean hands."

The doctrine originally developed as a complement to the antitrust laws in the sense that the same analysis used to evaluate a claimed violation of the antitrust laws was also used to evaluate claimed misuse. However, the doctrine eventually began to drift away from this concept. The courts began to employ per se rules even more rigid than those employed under the antitrust laws. For example, courts automatically condemned other potentially procompetitive license restrictions, including those that require the licensee to refrain from dealing in products that compete with the patented product (tie-out or exclusive dealing), 71/ that require the licensee to take a license under a group of patents even if the licensee desires a license for only one (compulsory package licensing), 72/ that require the licensee to pay royalties under the patent based in whole or part on the sales of an unpatented product (total sales royalties), 73/ and that require the licensee to pay royalties on sales after the patent expires. 74/

Judges also began to use the misuse doctrine to invalidate intellectual property on the basis of vague notions of what seemed "unfair" to them. For example, the courts have found misuse where a patentee licensed one licensee at a royalty different from that charged other licensees, 75/ where a patentee refused to license someone after others had been licensed, 76/ and even where the patentee charged rates that a judge deemed to be exorbitant and oppressive. 77/

It is not entirely clear that courts should refuse to enforce patents and copyrights on ground of misuse in cases where the infringer has not been injured. Nevertheless, the doctrine should at least conform to antitrust analysis if it is to remain available to the courts. Before a misuse can be found, the courts should be required to perform the same economic analysis using a structured rule of reason that it should perform when analyzing an intellectual property owner's conduct under the antitrust laws. Only conduct that is more likely than not to be anticompetitive and hence violates the antitrust laws, should constitute misuse. Unless this change is made, the misuse doctrine, combined with the whim and caprice of judges unsympathetic to the importance of intellectual property, will further erode the value of intellectual property, reduce incentives for R&D, and so exacerbate the productivity problems the country currently faces.

C. Needed Modifications of the Legal Framework

Although the present antitrust laws and their underlying rationale are conducive to the creation and exploitation of new technologies, judicial misinterpretation of those laws and excessively punitive remedies available under the statutes act as disincentives to innovation. The misuse doctrines under the patent and copyright laws further aggravate these disincentives for innovation. The solution is not to repeal the substantive antitrust laws and to legislate new substantive standards.

Rather, with a few modifications of the remedies and evidentiary presumptions under the antitrust laws, the nation can insure that the antitrust laws will not inhibit productivity and innovation. At the same time, the patent and copyright doctrines of misuse should be modified to assure that patents and copyrights will not be invalidated under the doctrine unless the conduct deemed to be misuse would be found anticompetitive under antitrust analysis. While promoting procompetitive practices that are essential to the creation and exploitation of technology, these modifications would also preserve antitrust standards to guarantee that the nation's desire to promote R&D will not be improperly used to shield practices that are on balance anticompetitive and so inimical to innovation and productivity. 78/

1. Clarification of the Evidentiary Rule, and Modification of the Remedies, Applicable to Joint R&D

There is a need to respond to the perception that the antitrust laws inhibit joint R&D ventures, even where such collaboration is necessary to perform R&D in the most efficient manner. Although the antitrust laws are generally sympathetic to R&D collaboration where it results in significant reductions in cost, uncertainty as to whether some court may wrongly conclude that a particular joint R&D venture is illegal may inhibit the venture's creation. Even though the risk of an incorrect legal decision may be small, that risk is exacerbated by the length, complexity, and cost of antitrust suits and the

fact that a successful claimant under the antitrust laws is automatically entitled to three times the damages actually suffered. Industry fears that after investing large amounts of capital in a venture, it may be faced with the threat of a treble damage suit from a disgruntled competitor who has been excluded from the venture. And, of course, the risk of such a suit increases in direct proportion to the economic success of the joint venture.

There have been a variety of legislative proposals that seek to address this general problem. 79/ Several of these proposals seek to alleviate the antitrust risk that joint R&D ventures face by replacing the current antitrust standard with a different standard for scrutinizing the legality of joint R&D. However, none of the various standards that have been proposed would be as effective as the current antitrust standard in distinguishing procompetitive ventures from anticompetitive ones. Moreover, some of those bills include requirements that the joint ventures provide open access to all United States competitors and that the joint ventures license the fruits of its R&D to all applicants after a reasonable period of time. These provisions not only would fail to promote efficient R&D, but in fact would dissipate the incentives for R&D and so inhibit innovation. In addition, some of the proposals are unattractive because they would transform the Justice Department from its traditional role as

an enforcer of the law to that of a bureaucracy regulating the structure and conduct of all joint R&D ventures, regardless of their anticompetitive potential.

The best solution to this difficult problem would have two objectives. First, it should be made clear that joint R&D ventures may not be deemed per se illegal under the antitrust laws. Although there is no recent case holding joint R&D activity illegal per se, clarification would eliminate all uncertainty on this account. The clarification would prohibit the courts from condemning any joint R&D venture under the antitrust laws without first considering its potential competitive benefits.

Second, it would be appropriate to amend the antitrust laws to provide that those joint R&D ventures that have been fully disclosed to the Justice Department and the Federal Trade Commission would be immune from any antitrust suit brought by private parties. Such a change in the law would not entail government certification that the venture was legal under the antitrust laws, and if the venture was anticompetitive, the government would remain free to challenge it. This change in the legal remedies that apply to joint R&D thereby would eliminate the deterrent effect that any legal uncertainty may now have on joint R&D efforts, and at the same time it would retain adequate antitrust safeguards against anticompetitive joint R&D activity.

2. The Elimination of the Treble-Damage Remedy for Conduct Judged Under the Rule of Reason

Similarly, antitrust remedial law should be amended to eliminate mandatory treble damages for all but the most serious antitrust violations. The treble damages remedy is appropriate and necessary to deter conduct that is plainly and inherently anticompetitive and that is carried out in secret. However, where the conduct may very well be procompetitive and is carried out in the open, the availability of punitive damage remedies is unfair and counterproductive.

The antitrust legality of a wide range of business practices that are not clearly anticompetitive frequently may be uncertain at the time the practices are conceived and employed. The legality of these practices will generally turn on specific circumstances that may never before have been dealt with by the courts. By greatly increasing the cost associated with the risk that a court may find conduct illegal that in fact is procompetitive, the threat of treble damage liability surely inhibits at least some innovative business practices that could increase efficiency and productivity. For example, the threat of treble damage liability may deter a manufacturer of products that uses advanced technology, such as computers, from restructuring its system of manufacturing and distribution in a way that would lower its cost and enable it to disseminate its technology to a greater number of consumers. It is even

possible that the overdeterrence of the treble damage remedy is partially responsible for the seeming reluctance of American management to take vigorous steps to meet the challenge of foreign competition.

With the exception of joint R&D activity, the most obvious and potentially devastating effect that the availability of treble damages can have on innovation and productivity appears in the area of intellectual property licensing. Given the hostility that the courts have frequently manifested toward intellectual property and its licensing, businesses may understandably hesitate to enter into such arrangements for fear that some court might someday condemn the arrangement as anticompetitive and require the patentee to pay treble damages. The unreasonably excessive penalty of treble damages that the courts can impose on such licensing likely discourages the transfer of at least some technology and so reduces the rewards to successful R&D. As a result, the overall incentive to invest in R&D is likely to be reduced.

As a corollary to the elimination of the treble damage remedy for conduct other than that which is inherently anticompetitive, the antitrust laws should enable parties injured by non-treble-damage violations to obtain their actual damages plus prejudgment interest calculated from the date the suit is filed. By amending the law to include prejudgment interest for the first time, such a reform would assure that

those who suffer injury as a result of an antitrust violation will be made whole. At the same time, by eliminating treble damage liability for conduct that is not clearly anticompetitive, the deterrence that the antitrust laws may have on potentially beneficial practices would be minimized.

As a "second best" alternative to a general elimination of treble damages, antitrust remedial law should at least be amended to eliminate the treble damage remedy for conduct involving intellectual property licensing. Because that conduct can be extremely procompetitive and because the treble damage remedy is unnecessarily punitive, it is essential that this deterrent to the efficient exploitation of the fruits of R&D be eliminated. A remedy of actual damages plus prejudgment interest is sufficient to protect those injured by anticompetitive intellectual property licensing.

3. A Prohibition on the Courts' Ability to Condemn Intellectual Property Licensing As Per Se Unlawful

For the same reasons, the antitrust laws should be clarified to prohibit the courts from condemning intellectual property licensing as per se unlawful. To enable intellectual property owners to obtain the maximum legitimate rewards possible for their efforts, it is crucial that the courts carefully consider procompetitive benefits when evaluating the lawfulness of intellectual property licensing under the antitrust laws. While many courts appreciate the competitive benefits of intellectual property, the occasional judicial

hostility shown toward intellectual property in the context of antitrust suits must be proscribed. A law clearly stating that intellectual property licensing cannot be deemed per se illegal would inform the courts that intellectual property licensing arrangements generally enhance rather than impede innovation and productivity and that the antitrust laws must be sensitive to this fact.

4. Modification of the Patent and Copyright Doctrines of Misuse

It is also necessary to clarify the patent and copyright doctrines of misuse to mitigate the danger that the courts will use those doctrines as a vehicle for venting judicial hostility toward intellectual property. The misuse doctrine, which the courts use to justify a refusal to enforce patent and copyrights, can provide a devastating disincentive to innovate. If the doctrine is to continue to exist, the courts must be required to apply it in a manner that is consistent with the procompetitive exploitation of intellectual property. The law should clearly provide that before the courts can find that the exploitation of a patent or copyright constitutes misuse, they must determine pursuant to an analysis grounded in economic theory that the conduct is anticompetitive and a violation of the antitrust laws.

5. Closing the "Loophole" in Process Patent Protection

Finally, one problem, not heretofore discussed in this paper, which should also be targeted for reform, involves a loophole in the United States patent laws that has impaired the ability of process patent holders to earn their rightful reward and so has artificially reduced the incentive to create and develop process inventions and innovations. Moreover, this loophole has created a perverse incentive for United States firms to manufacture products outside this country using foreign labor.

Process patents are particularly important in any effort to increase the productivity of labor and the competitiveness of industry. Those patents generally are granted for new uses of existing goods or for new ways to produce existing goods. They enable industry to manufacture products at minimum cost.

Under current law the owner of a patent covering a process has significantly less protection against the unauthorized use of his invention than the owner of a patent covering a product. Where a product patent is involved, a firm cannot avoid infringement by manufacturing the product overseas and then importing it into the United States because the use or sale of the product in the United States would infringe the United States product patent. Where a process patent is involved, however, there is currently no generally effective means by which a patentee can prevent a firm from practicing

the process patent overseas and then selling the product made by that process in the United States. Under United States patent law, this conduct does not constitute infringement of the process patent. This loophole not only discourages firms from investing in R&D aimed at discovering new and better processes, but it also encourages firms to perform the manufacturing overseas with foreign labor when a United States process patent is involved.

This loophole may be particularly devastating when one considers that genetic engineering, which generally relies on process patent protection, is one of the most promising new areas of high technology. If the loophole in the legal protection afforded process patent is not closed, the technological advantage that the United States currently holds in genetic engineering may rapidly dissipate along with the promise of new jobs that the technology currently holds.

It seems obvious that this loophole should be closed. The law should be changed so that sales in the United States of a product made by a process covered by a United States patent are classified as an infringement of the process patent, regardless of where in the world the patent is practiced.

II. NATIONAL INDUSTRIAL POLICY, CENTRAL PLANNING, AND ECONOMIC EFFICIENCY

The reforms set out above constitute only minor modifications of the legal framework within which the creation and exploitation of technology must take place. These

modifications would help to assure that the nation's overall legal and economic environment does not unreasonably inhibit investment in R&D. Moreover, these reforms would enhance the ability of the market to channel R&D investment into those areas that hold the greatest economic promise. However, the changes would not (and should not) interfere with the market mechanism, nor would they (nor should they) require any intervention in the market by government bureaucracies.

A number of other proposals to increase the country's productivity are far more drastic; they would require that the market mechanism itself be supplanted, in varying degrees, by bureaucratic decisionmakers. Omniscient bureaucracies would "target" industries and technologies into which the nation's scarce capital would flow. In addition, the bureaucracies would ease the pain, and hasten the exit, of dying industries. Even substantive antitrust laws would have to yield where the bureaucrats found them to be a hindrance. Although the proponents vehemently deny they are advocating any form of central planning, it is often difficult to see the difference.

The proposals for such an "industrial policy" have come from literally all parts of the political spectrum. The details of the proposals vary widely. 80/ Nevertheless, all the proposals seem to be premised on the beliefs that markets and the private sector are incapable of dealing with our economic problems and that the government should step in,

cooperate with business and labor, help to coordinate our economy, and aid United States industry in its efforts to compete in international markets.

The proposals generally call for a "closer cooperation" among business, labor and government. The advocates claim that through such cooperation the American economy can adapt more smoothly and quickly to structural changes and can be strengthened to compete with its foreign counterparts. Moreover, such a policy is necessary, according to the advocates, because by focusing on short-run profits, this country's capital markets tend to neglect promising new technologies. This strategy would be implemented by targeting industries that show the greatest promise and by providing subsidies in the form of low interest loans, export credits, tax breaks, lax antitrust enforcement, and the like. Those subsidies would also be designed in such a way as to overcome what is deemed to be outmoded, inefficient management practices that supposedly have made it impossible for the market by itself to respond to structural changes in the economy. Also, the policies generally call for import protection of targeted domestic markets through the use of tariffs and import quotas, conferring indirect subsidies on the favored industries in the form of non-competitive profit margins and hidden sales taxes on consumers.

The model for these proposals is clearly the Japanese Ministry of International Trade and Industry--"MITI." The apparent successes of Japan, which has adopted such policies, also serve as a partial excuse for the abandonment of the ideals of free trade and free markets. The advocates of such a policy argue that the United States is losing the competition for international markets because of its failure to adopt similar policies. Upon closer scrutiny, the arguments of the advocates for industrial policy are unpersuasive and fail to consider critical countervailing factors.

First, the advocates for a national industrial policy generally idealize the Japanese experience and ascribe far too much importance to the role that the Japanese government has played in Japan's economic success. Japanese economic growth has seemed so impressive relative to our own because it started from a base so far below our own. 81/ In addition, some measure of the Japanese success has been due to the ability of Japanese industry cheaply to copy technology developed at great expense in this country. And, currently, exchange rate values--affected by a number of factors mentioned at the beginning of this paper--account for much of the apparent success of some Japanese industries to export to the United States. Moreover, a number of other factors that have nothing to do with MITI, such as lower wage rates, flexible management-labor relations, high personal savings rates, and plain "luck," have contributed to Japan's economic success.

Furthermore, the Japanese economy has not been without its own problems. At present it is experiencing overcapacity in industries such as steel, textiles, and aluminum. The Japanese petrochemical industry is operating at only about 50 percent of capacity and is complaining of encroachments by U.S. companies.

On the other hand, there is no denying that the recent performance of the Japanese economy has been very impressive. However, it is very possible that Japan's success has come in spite of, rather than because of, government interference.

Although information on the relationship between government efforts and Japanese growth is limited, there are some indications that much of what passes as fact concerning the Japanese government's ability to outperform the market is simply untrue. First, the public sector in Japan spends far less of that country's national income than does the public sector in this country. 82/ Most of the government spending goes for normal public purposes, such as public works. Moreover, much of Japan's vaunted industrial policy consists merely of hortatory pronouncements with little government action. For example, Japanese subsidies to industry have been so low as to be trivial. To the extent there has been government assistance to industry, that assistance typically has been aimed at chronically weak sectors of Japan's economy such as agriculture, textiles, food processing, and domestic mass transit. Finally, the Japanese automobile industry,

perhaps the most spectacular success of that economy, developed with very little help from the Japanese government. In fact, Japanese automobile manufacturers rejected MITI's scheme to limit the number of competitors.

Moreover, even if the advocates of an industrial policy are able to prove that the Japanese government has been responsible for the Japanese success, that does not necessarily mean that the Japanese experience can readily be transferred here. Their society is significantly different from our own. One example is the difficulty encountered in applying Japanese labor-management techniques in this country.

The results of the various industrial policies in Western European nations might be a better indicator of such a policy's potential here. However, even the policy's advocates cannot seriously argue that government interference has been a ringing success there. France, for example, has adopted the most comprehensive industrial policy, and yet is suffering the most severe economic problems of any Western industrialized country.

Even if subsidies and protectionist policies by foreign governments have been successful in terms of enabling selected industries to capture large market shares, the costs to the economies of those countries and of the world greatly outweigh the benefits. Regardless of the comparative disadvantages and inefficiencies that a domestic industry may face, that industry can be made "competitive," in the sense of lowering sales

price, if the government is willing to provide a sufficiently large subsidy. However, this is hardly a worthy goal. In fact, the United States should be doing everything possible to discourage other countries from adopting such policies rather than embracing them ourselves.

Free trade is the best guarantee of maximizing world wealth. It assures that those countries that have a comparative advantage in the production of some good or service--that is, that can produce that good or service at the lowest cost--will do so. High tariffs impede the promise of efficient resource allocation by prohibiting countries from taking full advantage of their comparative advantage. Subsidies are even more pernicious because they may actually reverse comparative advantages as production moves not to that location where fewest resources are required but rather to the location where subsidies are the greatest.

The subsidizing nations, in obtaining the resources for subsidies, impose substantial resource misallocations on those sectors of their economies which are taxed, both explicitly and implicitly, to generate the subsidies. For example, erecting barriers to imports of one product--say, steel--would allow domestic producers to sell more steel and employ more steel workers. However, simultaneously, those barriers would raise the costs to related industries, such as automobile manufacturing, that must use a great deal of steel and hence

would put those industries at an artificial disadvantage to their foreign competitors. More steelworkers might be employed, but only at a substantial cost in terms of jobs in other industries and in terms of higher prices to the ultimate consumer. By interfering in the market and promoting those industries which, for whatever reason, have the most powerful political constituency, those countries are inhibiting their own economies from adjusting to structural changes and thereby from fully exploiting their own comparative advantage.

Clearly, a free market economy and free trade are not perfect. The market does not respond instantaneously and painlessly to exogenous shocks. However, the free market is far superior to any of the alternatives, including a government directed industrial policy. Quite simply, logic and experience strongly suggest that the free market is a far more efficient and successful mechanism for economic decision-making than is the political mechanism. 83/

Unlike the market, which facilitates the transfer of assets to their most highly valued use, political institutions tend to allocate resources on the basis of the relative electoral strength of competing interest groups. 84/ For example, if the government were called upon to target industries which would then be subsidized and protected from foreign competition, it is likely that a political mechanism would target industries that once enjoyed a comparative advantage which has since

migrated to other countries. Those industries would have large pools of readily identified, organized and mobilized employees, shareholders, and managers who would benefit from targeting and so would use their combined electoral strength to see that the political mechanism responded accordingly. The costs of such targeting, however, would be widely disseminated throughout the economy. And even though collectively those costs might greatly exceed the benefits to the dying industry, the costs might be so dispersed that the burden to any individual would be modest. Political mobilization of the adversely affected citizens would be impossible. As a result, there probably would be no effective countervailing interest group.

Similarly, since it is unclear ex ante who will reap the benefits from the promotion of frontier industries, it is hard to imagine whence the constituency--clearly a prerequisite for targeting--for those new industries would come. Rather than aiding in the development of new industries, it is more likely that an industrial policy would prolong the death of older industries while diverting resources from investment in newer, more promising industries.

Also, the proposals for an industrial policy would entail a bureaucratic mechanism for directing resources--investment capital in particular. As has been explained above, one of the benefits of competition in research and development stems from the fact that the market is allowed to test more than one

idea. 85/ If one competitor follows a strategy or pursues a technology that proves unfruitful, the existence of other competitors to try other strategies minimizes the social cost of that failure. A national industrial policy would almost certainly stifle that competition and raise the size and cost of mistakes.

Those bureaucratic costs are likely to be particularly high. A private party motivated solely by market forces generally will cease further investment once it is clear that the initial investment was a mistake. But a strong constituency with a vested interest in the original political decision might well prevent the government from making such a correction for fear of losing that government subsidy. This concern is hardly fanciful. 86/

Recent large, government investment projects are good examples of the inherent problems associated with government usurpation of the market. The French-British wager on the Concorde is one such example. Fortunately, this country narrowly escaped from a similar folly with the SST. The unavailability of private capital for a superficially attractive project should convey a message about that project's prospects. The general insensitivity of the political mechanism to that message is likely to result in errors that are both massive and enduring, because politicians are slow to confess error and because the original political constituency is likely to be strengthened by the capital infusion.

Fortunately, analysis of the prospects for an industrial policy does not have to be conducted in the vacuum of mere theory. This country tried industrial planning during the 1930s, and the experiment met with failure. The Reconstruction Finance Corporation ("RFC"), the National Recovery Administration ("NRA"), and the Smoot-Hawley Tariff were the vehicles then.

Created in 1932, the RFC provided capital subsidies to targeted industries. Originally, the RFC focused its activities on troubled financial institutions and railroads; however, in 1940, it was expanded to prepare for wartime mobilization. After the war, the RFC was redirected to help the economy readjust to peace. Thereafter, most of its subsidies went to finance veteran-owned businesses and plants purchased as war surplus. These targets seem to have been chosen not on the basis of their future economic promise but rather on the basis of their contemporary political constituency. Most of these businesses could not obtain funding in the capital markets, and at least this author is not aware of any ultimately successful industries that got their start as a result of RFC subsidies. Of course, it is impossible to know what promising industries were handicapped by the lack of capital as a result of the RFC's "crowding-out" of private borrowing. Nonetheless, the RFC eventually became so scandal-ridden that Congress legislated the overgrown bureaucracy out of existence in 1953. 87/

The Smoot-Hawley Tariff represented the country's efforts to use protectionist barriers to foster recovery in the United States. Smoot-Hawley set up the highest general tariff rate structure that the United States had ever experienced and, ultimately, was responsible for dragging the world economy further into depression. More than 30 other countries retaliated, and international debt repudiation became commonplace. United States exports fell from $5.2 billion in 1929 to $1.647 billion in 1933, while imports fell from $4 billion to $1.45 billion over the same period. 88/

For an antitrust practitioner, the National Recovery Administration is perhaps the most interesting and, not surprisingly, disastrous aspect of the experiment with industrial policy. Under the NRA, industrywide codes were developed for over 550 industries. The Codes governed output, prices, wages, and practically every other conceivable aspect of firm conduct on which members of the industry could compete. The Codes were so extensive and detailed that, by the time the Supreme Court found the enabling act unconstitutional, the system of government enforced cartels had largely broken down. By keeping the wage and price levels artifically high and so impeding what otherwise would have been a quicker redeployment of society's resources, the NRA crippled the economy's ability to make the adjustments essential to the climb back to prosperity. 89/

Overall, this country's experiment with industrial policy in the 1930s diverted resources from more efficient deployment and probably prolonged the Great Depression significantly. At least until recently, even the most ardent supporters of the policies of the 1930s would not have cited these programs as significant achievements. 90/

On the other hand, government obviously does have a role. Providing and protecting the legal framework within which the market operates is one example. The modifications of that framework proposed in section I of this paper are important examples of ways that government policy can play a constructive role in improving productivity and competitiveness. The framework should be designed so as to be conducive to economy-wide development of technology and improvement of productivity, at the same time that it is neutral toward investment in any particular industry.

National security is another important area in which an "industrial policy" may be appropriate. The federal government probably should preserve certain critical industries at some level of activity to protect against uncertain foreign supply in a time of national emergency. Only the government can provide for national defense, and defense policy has a role beyond the mere procurement and deployment of weapons and military personnel. Nevertheless, protectionist measures will rarely be the most cost-effective means for achieving national security goals.

There are other areas as well where government policy, both at the state and federal level, can improve productivity and help to achieve other social goals. For example, education, basic research, foreign relations, and fiscal and monetary policies all have a profound effect on productivity. In deciding precisely what role government should play, however, one must recognize the severe and inherent limitations on the effectiveness of government interference in the market. Government intervention can only be justified by establishing the existence of a significiant market failure, whose costs if unchecked would exceed the costs associated with the proposed interference in the market. The case for an overwhelming market failure that would justify the costs of an industrial policy quite simply has not been made. Moreover, none of the advocates of industrial policy have confronted, much less overcome, the historical precedents that strongly suggest their "program" is doomed to failure.

Conclusion

This country currently faces decisions that will be crucial to our ability to maintain international economic preeminence. The industries of other countries are challenging the superior position traditionally enjoyed by United States industry in international markets and this country's rate of growth of productivity has not kept pace with the rate of many of our

other major trading partners. However, there is no cause for panic; rather, it is essential that we approach the issue calmly and analytically and determine what problems exist and how they can best be addressed.

One area in which this country might take action to induce greater innovation and productivity involves the relationship between the antitrust laws and R&D. The substantive standard embodied in the federal antitrust statutes is not an impediment to promoting innovation, efficiency, and productivity. In fact, those statutes were designed to ensure that the market performs in a manner that is conducive to improvements in consumer welfare. Nevertheless, overly punitive sanctions and judicial misinterpretation of the proper antitrust standard may be having an adverse effect on productivity.

Although the deterrent effect that the antitrust laws have on efficiency-enhancing joint R&D has been greatly exaggerated, the modicum of uncertainty surrounding the analysis employed by the antitrust laws, combined with the excessively punitive antitrust remedy of mandatory treble damages, may inhibit the formation of some procompetitive joint R&D ventures. More damaging to the economy's efforts to create and exploit new technologies, however, is the judicial and enforcement hostility that has been manifested toward intellectual property. The antitrust laws and the patent and copyright doctrines of misuse have been misconstrued to the point that they impede the efficient exploitation of the fruits of R&D.

Not only has this hostility impaired short-term efficiency, but it may well have also adversely affected the incentives to invest in R&D by reducing the overall returns to intellectual property. Fortunately, a few, relatively minor modifications of the antitrust laws, as well as a change in the doctrines of patent and copyright misuse, should be sufficient to correct these problems and improve the legal climate for procompetitive R&D-related conduct, while at the same time maintaining the traditional antitrust standard to ensure that anticompetitive practices are not allowed to reduce efficiency and productivity.

The more drastic solutions recommended by the advocates of a national industrial policy, on the other hand, are more likely to harm than to enhance this country's competitiveness and productivity. An industrial policy would entail the unjustified replacement of the market's economic mechanism for allocating resources with a bureaucratic one. By exaggerating the success of industrial policies adopted by other countries and by ignoring this country's own disastrous experience with similar policies, the advocates of such a policy have been able to avoid coming to terms with the strong evidence that a national industrial policy is doomed to failure. The free market and international free trade are the best guarantees for a strong and vital economy. To the extent that one advocates government intervention in the market, especially when the intervention is as extensive as that contemplated by a national

industrial policy, he has a significant burden of establishing a severe market failure, the costs of which clearly outweigh the costs of the advocated intervention. The advocates of wholesale government intervention in the guise of an industrial policy simply have not carried that burden.

FOOTNOTES

* Assistant Attorney General, in charge of the Antitrust Division, U.S. Department of Justice.

1/ See, e.g., COMMITTEE FOR ECONOMIC DEVELOPMENT, STIMULATING TECHNOLOGICAL PROGRESS 19-25 (1980).

2/ See BUSINESS-HIGHER EDUCATION FORUM, AMERICA'S COMPETITIVE CHALLENGE: THE NEED FOR A NATIONAL RESPONSE 8-9, 36 (1983); NATIONAL ACADEMY OF SCIENCES, ANTITRUST, UNCERTAINTY, AND TECHNOLOGICAL INNOVATION (1980); NATIONAL RESEARCH COUNCIL, TECHNOLOGY, TRADE, AND THE U.S. ECONOMY (1978).

3/ See, e.g., NATIONAL ACADEMY OF SCIENCES, supra note 2, at 26-29.

4/ As used in this paper, the phrase, "antitrust statutes," refers to the federal antitrust laws, i.e., the Sherman Act, the Clayton Act, and the Federal Trade Commission Act, 15 U.S.C. 1 et seq.

5/ E.g., Reiter v. Sonotone Corp., 442 U.S. 330, 343 (1979), quoting R. BORK, THE ANTITRUST PARADOX 66 (1978) (the antitrust laws are a "consumer welfare prescription"). See also Baxter, Responding to the Reaction: The Draftsman's View, 71 CALIF. L. REV. 618, 619-21 (1983).

6/ See generally Arrow, Economic Welfare and the Allocation of Resources for Invention, in THE RATE AND DIRECTION OF INVENTIVE ACTIVITY, 609-25 (1962) and Demsetz, Information and Efficiency: Another Viewpoint, 12 J.L.& ECON. 1 (1969).

7/ Arrow, supra note 6, at 610-14.

8/ "Information impactedness" is a term used to describe the situation in which there are informational asymmetries among parties to a transaction and those informational asymmetries prove difficult to rectify. Professor Oliver Williamson describes the term as follows:

> "It is attributable to the pairing of uncertainty with opportunism. It exists in circumstances in which one of the parties to an exchange is much better informed than is the other regarding underlying conditions germane to the trade, and the second party cannot achieve information parity except at great cost--because he cannot rely on the first party to disclose the information in a fully candid manner."

O. WILLIAMSON, MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS 14 (1975). See also Arrow, supra note 6, at 612-13.

9/ Moreover, "adverse selection" problems will make it difficult to pool the risks. That is, because the third party risk-assumers cannot easily differentiate among the various abilities of inventors, the risk-assumers may attempt to charge a risk premium that reflects the average ability of inventors. A number of inventors with above-average ability (the number will depend on the risk aversion of those inventors) will leave the pool. As the above-average risks leave the pool, the pool's average declines, increasing the number of above-average inventors with an incentive to leave the pool. At the limit, only the least able inventors will be left in the pool. See O. WILLIAMSON, supra note 8, at 14.

10/ This phenomenon is referred to in the literature as the "moral hazard." While adverse selection involves ex ante informational asymmetries that are present at the time of negotiation, the moral hazard is an ex post asymmetry. That is, the third party risk-assumer will find it costly to determine the intent and motivation of the party from whom the risk was assumed. Ceteris paribus, higher risk premia will be charged to assume risks which the insured's conduct can affect than to assume risks over which the insured has little or no control. See, id.

11/ See Arrow, supra note 6, at 614-16; Demsetz, supra note 6, at 9-11.

12/ See Arrow, supra note 6, at 616-19; Demsetz, supra note 6, at 11-12.

13/ In other words, information is subject to problems of indivisibilities of use (or, as it is commonly referred to, public goods). For a discussion of public goods, see A. ATKINSON & J. STIGLITZ, LECTURES ON PUBLIC ECONOMICS 483-89 (1980); Samuelson, The Pure Theory of Public Expenditure, 36 REV. ECON. & STAT. 387 (1954).

14/ In criticizing Professor Arrow's concern that positive prices are charged for the use of information, Professor Demsetz notes that "[i]ndivisibilities in the use of knowledge become important only when the costs of contracting are relatively large. . . . If the cost of contracting were zero, . . . prospective 'free-loaders' would be willing to pay researchers to increase the investment being made. Research activity would be purchased just as any other good." Demsetz, supra note 6, at 12. As Professor Demsetz notes, a system of intellectual property provides an efficient mechanism for approaching the welfare-maximizing level of research that would be realized in a zero-transactions-cost world. Id. at 13.

15/ The problems associated with reliance on a political mechanism to allocate resources are discussed more fully in part II of this paper, infra.

16/ The patent laws, for example, give a patentee the right to exclude others from making, using, or selling the patented invention throughout the United States for a period of seventeen years. 35 U.S.C.§ 154. This right is derived from the Constitution, which states that, "[t]o promote the progress of science and useful arts," Congress shall have the power to "secure for limited times to authors and inventors the exclusive right to their respective writings and discoveries." U.S. CONST., art. I, § 8.

17/ In this sense, patent rights are a solution to some of the transactions-cost problems that would obtain in the absense of legally protected rights. Bargaining in information involves problems of opportunism and ex ante asymmetries--the owner has the information that another wants to obtain. Until the information is divulged to the potential purchaser, it generally will be impossible for the purchaser to determine his reservation price (i.e., what the information is worth to him). However, once the information is divulged to the potential purchaser, an ex post information asymmetry arises--the purchaser now knows his reservation price, but it will be costly for the owner to determine that price. Unless the owner of the information has right to prevent the potential purchaser from using the information, the owner is at the mercy of the purchaser, who, depending on the extent to which the information has been divulged, may need nothing more from the owner and so may be willing to pay little or nothing. A defined patent right avoids this information asymmetry and so lowers bargaining costs. Cf. O. WILLIAMSON, supra note 8.

18/ See, e.g., Citizen Publishing Co. v. United States, 394 U.S. 131 (1969); Timken Roller Bearing Co. v. United States, 341 U.S. 593, 598 (1951); United States v. Minnesota Mining & Mfg. Co., 92 F. Supp. 947 (D. Mass. 1950); Brodley, The Legal Status of Joint Ventures Under The Antitrust Laws: A Summary Assessment, 21 ANTITRUST BULL. 453 (1976). But see Broadcast Music, Inc. v. CBS, 441 U.S. 1 (1979).

19/ United States v. Line Material Co., 333 U.S. 287, 310 (1948); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263, 301 (2d Cir. 1979), cert. denied, 444 U.S. 1093 (1980); L. SULLIVAN, HANDBOOK OF ANTITRUST LAW, 303 (1977). Ginsburg, Antitrust, Uncertainty, and Technological Innovation, 24 ANTITRUST BULL. 635, 672 (1979).

20/ In Berkey, the appellate court, applying a rule of reason, upheld the district court's finding that a joint development venture involving a monopolist was illegal. 603 F.2d at 298-304. See also Ginsburg, supra note 19, at 671; Note, Joint Research Under the Antitrust Laws, 39 GEO. WASH. L. REV. 1112, 1123 (1973).

21/ See the discussion, supra at notes 8-10.

22/ An excellent summary of the debate and the empirical data can be found in Weiss, The Concentration-Profits Relationship and Antitrust in INDUSTRIAL CONCENTRATION: THE NEW LEARNING 184 (H. Goldschmid, H. Mann & J. Weston eds. 1974).

23/ U.S. DEPARTMENT OF JUSTICE, MERGER GUIDELINES (Antitrust Division June 14, 1982) [hereinafter referred to as MERGER GUIDELINES]. See also Baxter, supra note 5, at 618.

24/ See generally U.S. DEPARTMENT OF JUSTICE, ANTITRUST GUIDE CONCERNING RESEARCH JOINT VENTURES (Antitrust Division November 1980) [hereinafter referred to as JRDV GUIDES].

25/ An example might be the development of new brake systems for automobiles.

26/ See the discussion at pp. 17-18, infra.

27/ JRDV GUIDES, supra note 24, at 3.

28/ See generally F. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 413-38 (2d. ed. 1980). Professor Scherer notes that "[t]he more rivals an industry includes, the more independent centers of initiative there are, and the more likely it is that some entrepreneurs will consider the development of a product worthwhile." Id. at 428-29.

29/ See id. On the other hand, it does not appear that atomistic competition is an ideal market structure for R&D. Id.; Ginsburg, supra note 19, at 644. This is true because the greater the number of competitors the lesser is the discounted value of the expected returns to an investment in R&D for any particular competitor. Joint ventures can help to counteract this effect by reducing risk.

Moreover, commentators generally assume that there is an inverse relationship between the number of competitors and an inventor's ability to appropriate the benefits generated by his invention. See, e.g., SCHERER, supra note 28, at 429-30. Of course, institutions of intellectual property are designed to ameliorate the effect that a competitive market structure has on an inventor's ability to appropriate the returns to R&D. To the extent intellectual property fulfills its function, one need not be as concerned about the adverse effect of vigorous competition on innovation.

30/ See United States v. Automobile Mfgs. Assn., 307 F. Supp. 617 (C.D. Cal. 1969), aff'd sub nom. City of New York v. United States, 397 U.S. 248 (1970); JRDV GUIDES, supra note 24, at 12-13. But see R. POSNER, ANTITRUST CASES, ECONOMIC NOTES AND OTHER MATERIALS 319-20 (1974). Judge Posner argues that the disincentive to install auto emissions devices would be decreased if all competitors agreed to do so simultaneously.

31/ See the discussion supra at note 18-20. See also JRDV GUIDES, supra note 24.

32/ The MERGER GUIDELINES, supra note 23, set out the appropriate analysis of market definitions and market share calculation in the context of merger analysis. The analysis that follows uses the MERGER GUIDELINES as a starting point.

33/ See generally MERGER GUIDELINES, supra note 23, § II.

34/ See the discussion supra at pp. 12-14.

35/ To define markets in the context of merger analysis, the MERGER GUIDELINES supra note 23, look both to demand and supply substitutability. To determine the products that are competitive substitutes to the products of the merging parties, the GUIDELINES add "additional products to the market if a significant percentage of the buyers of products already included [in the provisional market] would be likely to shift to those other products in response to a small but significant and non-transitory increase in price." Id. at 4. As explained below, the question of demand substitutability may frequently be speculative in the context of joint R&D ventures, and, hence, there must be greater reliance on use of the concept of supply substitutability.

36/ The discussion here is analogous to the discussion in MERGER GUIDELINES, supra note 23, of supply or production substitutability. The MERGER GUIDELINES include in the market firms that "could easily and economically be used to produce and sell the relevant product within six months in response to a small but significant and non-transitory increase in price." Id. at 6. Because the anticompetitive effect of joint R&D ventures does not manifest itself quickly, the six-month limitation in the case of mergers should be extended in the case of joint R&D ventures (the period of extension will vary depending on the circumstances). Also, because "price" is not an easily understood concept in the context of R&D, it is more appropriate to focus on the response of firms to an increase in the returns to R&D.

37/ See generally MERGER GUIDELINES, supra note 23, § II(C).

38/ See generally id., § II(D).

39/ See the discussion, supra at notes 28-29.

40/ Address by William F. Baxter to the National Association of Manufacturers 12 (May 10, 1983). Of course, as with any number of this sort, it should not be viewed as totally inflexible. For example, a 20 percent market share might not, under certain circumstances, raise any concern, while 14 percent might. Some flexibility may be necessary because of the problems inherent in calculating market shares for R&D.

41/ This general approach is discussed in greater detail in W. BAXTER, P. COOTNER, & K. SCOTT, RETAIL BANKING IN THE ELECTRONIC AGE: THE LAW AND ECONOMICS OF ELECTRONIC FUNDS TRANSFER, ch. 5 (1977).

42/ Id.

43/ Cf. United States v. Terminal R.R. Ass'n, 224 U.S. 383 (1912)

44/ This perception has no doubt developed from cases holding group boycotts per se illegal. Id.; Associated Press v. United States, 326 U.S. 1 (1945); Silver v. New York Stock Exchange, 373 U.S. 341 (1963). See also JRVD GUIDES, supra note 24, at 21-24; Brodley, The Legal Status of Joint Ventures Under the Antitrust Laws: A Summary Assessment, 21 ANTITRUST BULL. 453, 468-69 (1976). But see United States Trotting Ass'n v. Chicago Downs Ass'n, 665 F.2d 781 (7th Cir. 1981).

44a/Although the government can sue to enjoin an overinclusive joint venture, the risk of such a suit has less of an adverse financial impact than treble damages because, other than breaking up the anticompetitive venture, the injunction will not necessarily impose substantial costs on the individual joint venturers.

45/ See F. SCHERER, supra note 28, at 411. Scherer divides innovation into four stages: invention, entrepreneurship, investment, and development. All four stages require the development of information upon which competitors can "free-ride."

46/ The effort required to develop the technology for the Xerox copier provides a good example. After the invention of the electrostatic principle on which the copying machine is based, it was yet necessary to produce the paper feed and transport system, ink metering mechanism, exposure timer, and the myriad of other features that were required to manufacture a marketable copier. The time attributable to these efforts can be very lengthy. One study lists 50 famous inventions and the corresponding delay periods, which range from 2 to 68 years. Kitch, The Nature and Function of the Patent System, J.L. & ECON. 265, 272 (1977). Another study estimates an average delay of 10 to 15 years for 46 inventions in a variety of industries. E. MANSFIELD, INDUSTRIAL RESEARCH AND TECHNOLOGICAL INNOVATION 110, 202-03 (1968).

47/ O. WILLIAMSON, supra note 8, at 9, 26-30. For another discussion of the problems of bilateral monopoly see Arrow, The Organization of Economic Activity in THE ANALYSIS AND EVALUATION OF PUBLIC EXPENDITURE: THE PPB SYSTEM, Joint Economic Committee, 91st Cong., 1st Sess. 59-73 (1969).

48/ The description of metering was first published in Director and Levy, Law and the Future: Trade Regulation, 51 NW. U.L. Rev. 281 (1956).

49/ See E. SINGER, ANTITRUST ECONOMICS AND LEGAL ANALYSIS 106 (1981).

50/ See, e.g., Dawson Chemical Co. v. Rohm & Haas Co., 448 U.S. 176 (1980).

51/ See, e.g., Priest, Cartels and Patent License Arrangements, 20 J.L. & ECON. 309 (1977).

52/ See generally Continental TV, Inc. v. GTE Sylvania, Inc., 433 U.S. 36 (1977).

53/ See, e.g., United States v. Line Material, Inc., 333 U.S. 287 (1948); Mercoid Corp. v. Mid-Continent Co., 320 U.S. 661 (1944); Ethyl Corp. v. United States, 309 U.S. 436 (1940); Carbice Corp. v. American Patent Development Co., 283 U.S. 27 (1931); Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917).

54/ Mercoid Corp. v. Mid-Continent Co., 320 U.S. at 665.

55/ Id.

56/ United States v. Studiengesellschaft Kohle, m.b.H. 670 F.2d 1122, 1127 (D.C. Cir. 1981).

57/ Ginsburg, supra note 19, at 678.

58/ Henry v. A.B. Dick Co., 224 U.S. 1 (1912); Heaton-Peninsula Button-Fastener Co. v. Eureka Specialty Co., 77 F. 288 (1896).

59/ See, e.g., International Salt Co. v. United States, 332 U.S. 392 (1947), Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917). However, tie-ins can be justified if (1) a seller offers a new technology that cannot succeed unless all of its components function correctly; see, e.g., United States v. Jerrold Electronics Corp., 187 F. Supp. 545, 555-58, 560-61 (E.D. Pa. 1960), aff'd per curiam, 365 U.S. 567 (1961); General Talking Pictures Corp. v. American Tel. & Tel. Co., 18 F. Supp. 650, 666-67 (D. Del. 1937); or (2) a seller, to maintain quality control or to preserve goodwill, must prevent buyers from utilizing inferior complementary goods with the seller's product; see, e.g., Kentucky Fried Chicken Corp. v. Diversified Packaging Corp., 549 F.2d 368 (5th Cir. 1977); Baker v. Simmons Co., 307 F.2d 458, 469 (1st Cir. 1962)

60/ The other two conditions are that there is an agreement actually conditioning the sale of one item (the "tying product"), on the purchase of a second item (the "tied product"), and that the arrangement must affect a "not insubstantial amount" of commerce. International Salt Co. v. United States, 332 U.S. 392, 396 (1947); Fortner Enterprises, Inc. v. United States Steel Corp., 394 U.S. 495, 501-02 (1969).

61/ See, e.g., United States v. Loew's, Inc., 371 U.S. 38, 46 (1962).

62/ United States v. General Electric Co., 272 U.S. 476 (1926) held that it is not per se illegal for a patentee to set the resale price of a patented product that it has sold to a licensee. Subsequent cases have eroded this aspect of the General Electric decision, and patentees currently are reluctant to rely upon General Electric for fear that it would be overruled if tested. See, e.g., United States v. Line Material, 333 U.S. 287 300-01 (1948); NORDHAUS, PATENT-ANTITRUST LAW, § 33 (1982).

63/ See, e.g., Transparent-Wrap Machine Corp. v. Stokes & Smith Co., 329 U.S. 637 (1947) reh'g denied, 330 U.S. 854 (1947); Nordhaus, Patent-Antitrust Law, § 58.

64/ Prior to Continental TV, Inc. v. GTE Sylvania, Inc., 433 U.S. 36 (1977) a number of cases indicated a rule of per se illegality for field-of-use and other restrictions placed on a licensee that purchased the product. See, e.g., United States v. Glaxo Group Ltd., 302 F. Supp. 1 (D.D.C. 1969), rev'd on other grounds, 410 U.S. 52 (1973). The rationale of GTE Sylvania, however, strongly indicates that field-of-use and territorial restrictions in intellectual property licenses would today be judged under the rule of reason. Indeed, in Munters Corp. v. Burgess Industries Inc., the court first held that a field-of-use restriction was per se illegal, 450 F. Supp. 1195 (S.D.N.Y. 1977), but reversed itself after GTE Sylvania, 1978-2 Trade Cas. ¶ 62,149 (S.D.N.Y.). (The court, however, held the restriction to be illegal under the rule of reason.) Accord, United States v. Studiengesellschaft Kohle, m.b.H., 670 F.2d 1122 (D.C.Cir. 1981).

65/ Thus, in United States v. Studiengesellschaft Kohle, m.b.H., 670 F.2d 1122 (D.C. Cir. 1978), even though the court applied a rule of reason and upheld the validity of the licensing restrictions at issue, its analysis was replete with improper notions concerning intellectual property and its relationship to the antitrust laws. Particularly ominous in this regard is the court's repeated focus on whether the license restriction has the danger of extending the "patent monopoly." Id. at 1131-35.

66/ Remarks of Bruce Wilson, Department of Justice Luncheon Speech, "Law on Licensing Practices: Myth or Reality?" (January 21, 1975).

67/ Dkt. 9108 (April 5, 1978), 4 Trade Reg. Rep. (CCH) ¶ 23,613 (September 4, 1979) (dismissal by ALJ) (titanium dioxide).

68/ Dkt. 8908, Trade Reg. Rep. (CCH) FTC Complaints and Orders 1970-73 Transfer Binder at ¶ 20,164 (electrostatic copying).

69/ See, e.g., Remarks of Abbott B. Lipsky, before the American Bar Association Antitrust Section "Current Antitrust Division Views on Patent Licensing Practices" (November 5-6, 1981); Remarks of Roger B. Andewelt before the Houston Patent Law Association "Basic Principles to Apply at the Patent-Antitrust Interface" (December 3, 1981).

70/ See Remarks of Roger B. Andewelt before the Patent, Trademark and Copyright Section of the Bar Association for the District of Columbia, "Competition Policy and the Patent Misuse Doctrine" (November 3, 1982), for a general description of the misuse doctrine and its development.

71/ National Lockwasher Co. v. George K. Garrett Co., 137 F.2d 255 (3d Cir. 1943); McCullough v. Kammerer Corp., 166 F.2d 759 (9th Cir.), cert. denied, 335 U.S. 813 (1948).

72/ Zenith Radio Corp. v. Hazeltine Research, Inc., 395 U.S. 100, on remand, 418 F.2d 21 (7th Cir. 1969), rev'd, 401 U.S. 321, reh'g denied, 401 U.S. 1015 (1971).

73/ Id.

74/ See, e.g., Brulotte v. Thys Co., 379 U.S. 29 (1964).

75/ Laitram Corp. v. King Crab Inc., 244 F. Supp. 9, modification denied, 245 F. Supp. 1019 (D. Alaska 1965).

76/ Allied Research Products, Inc. v. Heatbath Corp., 300 F. Supp. 656 (N.D. Ill. 1969).

77/ American Photocopy Equipment Co. v. Rovico, Inc., 359 F.2d 745 (7th Cir. 1966).

78/ The approach described below is outlined in the Statement of William F. Baxter on S. 737, S. 568, and S. 1383, Bills Related to Joint Research and Development before the Senate Committee of the Judiciary, 98th Cong., 1st Sess. (June 29, 1983).

79/ See, e.g., S. 737, S. 568, and S. 1383, 98th Cong., 1st Sess. (1983).

80/ Although there have been numerous proposals for a national industrial policy, the most prominent recent proposal can be found in R. REICH, THE NEXT AMERICAN FRONTIER (1983). See also, HIGH TECHNOLOGY: PUBLIC POLICIES FOR THE 1980s (National Journal Issues Book 1983).

81/ For a more detailed analysis of the role of the Japanese government in Japan's economic success, see Trezise, Industrial Policy in Japan in INDUSTRY VITALIZATION: TOWARD A NATIONAL INDUSTRIAL POLICY (19832). This part of the paper has drawn heavily on that analysis and on the Remarks of James C. Miller III before the Economic Club of Detroit, "Reindustrialization Policy: Atari Mercantilism" (April 18, 1983).

82/ For example, in 1973, the government spent only 29 percent of Japan's national income, while the government here spent 40 percent of this country's national income. See G.W. NUTTER, GROWTH OF GOVERNMENT IN THE WEST at 6, 58-73 (1978).

83/ For a general defense of the free-market and an analysis of the inherent weaknesses of central planning, see Hayek, The Use of Knowledge in Society, 35 AM. ECON. REV. 519 (1945). See also Brennan, Municipal Antitrust Liability--An Economic Perspective 2-4 (Economic Policy Office, U.S. Department of Justice, Discussion Paper No. 83-9 1983).

84/ See generally R. NOLL, GOVERNMENT POLICY AND THE PRODUCTIVITY PREDICAMENT (Cal. Tech. Social Science Working Paper No. 430 1982).

85/ See the discussion, supra at notes 28-29.

86/ For some examples of the adverse effects of government interference in the market for R&D, see R. NOLL, supra note 84.

87/ For a description of the RFC, see B. MITCHELL DEPRESSION DECADE: FROM NEW ERA THROUGH NEW DEAL, 1929-1941, 76-78, 177 (Vol. IX, The Economic History of the United States) reprinted by M.E. Sharpe, Inc., White Plains, N.Y.; FAINSOD AND GORDON GOVERNMENT AND THE AMERICAN ECONOMY 716-17 (Rev. Ed. 1948); CONGRESSIONAL QUARTERLY, CONGRESS AND THE NATION, 1945-64, at 350, 362-63.

88/ See DOBSON, TWO CENTURIES OF TARIFFS: THE BACKGROUND AND EMERGENCE OF THE U.S. INTERNATIONAL TRADE COMMISSION 33-5, (1976); The Rise and Fall of the United States in the World Economy, in THE BUSINESS CYCLE AND PUBLIC POLICY, 1929-80 (a compendium of papers submitted to the Joint Economic Committee, Congress of the United States), Joint Committee Print, 96th Cong. 2d Sess 68 (November 28, 1980); FAINSOD and GORDON, supra note 87, at 90-91; and LARY and ASSOCIATES, THE UNITED STATES IN THE WORLD ECONOMY: THE INTERNATIONAL TRANSACTIONS OF THE UNITED STATES DURING THE INTER-WAR PERIOD, 171-72 (1943).

89/ NRA's enabling statute, the National Industrial Recovery Act, was held unconstitutional in Schecter v. United States, 295 U.S. 495 (1935). For a description of the NRA, see B. MITCHELL, supra note 87, at 228-59.

90/ In addition to our experience with industrial policy in the 1930s, this country also tried massive government interference in the market in the early 1970s. At that time, the Federal Government adopted a comprehensive incomes-policy of wage and price controls to slow inflation. That policy also generally failed and was ultimately abandoned as a bad idea. See, e.g., ECONOMIC REPORT OF THE PRESIDENT, 226-29 (1975).