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WHY INNOVATION MARKET ANALYSIS MAKES SENSE

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The importance of innovation in advancing consumer welfare is evident.[1] Indeed, innovation becomes more important in the transition to a more globalized economy. Today we see markets expanding beyond our borders, with more competition from firms located outside the United States. The evidence suggests that the firms that will succeed globally are those that have flourished in the face of domestic competition.[2] Competition spurs innovation which, in turn, makes for greater competitive success in this increasingly global market. Hence, antitrust enforcers have a role to play in ensuring that competition among innovators is not reduced or retarded, and this role is especially important in the area of merger policy.

A merger of two innovating corporations can, under certain circumstances, have procompetitive benefits. For example, combining complementary research and development assets may allow the merged entity to better compete. A merger, however, may retard or restrict innovation in a way that can have adverse consequences for consumers. Innovation

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[1] As used in this speech, "innovation market analysis" involves analysis of research and development of innovation as separate and apart from a market for currently-existing goods or technology. See generally "U.S. Department of Justice Guidelines for Licensing and Acquisition of Intellectual Property," § 3.2.3 (Issued for public comment Aug. 8, 1994) (hereafter "Draft Intellectual Property Guidelines").

[2] Michael Porter, The Competitive Advantage of Nations (1990). See also David Halberstam, The Reckoning 244-45 (1986) (noting a possible connection between competition and innovation in describing problems that plagued the U.S. automobile industry). Others have suggested that some level of cooperation, albeit at a level that does not usually raise anticompetitive concerns, may also play some role in firms' ability to succeed on a global basis. See David J. Teece, "Information Sharing and Innovation," 62 Antitrust L. J. 465, 471-73 (1994) (noting importance of businesses joining trade associations that offer limited assistance on foreign market research, common fiscal and legal concerns, and government and union relations as well as the importance of buyers joining together to encourage upstream input manufacturers to innovate).

can be suppressed or slowed or promising alternative technological approaches can be abandoned. Indeed, having more than one company undertaking research and development has the potential of producing an innovation that might not otherwise be discovered.[3]

While the possible effect of retarding or restricting innovation on consumers may seem clear, analyzing the competitive effect of a merger on innovation is not so easy. Antitrust principles usually come into play in markets where goods are currently in production, the product market is ascertainable, market shares and concentration ratios can be assessed from sales figures and other data, and competitive effects can be quantitatively measured.

How can we assess competitive effects where no goods are being produced, but rather where R&D is the "product"? Some question whether innovation market analysis adds any new insights to antitrust theory.[4] My view is that innovation analysis does not require any radical departure from the traditional tools we use in antitrust analysis. We need, rather, a theoretical refinement to understand this important facet of competition. However, the best way for the Commission to proceed in investigating mergers involving innovation markets is

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[3] See Robert Pitofsky, "Proposals for Revised United States Merger Enforcement in a Global Economy," 81 Geo. L.J. 195, 243 (1992). For an extensive discussion of innovation markets and merger analysis, see Richard J. Gilbert & Steven C. Sunshine, "Incorporating Dynamic Efficiency Concerns in Merger Analysis: The Use of Innovation Markets," 63 Antitrust L. J. 569 (1995).

[4] See, e.g., Robert P. Taylor, "Pilkington, Microsoft, and S.C. Johnson Signal a Policy Shift at DOJ," Antitrust 23, 27 (Fall 1994).

case-by-case, after an investigation of relevant facts that support a plausible anticompetitive theory.[5]

The idea of innovation competition is by no means a new one: antitrust has been grappling with competition involving research and development for some time now. In the seminal *Alcoa* antitrust case, Judge Learned Hand recognized the benefits of competition in fostering innovation. He explained that:

> possession of unchallenged economic power deadens initiative, discourages thrift and depresses energy; that immunity from competition is a narcotic, and rivalry a stimulant, to industrial progress; that the spur of constant stress is necessary to counteract an inevitable disposition to let well enough alone.[6]

Innovation was also addressed by Judge Bork in a challenged merger of producers of aircraft transparencies. In that case, FTC v. PPG Industries, Inc.,[7] Judge Bork approved a product market definition of aircraft transparencies requiring high technology to produce. Although he did not actually find a market for innovation separate from one for goods, he did note the importance of competition at the innovation stage.

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[5] Jonathan Baker has similarly suggested that case-by-case analysis is probably the best way to judge competitive effects in innovation markets. Jonathan B. Baker, "Fringe Firms and Incentives to Innovate," 63 Antitrust L. J. 621, 641 (1995).

[6] United States v. Aluminum Co. of Am., 148 F.2d 416, 427 (2d Cir. 1945).

[7] 798 F.2d 1500 (D.C. Cir. 1986).

Congress recognized the importance of competition at the research and development stage in 1984, when the National Cooperative Research Act was enacted.[8] The statute directs that evaluation of the competitive effects of certain cooperative research ventures should include "all relevant factors affecting competition, including, but not limited to, effects on competition in properly defined, relevant research, development, product, process, and service markets."[9]

I also believe that it is important to evaluate innovation markets in order to understand all of the dimensions of competition among firms. It is often the case that a merger that may retard innovation will also involve a highly concentrated goods market. For example, where only current goods market participants are likely to have the necessary specialized assets or technical expertise to innovate, the cast of innovators is likely to be the same as the current goods market participants. Hence, the loss of innovation may be largely captured by the market concentration in the goods market alone.[10] However, assessing an innovation market may be necessary in order to gain a full understanding of all of the ramifications of competition. For example, some of the current producers of goods may not have the

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[8] In 1993 Congress revised this law, adding certain cooperative production ventures, as well as cooperative research ventures, to the law's coverage and renamed it the "National Cooperative Research and Production Act." See Pub. L. No. 103-42 (1993).

[9] 15 U.S.C. § 4302 (1984) (emphasis added).

[10] Note, however, that analysis of research and development, in addition to analysis of the goods market, may be still be necessary to gain a full appreciation of all of the competitive ramifications of a merger. For example, analysis of innovation market competition may impact on the extent and nature of the remedy that is necessary to restore competition in all the markets.

technical know-how or be able to acquire it through licensing. Consequently, although a goods market may appear to be competitive, the market for innovation may, in fact, be highly concentrated. In addition, the innovation may be for a radically new technology or good, in which case the innovation market may be only tangentially connected to the existing goods market.

Product market definition, of course, is different in the innovation context. Unlike the currently-existing goods market, there is no price data, and the ability to ask hypothetical questions regarding an increase in price. Determining the exact parameters of a relevant product market without hard quantitative information is not a problem unique to innovation markets. Often in an existing goods market, the data may be limited to qualitative information. In the innovation context, the product market consists of research and development directed to particular new or improved goods or processes, and the close substitutes for that research and development. The critical question is to determine what specialized research and development assets or technical expertise are necessary to innovate successfully. Close substitutes are research and development efforts and goods that would significantly constrain the exercise of market power with respect to the relevant research and development, for example, by limiting the ability of a hypothetical monopolist to retard the pace of research and development in a significant way. Of course, because some aspects of successful innovation are based on factors such as marketing ability and reputation, ownership of research assets like laboratories and scientists will not alone answer the product market question.

Commentators have raised concerns that identifying the actual innovators and market shares may be difficult because innovation cannot be easily observed or measured. Although identifying participants and assigning market shares is sometimes tricky, we have found that information on innovation markets is typically not extremely difficult to obtain.

First, innovation is often driven by demand and the "customers" of the innovation may have useful information on the participants in the market. There may be organized efforts by downstream buyers, including the government, to press upstream manufacturers to engage in research and development of new products. For example, medical professionals may be engaged in monitoring research developments for new medical devices or medical procedures and thus may have extensive unbiased information about the companies engaged in a particular innovation. Also, downstream buyers' associations may be actively engaged in pressing upstream companies to innovate by, for example, conducting competitions among innovators. These associations can provide antitrust enforcers with extensive unbiased information about the number and quality of the innovators in a particular market.

Second, intellectual property assets, particularly patents, are often publicly available and competitors are usually aware of them. Patents not only disclose who is in the innovation market but can also tell a great deal about the research path that the particular innovator is taking.

Third, firms sometimes choose to make their research and development public in order to generate market interest in and build consumer demand for a particular innovation. Indeed, firms sometimes brag openly in newspaper and trade press articles about their plans to research and develop new products or processes.

Although determining exact market share is theoretically possible, it may not be practical. Such determinations often will be qualitative, rather than quantitative. However, the inability to quantify market shares with absolute precision is not a bar to the inquiry. The National Cooperative Research and Production Act, by providing for limited immunity for joint ventures in markets with more than four participants, recognizes that, in innovation markets, the best we may be able to do is identify participants and obtain a qualitative sense of their relative competitive strengths in research and development.[11] Moreover, much of the qualitative information will have a quantitative basis. For example, by comparing the amount of research and development money spent each year by different innovators or the

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[11] In enacting the National Cooperative Research Act, Congress indicated that the existence of four or more comparable R&D ventures would generally be sufficient to insulate an R&D joint venture from antitrust condemnation. H.R. Conf. Rep. No. 1044, 98th Cong., 2d Sess. 10, reprinted in 1984 U.S. Code Cong. & Admin. News 3105, 3134-35. The Department of Justice's 1988 Antitrust Enforcement Guidelines for International Operations relied on this legislative history in discussing the likelihood of anticompetitive effects from research and development joint ventures. U.S. Department of Justice, Antitrust Enforcement Guidelines for International Operations, 52-53 & n.236 (1988). It should be noted, however, that the legislative history also registered concern with always relying exclusively on numerical indicators. When Congress added certain cooperative production ventures to the Act's coverage in 1993 and renamed it the National Cooperative Production and Research Act, a House Report noted that "basing ... market power determinations exclusively on numerical measures would ignore the reality of the indeterminacy of defining many new and uncharted markets for future technologies." H.R. Rep. No. 94, 103d Cong., 1st Sess. 15, reprinted in 1993 U.S. Code Cong. & Admin. News 176, 188.

number of engineers working on a particular project, antitrust enforcers will be able to work from a quantitative basis in determining the relative competitive strengths of the innovators.

Product market definition, of course, does not end merger analysis in an innovation market. We also examine the possibility of an anticompetitive effect as a result of the merger. We look at two types of anticompetitive effects in analyzing mergers: unilateral effects and effects from collusion or coordinated interaction. These concepts apply to innovation markets as well as markets for currently-existing goods.

Unilateral anticompetitive effects result when the newly merged entity has sufficient "market power" to unilaterally reduce innovation or abandon promising alternative technological approaches. For example, a unilateral anticompetitive effect is possible in a merger of the only two companies involved in research and development on a particular innovation or in a merger leading to the formation of a dominant researcher. The past behavior of firms may also help in determining whether a unilateral anticompetitive effect is probable. If a firm has a history of acquiring competitors with innovative and seemingly successful research projects and then terminating those projects, for example, it may be likely to do so again.

Collusion or coordinated interaction -- as opposed to unilateral action by a company with market power -- is another possible anticompetitive scenario. On the one hand, some factors may reduce the likelihood of collusion in innovation markets. In circumstances where

much research is conducted in secret and a major innovation could completely disrupt existing competitive relationships, detection and punishment of cheaters from a collusive scheme to reduce levels of research and development would be difficult.

On the other hand, incentives to reduce research and development may be great and collusion may result.[12] For example, parties may agree on a particular research track to pursue.[13] Innovators may be developing different technologies in a competitive race toward what may, but not necessarily will, become the predominant research track. This may create an incentive to agree on a common research approach so that no one's research is rendered unusable.

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[12] Collusion over innovations has been the subject of enforcement efforts in the past. For example, in 1969, four automobile manufacturers and their trade association entered into a consent decree with the Justice Department under which they were prohibited from conspiring to prevent or limit the development, manufacture, installation, distribution, or sale of air pollution emission control equipment. United States v. Automobile Mfr's Ass'n, 1969 Trade Cas. (CCH) ¶ 72,907 (C.D. Cal. 1969). Yao and DeSanti provide a fuller description of allegations that, in the 1960's, the automobile companies may have found ways to reduce competition in developing pollution control device technologies as part of a larger effort to forestall government regulations mandating usage of such devices. Dennis A. Yao & Susan S. DeSanti, "Innovation Issues Under the 1992 Merger Guidelines," 61 Antitrust L. J. 505, 516-17 (1993).

[13] Yao & DeSanti note the possibility of coordination over types of research. Yao & DeSanti, supra n.12, at 516. These theories of collusion should be distinguished from competitors joining together to set a common standard. Such standard-setting activities are generally procompetitive. By contrast, these theories of collusion involve situations where it is not clear that a common standard is either necessary or desirable and competitors are seeking, through merging and colluding, to eliminate promising alternative tracks of research in order to impose, by collusion, a standard research track.

This incentive to collude may increase depending on the type of current assets innovators now hold. For example, consider a situation where innovators have an installed base for their currently-existing goods and that base has limited compatibility with other technologies. Buyers are demanding an innovation which may not require a change in the installed base, but could create a dominant technology. In such a situation, an innovator may fear that broad adoption of a rival's alternative technology will make its innovation research valueless and render its current installed base unusable. Hence, there may be even greater incentives to agree on one technological research track so that no one competitor's installed base is rendered unusable. The competitors could also agree that the research track be one that is compatible with all existing technologies. This could lead to an anticompetitive result if alternative technologies that could have provided even greater benefit to consumers are shelved as a consequence of the agreement.

Any analysis of an innovation market merger is not complete without a careful look at possible efficiencies of the merger in fostering innovation. First, a merger may eliminate unnecessary and redundant R&D and help reduce the costs of innovation. Second, a merger may help exploit scale economies or the merging firms may have complementary R&D assets. Efficiencies arguments must, as always, be supported by evidence that the efficiencies are real and that they are merger-specific. For example, such arguments can sometimes obscure important differences between the two companies' research efforts. Care must always be taken to ensure that mergers do not lead to the possible loss of a significant alternative research track.

With these principles in mind, I want to turn to some examples of recent FTC cases involving innovation markets. In a proposed consent agreement with American Home Products Corporation (AHP) regarding its acquisition of American Cyanamid Company, the Commission considered an innovation market consisting of research and development of a rotavirus vaccine.[14] Rotavirus is a diarrheal disease that causes thousands of childrens' deaths annually; finding a vaccine is vitally important to stop the spread of this disease. In the complaint, the Commission alleged that a market exists for the research and development of rotavirus drugs in which AHP and Cyanamid are two of only three competitors with research projects either in or near the clinical trial stage. Moreover, Cyanamid's project was using a different research approach than that of the other two companies' projects, holding out the possibility of a superior vaccine. To assure that both the AHP and Cyanamid rotavirus projects continue independently, the consent agreement requires AHP to license Cyanamid's vaccine research to a Commission-approved licensee and provide the licensee with certain technical assistance. In this way, the Commission sought to ensure the continuation of different approaches to developing this important vaccine which will hopefully speed the day when a vaccine is found.

In a recent proposed consent agreement with Wright Medical Technology regarding its acquisition of Orthomet, Inc., the Commission considered an innovation market consisting

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[14] American Home Products Corp., FTC File No. 941-0116 (Consent agreement accepted for public comment, Nov. 9, 1994).

of next-generation finger implants.[15] The current finger implant market was allegedly highly concentrated, with Wright having a 95% share of the market. Although Orthomet did not have a finger implant product on the market, it had exclusive licensing contracts with the Mayo Clinic for clinical trials of next-generation finger implants. Although the next-generation finger implants could compete with Wright's current products, the more likely scenario was a leapfrogging-type of innovation that would render most current products essentially obsolete. The Commission alleged in its complaint that the acquisition would prevent the entry of Orthomet as a competitor to Wright's finger implants and reduce competition in research and development of next-generation implants. The proposed consent agreement requires that Wright transfer to the Mayo Foundation copies of the current Orthomet/Mayo research information and grant Mayo a license to those assets with the right to sublicense them in perpetuity. The proposed consent order is intended to free the Mayo Foundation to find another non-exclusive licensee, in addition to Wright, to develop orthopaedic implants used or intended for use in human hands. In this way, both Wright and a new Mayo Clinic licensee will be able to continue competing for next-generation finger implants.

Finally, a case that provides a good example of the importance of innovation markets in understanding all of the ramification of competition is the Commission's proposed consent agreement with Sensormatic Electronics Corporation regarding its proposed acquisition of

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[15] Wright Medical Technology, Inc., FTC File No. 951-0015 (Consent agreement accepted for public comment, Dec. 8, 1994).

certain assets of Knogo Corporation.[16] Both companies now manufacture electronic-article surveillance systems used by retailers to reduce shoplifting for non-apparel products. The companies produce labels to be placed on items manually by retailers as well as surveillance systems that are installed in individual retail outlets to detect those labels. These systems are currently based on different technologies. Both companies also are developing labels for use in these systems that will be sturdier, less costly and that will meet other performance criteria so that they can be installed by manufacturers ("source labelling"), rather than manually by retailers. It comes as no surprise that retailers have been interested in fostering efforts to innovate toward source labelling. Because manufacturers, as opposed to individual retailers, place these new labels on products, an innovation may or may not affect the viability of the companies' current installed base of electronic surveillance systems, depending on whether the source label is compatible with existing technologies.

In the acquisition, Sensormatic proposed to acquire, inter alia, Knogo's developmental source label called "SuperStrip." A successor to Knogo would be spun off and that independent successor would continue to compete in the existing goods market as well as have a nonexclusive license to the SuperStrip technology. Sensormatic and Knogo's independent successor planned to grant royalty-free cross licenses to one another for any improvements to patents or trade secrets related to SuperStrip. The complaint contains no allegation of any anticompetitive effect in the currently-existing market for manually-applied

[16] Sensormatic Electronics Corp., FTC File No. 941-0126 (Consent agreement accepted for public comment, Jan. 4, 1995) (Comm'r Azcuenaga, concurring in part and dissenting in part).

labels and electronic systems. Rather, the complaint focusses on the market for research and development of source labelling. The complaint alleges that the innovation market is highly concentrated and that the acquisition could reduce research and development for source labels by decreasing the number of tracks on which such research development is taking place and increasing Sensormatic's ability to unilaterally reduce the research and development for these labels and manufacturing processes. The complaint also alleged that the royalty-free cross license could reduce the successor Knogo's incentive and Sensormatic's incentive to improve the SuperStrip technology.[17]

Under the proposed consent agreement, Knogo's independent successor would retain the SuperStrip assets. Sensormatic will, however, be able to obtain a non-exclusive license for the current SuperStrip technology, but not a license for improvements in SuperStrip technology. In this way, both companies will be able to reap the sole rewards of their own improvements to the SuperStrip technology. The effect of this consent agreement, then, is to preserve the continued incentives of both Sensormatic and Knogo's independent successor to improve the SuperStrip technology.

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[17] The draft intellectual property guidelines recognize that "grantback" arrangements, depending on the particulars of the arrangement, may possibly reduce incentives of licensees to innovate. Draft Intellectual Property Guidelines, § 5.6. Of course, such a provision, again depending on the particulars of the arrangement, may increase the incentives of the licensors to license, a beneficial outcome. In assessing the competitive effects of such licensing arrangements, antitrust enforcers must look at the overall competitive effects of such a license.

Even where the competitive effects of a merger can be adequately analyzed by focussing on the existing goods market, innovation market analysis can still aid enforcers in fashioning the most procompetitive remedy possible. The Commission's recent proposed settlement with Boston Scientific highlights this point.[18] Boston Scientific wished to acquire its leading competitor in the intravascular ultrasound (IVUS) imaging catheter business, Cardiovascular Imaging Systems, Inc. ("CVIS"). Thereafter, Boston Scientific also sought to acquire SCIMED Life Systems, Inc., which allegedly was within two to three years of introducing its own IVUS catheter. IVUS catheters are used in the diagnosis and treatment of heart disease. By using IVUS, cardiologists can generate an ultrasound image of the inside of arteries, providing detailed information useful in diagnosis and treatment.

In January, the FTC filed a complaint in federal court in Washington, D.C., seeking an injunction to block Boston Scientific's acquisition of CVIS. According to the complaint, the Boston Scientific/CVIS transaction would give the merged company 90 percent of the domestic IVUS catheter market, with Endosonics Corporation as its only competitor. Endosonics' market share has dropped in recent years, the complaint states. The complaint also notes that entry is very difficult in this market. An administrative complaint filed at the time of settlement also alleged that the acquisition of SCIMED may substantially lessen competition. Although SCIMED was not currently producing IVUS catheters, it had conducted substantial research and development in the IVUS field and had developed a

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[18] Boston Scientific Corp., FTC File No. 951-0002 (Consent agreement accepted for public comment, Feb. 24, 1995) (Commissioner Azcuenaga, concurring in part and dissenting in part).

prototype imaging guidewire, making it a likely entrant into the market within two to three years, the FTC alleged.

In the proposed settlement, Boston Scientific would grant a broad royalty-free, non-exclusive license to use its own patents and the acquired two companies' patents and technology to a new entrant in the IVUS catheter market. Boston Scientific would also give the licensee non-patented research and development of CVIS and SCIMED related to imaging guidewire technology. Hewlett-Packard Company, which currently makes computer consoles that are used in conjunction with Boston Scientific's IVUS catheter, is a pre-approved licensee. The concept behind the settlement is to launch a strong, independent competitor in the U.S. IVUS catheter market. The settlement gives the licensee a wider array of patents and research and development, including Boston Scientific's own patents, than is normally required in licensing remedies. There was, however, a history of patent and licensing disputes in this market. Boston Scientific and CVIS had been engaged in protracted patent litigation, and CVIS and SCIMED had been involved in arbitration over a licensing agreement. The companies had, in fact, continued to compete on innovation over time, but the history of patent litigation had arguably rendered that competition less robust than it otherwise would have been. Given this history and what appeared to be a minefield of patents obstructing competition on innovation, the order was crafted in order to ensure that the licensee would be able to undertake future research and development from a strong technology portfolio, free of any possible dispute or cloud.

The American Home Products, Wright, Sensormatic and Boston Scientific investigations all demonstrate that the concept of an innovation market is vitally important in understanding all the ramifications to competition of a merger. Those consent agreements also, in my view, represent sound antitrust analysis grounded in relevant factual investigation. Again, however, it seems to me that innovation competition can only be judged on a case-by-case basis, after an investigation of the relevant facts in the light of plausible anticompetitive theories.