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### Restraints on Innovation

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# RESTRAINTS ON INNOVATION

*Herbert Hovenkamp\**

## INTRODUCTION

For many years courts and other writers have spoken about the “conflict” that exists between antitrust policy and the intellectual property laws. For example, in a 1981 decision involving Xerox and SCM the Second Circuit wrote:

The conflict between the antitrust and patent laws arises in the methods they embrace that were designed to achieve reciprocal goals. While the antitrust laws proscribe unreasonable restraints of competition, the patent laws reward the inventor with a temporary monopoly that insulates him from competitive exploitation of his patented art.<sup>1</sup>

In fact, this conflict is readily exaggerated and in the great majority of disputes involving competition policy and IP rights it simply does not

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\* Ben V. & Dorothy Willie Professor of Law, University of Iowa. This is the Bauer Lecture, presented March 29, 2007, at Cardozo Law School, New York, NY.

<sup>1</sup> SCM Corp. v. Xerox Corp., 645 F.2d 1195, 1203 (2d Cir. 1981); see also Int'l Wood Processors v. Power Dry, Inc., 792 F.2d 416, 426 (4th Cir. 1986):

Since patent law grants a patent holder the right to exclude others for a period of seventeen years, the property right thereby created is often referred to as either a limited or patent monopoly. Even though the patent statute does not describe a patent as a “monopoly,” the exclusive rights granted to a patent holder permit exploitation of the patent free from competition for seventeen years and amount to no less however called. Thus, there may be conflict between the patent laws on the one hand, which encourage monopoly power by granting patent holders the right to exclude and be free from competition, and the antitrust laws, on the other hand, which generally proscribe monopoly and encourage competition.

(citations omitted); *Deflecta-Shield Corp. v. Kar-Rite Corp.*, No. 85 C 5743, 1986 WL 4186, at \*2 (N.D. Ill.1986):

There is a natural conflict between patents and antitrust laws. A patent confers a monopoly upon the patent holder to make, use and sell the invention or discovery for seventeen years, while the principal aims of the antitrust laws are to prevent attempts and conspiracies to monopolize and combinations and contracts in restraint of trade.

On copyright, see *Data Gen. Corp. v. Grumman Sys. Support Corp.*, 36 F.3d 1147, 1152 (1st Cir. 1994):

The antitrust claims are intriguing because they present a curious conflict, namely, whether (and to what extent) the antitrust laws, in the absence of any statutory exemption, must tolerate short-term harm to the competitive process when such harm is caused by the otherwise lawful exercise of an economically potent “monopoly” in a copyrighted work.

exist.

Analysis of antitrust challenges in markets implicating IP rights should ordinarily proceed in this way. First, one must determine whether there is a reasonable basis for believing an antitrust violation has occurred. Many older decisions had exaggerated views about the power conferred by patents, or else they tended to overreach on issues of antitrust substance.<sup>2</sup> If there is no antitrust violation then one needs to go no further in assessing the existence of an antitrust/IP conflict.

Second, assuming that a reasonable basis for an antitrust violation exists one must further consider whether any IP policy serves to subvert the antitrust claim or change its nature. Most often the answer is no. *Walker Process* provides a good example.<sup>3</sup> The antitrust violation in that case consisted in the filing of a patent infringement suit against a rival when the suitor knew or should have known that the patent was fraudulently obtained and unenforceable. Although patent law entertains a presumption of patent validity (although not infringement), there simply is no patent policy of encouraging infringement suits or otherwise giving recognition to fraudulently obtained patents. As a result, there is no conflict between antitrust and patent policy and the antitrust action can proceed.

There will then be a small number of cases in which both a plausible antitrust claim and a countervailing IP policy are present.<sup>4</sup> But if the analysis proceeds carefully, the opportunities for such "balancing," if that is what we want to call it, should be rare.

But the topic for today deals with situations in which there should be little conflict between antitrust and IP policy. These are practices that serve to restrain rather than promote innovation. For example, suppose that a large firm files a patent infringement suit against a much smaller new entrant with innovative technology. The dominant firm is reasonably sure that the new entrant's technology does not infringe the dominant firm's patents, but it also knows that a nascent rival cannot afford years of infringement litigation, particularly if it is accompanied by such things as letters warning the small firm's customers that if they use the small firm's product they will be infringers as well. In this case the dominant firm might succeed in suppressing a superior technology

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<sup>2</sup> See, e.g., *Int'l Salt Co. v. United States*, 332 U.S. 392 (1947) (aggressive condemnation of tying in the absence of any showing of market power, when tying product was patented); *United States v. Loew's, Inc.*, 371 U.S. 38 (1962) (similar; copyright). Both decisions were overruled by *Ill. Tool Works, Inc. v. Indep. Ink, Inc.*, 126 S. Ct. 1281 (2006). See 2B PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* § 518 (3d ed. 2007) (forthcoming).

<sup>3</sup> *Walker Process Equipment, Inc. v. Food Machinery & Chemical Corp.*, 382 U.S. 172 (1965); See 3 PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* § 706 (2d ed. 2001).

<sup>4</sup> One example is *United States v. Gen. Elect. Co.*, 272 U.S. 476 (1926), which approved a price-fixing agreement between a licensor and licensee of a patent. See 12 HERBERT HOVENKAMP, *ANTITRUST LAW* § 2041 (2d ed. 2004).

by using the patent infringement system in an anticompetitive manner.

Or to take a more well known example, the *Microsoft* case produced evidence concerning Microsoft's response to a threat that Bill Gates himself described as the "commoditizing" of the computer operating system market, in which Microsoft Windows was the dominant player.<sup>5</sup> To oversimplify a bit, the threat came from the Netscape internet browser, which contained certain operating system functions within its own program and a program called Java developed by Sun Microsystems rather than relying exclusively on Windows. Java is a computer language that is still used in many internet applications today. One of Java's features was its multiplatform capabilities. Programs written in the Java language could be made to run on different hardware configurations and different operating systems.<sup>6</sup> The way that Java worked was that each computer that was enabled to run Java programs would employ a "java virtual machine,"<sup>7</sup> which was an intermediate or "middleware"<sup>8</sup> program that acted as a sort of interpreter of the Java program, translating it into language that the host computer could understand. Theoretically, one could have numerous different computers with largely incompatible hardware configurations and operating systems. The writer of an applications program such as a word processor or database could write the program to Java, and the Java virtual machine on each host computer would translate that program's code so that it could be run on that computer. As a result, "write once, run anywhere"<sup>9</sup> became a Java slogan. Java is used today, and permits computers with otherwise incompatible operating systems to access and run the same internet website programs.<sup>10</sup>

In the mid-1990s Java presented a major threat to Microsoft, and Gates warned his employees that it could lead to the "commodification" of the operating system.<sup>11</sup> More realistically, the threat was that Java could produce a market in which different operating systems sold by different vendors could run the same software, and thus claim all of the network advantages that had made Windows so extraordinarily

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<sup>5</sup> See *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 29 (D.D.C. 1999), *aff'd in part, rev'd in part*, *United States v. Microsoft Corp.*, 253 F.3d 34 (D.C.Cir. 2001), *cert. denied*, 534 U.S. 952 (2001).

<sup>6</sup> See *Microsoft*, 84 F.Supp.2d at 29 ("A program written in Java and relying only on APIs exposed by the Java class libraries will run on any PC system containing a JVM that has itself been ported to the resident operating system.").

<sup>7</sup> *Microsoft*, 253 F.3d at 74; *Microsoft*, 84 F. Supp. 2d at 29.

<sup>8</sup> *Microsoft*, 253 F.3d at 53-54; *Microsoft*, 84 F. Supp. 2d at 17-18.

<sup>9</sup> *Microsoft*, 84 F. Supp. 2d at 29.

<sup>10</sup> See generally JAMES GOSLING, BILL JOY, GUY STEELE, & GILAD BRACHA, *THE JAVA LANGUAGE SPECIFICATION* (3d ed. 2005).

<sup>11</sup> See *Microsoft*, 84 F. Supp. 2d at 29 (describing intra-firm memorandum by Bill gates entitled "The Internet Tidal Wave," warning them that Netscape was "pursuing a multi-platform strategy" that might "commoditize the underlying operating system").

successful. These network advantages were that Windows was more attractive to users because there were more of them than any other operating system enjoyed, and compatibility among users is of course highly valued. Further, on the supply side a large installed base ensured that software would have a larger market. As a result, software developers were more willing to write software for Windows than for less popular operating systems, and software written to Windows could be sold at a significantly lower price. Microsoft's dominance depended on its ability to take full advantage of all of these network efficiencies, while ensuring that no other operating manufacturer could successfully get on the network.

Java threatened to undermine these advantages not by supplanting Windows, but by making it compatible with other operating systems so that all could operate on the same network. The threat was that Java software would create a product differentiated market such as the market for telephone long distance service, in which products are distinguishable but nevertheless compete with each other on both price and features, and on a common network. Customers can buy the one that gives them the optimal combination of price and performance. In such a market Microsoft would have been forced to behave as a competitor rather than a monopolist, and this would undoubtedly have led to lower revenues as well as increased investment in maintaining a Windows product that was attractive to buyers who had opportunities to purchase elsewhere.

So Microsoft launched a campaign to undermine the development of multi-platform Java. It had already licensed Java from Sun Microsystems, but then it developed an alternative version of Java, internally named "polluted Java," which it distributed to firms that wrote software for Windows computers. Polluted Java lacked traditional Java's cross-platform capability.<sup>12</sup> Microsoft then provided

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<sup>12</sup> See *Microsoft*, 253 F.3d at 76-77 (describing Microsoft strategy to "kill cross platform Java by grow[ing] the polluted Java market," and noting that "[c]ross-platform capability is by far the number one reason for choosing/using Java"). See also *id.* at 74 (noting that Microsoft's Java Virtual Machine allowed Java applications to run faster but was incompatible with non-Microsoft JVM's). See also Judge Jackson's fact findings:

389. Since [Microsoft-developed JVMs] were custom-built for enabling native calls to Windows, and because they were developed by the firm with the most intimate knowledge of Windows, the native methods that Microsoft produced were slightly easier for developers to use than the method that derived from the Sun-sponsored effort, and Java applications using Microsoft's methods tended to run faster than ones calling upon Windows APIs with Sun's method. If a developer relied on Microsoft's methods rather than Sun's, however, his Java application would be much more difficult to port from the Windows-compatible JVM to JVMs designed to run on different operating systems.

390. Microsoft easily could have implemented Sun's native method along with its own in its developer tools and its JVM, thereby allowing Java developers to choose between speed and portability; however, it elected instead to implement only the Microsoft

its own development tools, including its polluted version of Java, to software developers. Some software developers were even deceived into believing that they were writing software that would work on cross-platform Java and would be compatible with a wide variety of operating systems, when in fact the software would work only on Windows system.<sup>13</sup>

Most importantly, in order to make cross-platform Java run effectively, Sun Microsoft and its partners needed a computer chip that was designed for that purpose. Intel initially agreed to develop a so-called "Java-enabled" chip. However, then Microsoft placed intense pressure on Intel, basically threatening to deny it support for development of Windows technology if it went ahead with its Java program.<sup>14</sup> Intel then abandoned the program.<sup>15</sup>

What characterizes these acts is that they were calculated to enable Microsoft to retain its dominant position in the market for operating

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methods. The result was that if a Java developer used the Sun method for making native calls, his application would not run on Microsoft's version of the Windows JVM, and if he used Microsoft's native methods, his application would not run on any JVM other than Microsoft's version. Far from being the unintended consequence of an attempt to help Java developers more easily develop high-performing applications, incompatibility was the intended result of Microsoft's efforts. In fact, Microsoft would subsequently threaten to use the same tactic against Apple's QuickTime. Microsoft continued to refuse to implement Sun's native method until November 1998, when a court ordered it to do so. It then took Microsoft only a few weeks to implement Sun's native method in its developer tools and JVM.

*Microsoft*, 84 F. Supp. 2d at 105-06.

<sup>13</sup> See *Microsoft*, 253 F.3d at 76-77 (citing Microsoft documents indicating that it "intended to deceive Java developers, and predicted that the effect of its actions would be to generate Windows-dependent Java applications that their developers believed would be cross-platform; these documents also indicate that Microsoft's ultimate objective was to thwart Java's threat to Microsoft's monopoly in the market for operating systems"); see also *Microsoft*, 84 F. Supp. 2d at 107.

<sup>14</sup> See *Microsoft*, 253 F.3d at 77-78 (noting Microsoft threats to Intel to refuse to distribute Intel technologies bundled with Windows unless Intel ceased development of a cross-platform Java enabled chip). See also *Microsoft*, 84 F. Supp. 2d at 107 (noting that "Gates himself" was involved in the coercion of Intel); *id.* at 109-10.

<sup>15</sup> See *Microsoft*, 253 F.3d at 77:

The District Court held that Microsoft also acted unlawfully with respect to Java by using its "monopoly power to prevent firms such as Intel from aiding in the creation of cross-platform interfaces." In 1995 Intel was in the process of developing a high performance, Windows-compatible JVM ["Java Virtual Machine," or environment in which Java acted as channel between software and alternative operating systems] Microsoft wanted Intel to abandon that effort because a fast, cross-platform JVM would threaten Microsoft's monopoly in the operating system market. At an August 1995 meeting, Microsoft's Gates told Intel that its "cooperation with Sun and Netscape to develop a Java runtime environment . . . was one of the issues threatening to undermine cooperation between Intel and Microsoft." Three months later, "Microsoft's Paul Maritz told a senior Intel executive that Intel's [adaptation of its multimedia software to comply with] Sun's Java standards was as inimical to Microsoft as Microsoft's support for non-Intel microprocessors would be to Intel."

*Id.* at 77 (citations to record and fact findings omitted) (agreeing with district court that this conduct violated section 2 of the Sherman Act).

systems for Intel-based personal computers. And of course, Microsoft could have attempted to do this by developing better and more capable versions of Windows. Innovation itself can lead to monopoly positions, and we generally applaud it when it does so. But these acts can hardly be characterized as innovation by Microsoft. Rather, Microsoft was engaged in suppressing the innovations of others.

### I. THE SOCIAL COST OF INNOVATION RESTRAINTS

The social costs of at least some exclusionary practices involving intellectual property rights may loom larger when we consider them as innovation restraints rather than price or output restraints. For example, so-called *Walker Process*<sup>16</sup> claims refer to a variety of practices by which a firm either acquires or enforces an IP right unreasonably, perhaps because it obtained the patent fraudulently, as when it failed to disclose prior art; or perhaps because it relied on a deficient legal theory.<sup>17</sup> Of course, many of these claims are either frivolous or not worthy of a great deal of further thought. But improper infringement suits can in fact be the mechanism by which a dominant firm keeps smaller innovators, and thus their innovations, out of the market.<sup>18</sup>

Not all restraints on innovation are monopolistic acts by a single firm. Cartels have also used such restraints, either to limit their own investments or, as in *Allied Tube*, to exclude innovative newcomers from the market. A good example is the *Allied Tube* decision, which went to the Supreme Court in 1988.<sup>19</sup> The defendants were manufacturers of steel electric conduit and also members of a standard setting organization called the National Fire Protection Assn (NFPA), which set construction standards for municipal building codes. The organization was very influential, and many municipalities incorporated its standards into their building codes virtually verbatim. As a result, for a manufacturer of building components to be excluded by the standards set by NFPA was tantamount to being excluded from the market altogether. The plaintiff Indian Head had innovated plastic electric conduit made from polyvinyl chloride, or PVC. PVC conduit had considerable advantages over steel conduit. It was cheaper and much easier to work with because it could be cut with a knife and fit together with glue. And it did not short out if it came into contact with

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<sup>16</sup> *Walker Process Equip., Inc. v. Food Mach. & Chem. Corp.*, 382 U.S. 172 (1965).

<sup>17</sup> See, e.g., *Proff'l Real Estate Investors v. Columbia Pictures Indus.*, 508 U.S. 49 (1993).

<sup>18</sup> See, e.g., *Nobelpharma v. Implant Innovations, Inc.*, 141 F.3d 1059 (Fed. Cir.), cert. denied, 525 U.S. 876 (1998).

<sup>19</sup> *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492 (1988); see 13 HERBERT HOVENKAMP, *ANTITRUST LAW* § 2220b (2d ed. 2005).

an exposed wire. The antitrust dispute arose when Allied Tube and its co-conspirators packed a standard setting meeting with people who voted to disapprove PVC conduit.<sup>20</sup> They succeeded in winning the vote, although only until the subsequent antitrust suit which exposed the effort.

Restraints on innovation are unquestionably a concern of antitrust policy, but enforcement has never been as strong as it should be. On the one hand, it seems clear that the social losses that result from innovation restraints are immense. On the other hand, identifying anticompetitive innovation restraints has proven to be very difficult and development of suitable remedies even more problematic.

Writing in the 1940s, the economist Joseph Schumpeter chided the economists of his generation for constructing economic models that were overly concerned with the relationship between prices and costs, and that paid to little attention to innovation, which was the real engine of economic growth.<sup>21</sup> The neoclassical models typically assumed that products were static, and that competition meant a state of affairs in which prices were as close as possible to cost. But in fact, Schumpeter suggested innovation was far more important than competitive pricing for attaining economic process.

Working in the 1950s, Robert M. Solow, who later won a Nobel prize for his work, attempted to quantify Schumpeter's suggestion. Solow developed his notion of the "aggregate production function," or the "neoclassical growth model," which attempted to look at all of the sources of economic growth.<sup>22</sup> Solow concluded that as much of 90% of non-farm economic growth that occurred during the first half of the twentieth century resulted from innovation and technological advance rather than from capital accumulation, including the movement of markets toward greater competitiveness. While Solow's precise methodology and conclusions have been subject to a great deal of refinement,<sup>23</sup> today no one doubts his basic conclusion that innovation and technological progress very likely contribute much more to economic growth than policy pressures that drive investment and output toward the competitive level.

But the inverse of that statement is a corollary that antitrust has never fully appreciated: if innovation contributes so much more than competition to economic growth, then *restraints* on innovation very

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<sup>20</sup> See *Allied Tube & Conduit*, 486 U.S. at 496-97 (on the conspiracy and how it was carried out).

<sup>21</sup> JOSEPH SCHUMPETER, *CAPITALISM, SOCIALISM, AND DEMOCRACY*, at Ch. 7 (1942) ("creative destruction").

<sup>22</sup> Robert M. Solow, *Technical change and the Aggregate Production Function*, 39 *REV. ECON. STUD.* 32 (1957).

<sup>23</sup> For a summary of Solow's contribution and work since the 1950s, see FREDERIC M. SCHERER & DAVID ROSS, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 613-17 (3d ed. 1990).



likely produce a far greater amount of economic harm than classical restraints on competition. As a result, antitrust, with its heavy concern that prices be kept as close as possible toward cost, is often shooting at the wrong target. Restraints on innovation are very likely even more harmful than traditional price cartels, which we usually consider to be the most harmful anticompetitive practice. Innovation restraints are almost certainly more harmful than a great many of the exclusionary practices that antitrust has condemned, often without fully understanding them.

## II. ANTITRUST POLICY AND INNOVATION RESTRAINTS

Overwhelmingly, the explicit focus of American antitrust enforcement has been the reduction of monopoly pricing, whether by cartels or single firms. Likewise, merger policy is directed almost exclusively at concerns for higher prices. While the academic literature contains many arguments to the effect that antitrust should adopt a “general welfare” or “consumer welfare” standard, even this literature tends to equate welfare with competitive prices, or small margins between prices and costs. While recognition of efficiencies is a big issue in the academic literature, and somewhat less so in enforcement, the term “efficiencies” typically refers to cost reductions attained via such things as economies of scale or reductions in transaction costs. Further, the remedies that antitrust law recognizes are concerned almost exclusively with the impact of deviations of price from cost. This suggests several things:

First, a myopic but perfect policy of encouraging the optimal amount of innovation would very likely produce greater economic gains than a myopic but perfect policy of driving prices to marginal cost, or increasing investment up to the point that price equals cost. If this were the only relevant consideration, it suggests that antitrust should yield to IP policy any time there is a conflict.

Second, Schumpeter’s and Solow’s work were theories and observations about innovation, not about the existing legal regimes creating intellectual property rights. To the extent that IP law overprotects it may operate so as to stifle rather than further innovation. Today a growing body of literature suggests that we would be far better off with less patent and copyright protection than we have, in terms of both duration and scope, and perhaps the system that we have is no better than not having any protection at all.<sup>24</sup> But the important point is

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<sup>24</sup> For argument and a survey of the literature, see HERBERT HOVENKAMP, *United States Antitrust Policy in an Age of IP Expansion*, in *INTERNATIONAL ANTITRUST LAW & POLICY: FORDHAM CORPORATE LAW 225-41* (Barry Hawk ed., 2004). For other perspectives, see LAWRENCE LESSIG,

that the relationship between antitrust and IP is not concerned primarily with restraints on innovation. Indeed, in most antitrust/IP cases the antitrust concern is the same as it is in any other antitrust case—namely, the threat that a practice will lead to higher prices and reduced output.

Third, the poor fit between optimal innovation policy and our existing system of IP rights might serve to rebut any presumption that competition policy should yield to IP policy. Nevertheless, as a general problem, imperfections in the IP system are not of antitrust concern. Antitrust's job is not to correct flawed political processes or repair defective statutes. Rather, it has its own mandate, which is to identify and condemn restraints on competition insofar as Congress, or in some cases state and local government, have chosen not to regulate in a certain area.

Nevertheless, the fact remains that in innovation intensive markets antitrust has been overly concerned with the impact of practices on price, and insufficiently concerned with longer run effects on technological progress.

To be sure, this concern might be justified on administrative grounds. Above-cost pricing is a “short run” concern in that it looks for immediate price impacts, or perhaps in some cases, such as the law of mergers, joint ventures, or attempt to monopolize, for price effects that are likely to show up within a year or two. This almost exclusive antitrust concern with the “short run” is largely driven by administrative limitations: it is difficult enough for antitrust tribunals to estimate immediate or short-run price effects; assessing what might happen a few years down the road is virtually impossible. This is particularly true in private plaintiff judicial proceedings in the district courts, where much of the fact finding is undertaken by juries.

In addition, deviations from competitive pricing are much easier for tribunals to measure than impact on innovation. For most firms, costs are relatively stable and observable, and we have a great deal of useful theory about market structure and the relationship between cost and prices. To be sure, measurement difficulties abound. Assessing market power directly is often impossible, so we use the surrogate of defining a relevant market using rather rough criteria, and then

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FREE CULTURE: HOW BIG MEDIA USES TECHNOLOGY AND THE LAW TO LOCK DOWN CULTURE AND CONTROL CREATIVITY (2004); WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW*, at ch. 1 (2003); LAWRENCE LESSIG, *THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD* (2001); Robert P. Merges, *One Hundred Years of Solicitude: Intellectual Property Law, 1900-2000*, 88 CAL. L. REV. 2187, 2235 (2000); Adam B. Jaffe, *The U.S. Patent System in Transition: Policy Innovation and the Innovation Process*, 29 Res. Policy 531 (2000); JARED DIAMOND, *GUNS, GERMS & STEEL: THE FATES OF HUMAN SOCIETIES*, ch. 13 (1999); William F. Patry, *Copyright and the Legislative Process. A Personal Perspective*, 14 CARDOZO ARTS & ENT. L.J. 139, 141 (1996); Stephen G. Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies and Computer Programs*, 84 HARV. L. REV. 281 (1970).

computing market share. We generally cannot measure marginal cost directly, so the courts often use average variable cost or some other surrogate. Or to say it differently, even on the rather easy field we have created for ourselves, playing the antitrust game is difficult enough.

In very sharp contrast, the effects of innovation or of restraints on innovation cast us into territory where outcomes can be radically indeterminate. In many industries firms launch dozens of research projects anticipating that only a few will produce marketable, profitable results. But *ex ante*, they do not know which ones will succeed and which ones will fail.

The same thing is true of restraints on innovation. Assessing the impact of Microsoft's pressure on Intel to refrain from developing a Java-enabled chip requires assumptions about whether Intel would have succeeded in developing such a chip, what the market acceptance of the chip would have been, whether it would create sufficiently seamless multi-platform compatibility to produce the results that Bill Gates feared and, perhaps most speculative of all, how much better off consumers would be as a result.

Today the knowledge that innovation contributes more to economic growth than increased price/cost competition seems relatively secure. But studies of the aggregate production function such as Bob Solow's looked *backward* at innovations that had already occurred. Speaking *ex post* it might be relatively easy to say that the amount of growth contributed by innovation in a particular industry exceeded the amount contributed by investment in output expansion.

By the same token, speaking *ex post* it is relatively easy to say that Viagra, which was patented in 1996, contributed a great deal to the value of its developer, Pfizer Pharmaceuticals. But looking *ex ante* the research endeavor that led to Viagra was very likely one of dozens that were begun that year, only a small portion of which produced any market success at all.

As Schumpeter himself pointed out, the results of innovation are unexpected, sometimes radically so in the sense that the valuable result was not even within the range of what was intended. For example, the Viagra research project at Pfizer was intended to develop treatments for angina. Only after the product was developed and found to have little effect on angina did someone inadvertently discover its effectiveness in treating erectile dysfunction. Indeed, protracted erections were initially reported by Pfizer scientists as one of the "adverse" side effects of its intended angina treatment.<sup>25</sup>

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<sup>25</sup> See IAN H. OSTERLOH, *The Discovery and Development of Viagra (sildenafil citrate)*, in *SILDENAFIL 1, 3* (U. Duzendorfer ed., Burkhäuser Verlag 2004):

The origins of the project that eventually led to the discovery and development of Viagra date from around the mid-1980s. At this time, scientists working at the Pfizer

Further, innovation is extremely lumpy in the sense that of several projects requiring significant investment, most are unprofitable. Further, there is no good way to predict success *ex ante*. If there were then the projects that ended up being unsuccessful never would have been funded to begin with. As a result, speaking *ex post*, one can readily conclude that the gains from innovation are considerable; but *ex ante*, it is almost impossible to predict which innovation programs will succeed and how much social wealth they will produce.

The impact of these measurement difficulties in antitrust is severe, although it does depend to an extent on the stage of innovation at the time of the antitrust challenge. *Allied Tube* was a fairly easy case because PVC conduit was fully developed at the time the antitrust claim arose, and by the time of trial the standard excluding plastic had been rescinded and PVC conduit had already shown success on the market.<sup>26</sup> In that case we might be able to show not only actual injury but also damages as a result of the innovation restraint. For example, if the restraint delayed PVC conduit's market entry by two years, but then it earned quick market success it would not be terribly difficult to develop a model showing how much profit Indian Head would have earned during the two years that the restraint kept it off the market. If users of conduit wanted to sue they might be able to show how much better off they would have been had PVC conduit been made available.

The innovation restraints in *Microsoft* are an entirely different matter. When Microsoft pressured Intel to halt development of a Java-enabled chip, that chip was still under development. If the product subject to a restraint on innovation is never innovated at all as a result of the restraint, then we are probably in no better than a position than the managers of Pfizer predicting the success of the research product that became Viagra.

In general, predicting future price/output effects is far easier than predicting the effects of an innovation that remains inchoate. For

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European Research Centre were interested in potential new approaches to the treatment of several cardiovascular diseases. Angina was an indication of particular interest... In early clinical studies performed in 1991 and 1992, sildenafil [Viagra] ... was shown to modestly lower the blood pressure in healthy volunteers.... Moreover, sildenafil was found to interact with nitrates, with the combination leading to exaggerated decreases in blood pressure in some individuals. Because nitrates are frequently prescribed to men with angina, further development of sildenafil for the lead indication of angina would have significant hurdles to overcome. Furthermore, sildenafil had a relatively short half-life, and when administered three times per day to healthy volunteers, it was associated with several adverse events. One of these adverse events, reported for the first time in Clinical Study 148-207, was penile erection.

(citations omitted).

<sup>26</sup> See *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492, 497 n.1 (1988) (noting that NFPA approved PVC conduit for buildings of less than three stories in its 1984 Code, and for all buildings in the 1987 Code). In fact, today Allied Tube is itself a manufacturer of PVC conduit. See <http://www.alliedtube.com/electrical-raceways/conduit/pvc-conduit.asp> (last visited Jan. 21, 2007).

example, when automobile manufacturers fix prices we have pretty good theory to aid us in approximating the deviations that the cartel caused from the competitive price, and to base damages on that. But suppose the claim is that the automobile manufacturers agreed with each other to restrain innovation in the development of pollution limiting technology for motor vehicles—a claim that was litigated in California in the 1970s. In that case total damages would equal the excess of pollution losses caused by existing technology over the presumably smaller losses caused by alternative technology that would have been developed and deployed in an unrestrained market. Just stating the issue indicates how difficult it would be to measure damages. We would have to infer what those alternatives would be, how long it would take to develop and deploy them, how quickly they would have displaced older technologies, how cost-effective they would be, and the like.<sup>27</sup> The same thing was largely true of the numerous antitrust cases in the late 1990s against the cigarette manufacturers, alleging an antitrust conspiracy not to develop healthier cigarettes and to conceal information about the health effects of existing cigarettes. Nearly all were dismissed on grounds of standing or causation because the injuries were thought to be too speculative.<sup>28</sup>

The practical effects of these measurement difficulties has been debilitating, although particularly in private antitrust lawsuits. Recently the United States Court of Appeals for the Fourth Circuit denied a consumer claim against Microsoft for the very same restraints on innovation that the D.C. Circuit condemned in the government action

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<sup>27</sup> *In re Multidistrict Private Civil Treble Damage Antitrust Litigation Involving Motor Vehicle Air Pollution Control Equipment*, 52 F.R.D. 398 (C.D. Cal. 1970) (challenge to cartel alleged “[t]o prevent, restrain or limit the development, manufacture, installation, distribution or sale of air pollution control equipment for motor vehicles”—refusing to dismiss private treble damage complaints, but related litigation also refused to certify a class and refused *parens patriae* actions). *Accord Ford Motor Co. v. Lane*, 86 F. Supp. 2d 711 (E.D. Mich. 2000) (denying antitrust standing on plaintiff’s claim that Ford had the capacity to build more efficient, lower emission vehicles but failed to do so as a result of a conspiracy with other automakers; in denying standing court concludes that plaintiff’s true injury resulted from the fact that he had to purchase more gasoline than he would have had to purchase if his engine had been more efficient, and that Ford did not operate in gasoline market).

<sup>28</sup> *See, e.g., Ass’n. Of Washington Pub. Hosp. Districts v. Philip Morris*, 241 F.3d 696 (9th Cir. 2001) (hospitals lacked standing to sue cigarette companies on claim that latter conspired to restrain development of safer cigarettes); *Regence Blueshield v. Philip Morris*, 40 F. Supp. 2d 1179 (W.D. Wash. 1999) (health insurer could not show that its injuries were proximately caused by alleged agreement among cigarette manufacturers to withhold information about health effects of smoking); *Group Health Plan, Inc. v. Philip Morris*, 188 F. Supp. 2d 1122 (D. Minn. 2002) (HMOs suing cigarette companies for injuries brought about by alleged agreement to suppress information relating to health consequences of smoking could not sufficiently establish causation and injury); *see Iron Workers Local Union No. 17 Ins. Fund v. Philip Morris*, 23 F. Supp. 2d 771, 792 (N.D. Ohio 1998) (alleged agreement not to develop safer cigarettes). Other decisions are collected in 2 PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* §§ 338-40 (2d ed. 2000).

against Microsoft.<sup>29</sup> A few months later a state court in Iowa did the same thing, applying state antitrust law.

The Fourth Circuit held two things. First, as far as antitrust was concerned the restraints on innovation could be recognized only insofar as they resulted in higher prices for Microsoft products. As a result, they were fully taken into account in any claim that the consumers had for a monopoly overcharge. That conclusion seems quite incorrect. The value of an innovation could be many times larger than any price cut that it forces on rival technologies.

Second, insofar as the claim was for inferior products that was not reflected in a price overcharge, it was in fact a product liability tort claim rather than an antitrust claim.<sup>30</sup> That conclusion also seems wrong. The Sherman Act nowhere insists that its reach be limited to price restraints, and cases such as *Allied Tube* and the government's *Microsoft* case itself make clear that restraints on innovation can be substantive antitrust violations quite aside from their impact on the price of any product.

But the court then made an additional observation that is difficult to dispute. It quoted and agreed with this conclusion of the district court:

It would be entirely speculative and beyond the competence of a judicial proceeding to create in hindsight a technological universe that never came into existence. . . . It would be even more speculative to determine the relevant benefits and detriments that non-Microsoft products would have brought to the market and the relative monetary value . . . to a diffuse population of end users.<sup>31</sup>

The Fourth Circuit then concluded:

At bottom, the harms that the plaintiffs have alleged with respect to the loss of competitive technologies are so diffuse that they could not possibly be adequately measured. The problem is not one of discovery and specific evidence, but of the nature of the injury claimed.

While those conclusions seem harsh, they are probably an essential consequence of the fact that the plaintiffs in this case were private

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<sup>29</sup> *Kloth v. Microsoft Corp.*, 444 F.3d 312 (4th Cir. 2006).

<sup>30</sup> *See id.* at 323:

If Microsoft developed inferior technology, it essentially overcharged intermediaries for the value of its products, as measured by the price it would have obtained in a competitive market. Such injury is no different in principle from the restrictions on end-user licenses and the suppression of substitute technologies. All are essentially claims for illegal overcharges passed on to consumers. And to the extent that Microsoft's software degraded the performance of plaintiffs' computers, then any such damage would not form the basis of a claim for antitrust injury but a claim for some type of product liability injury. Presumably plaintiffs could make that claim just as they could for any other product liability claim.

<sup>31</sup> *Id.* at 324 (quoting the lower court, 127 F. Supp. 2d at 711).

parties seeking damages for innovations that were never undertaken. The gains from innovation are considerable, but in any particular case the impact of *prospective* innovations is impossible to predict, and quantifying the losses from any particular failure to innovate seems well nigh impossible. For that reason private damages actions would appear to be an unlikely vehicle for challenging innovation restraints. This places the onus for enforcement policy on government agencies.

#### CONCLUSION

Restraints on innovation deserve the special attention of the government agencies charged with enforcing the antitrust laws. First, the social losses caused by innovation restraints are large, perhaps far larger than the social losses caused by monopolistic pricing in our economy. Secondly, however, innovation restraint cases such as the Fourth Circuit's *Microsoft* decision are typically not promising for private antitrust litigation. The main thing that drives such litigation is the prospect of treble damages, and the rules that antitrust has developed for quantifying injury and damages are very strict, with good reason, for private plaintiffs have brought far too many frivolous antitrust actions. To be sure, the story is more complex than this. When an innovation is improperly excluded from the market after it is fully developed or nearly so, measuring the injury caused by its exclusion may not be all that difficult. But many innovation restraints occur at a much earlier point, before an innovation is developed, when its market prospects are highly uncertain.

This combination of factors—high social cost but considerable difficulty of private proof of injury in individual cases—demands close governmental scrutiny.