Intellectual Property and Antitrust Limitations on Contract

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The existence of a tradeoff between the use of ideas and the incentives for their creation is both a central and recurring theme in the legal and economic analysis of intellectual property rights. It is the primary issue in legal and economic analyses that attempt to define the proper scope of legal protection for intellectual property (Arrow (1960); Easterbrook (1982)).

This inquiry is not limited to the scope of property rights contained in federal or state statutory or common law. An integral part of the inquiry into the proper scope of intellectual property laws is how related contracts affect the use-creation tradeoff. Contracts based on use of intellectual property rights are an indispensable complement to intellectual property (Nimmer (1998); Kobayashi and Ribstein (1999); Ginsburg (1997)). However, the scope of contracting over intellectual property rights is limited by law in important ways.

First, the intellectual property laws impose limits on contracts. Contracts can be held unenforceable because they are preempted by the federal intellectual property laws. The primary inquiry is one of use versus creation, with preemption resulting if the contract upsets the system of "uniform federal standards" that are "carefully used to promote invention while at the same time preserving free competition."[2] Second, provisions of the Copyright Law, such as the first-sale and fair use doctrines, directly limit copyright holders' ability to control use of their works

Enforcement of contracts that do not conflict with federal intellectual property laws can be limited by other policy concerns. For example, general contract principles can lead to invalidation of contracts. And use of valid contracts judged to be anticompetitive can be curtailed through application of the

[2] *Sears Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225 (1964).

antitrust or intellectual property misuse laws.

Arguments for limitations on contracts are frequently based on the assumption that they alter the carefully considered optimal tradeoff between use and creation reflected in the federal intellectual property statutes (Lemley (1995, 1999)). However, if the statutory regime in fact does not resemble an optimal balancing of use and creation, restrictions on contract may instead serve to prevent welfare enhancing alterations to imperfect intellectual property laws.

Not surprisingly, some of the most acute problems in defining legal rights have occurred in areas where technological progress has challenged or moved ahead of existing legal doctrine. The protection of intellectual property embodied in computer software is a prime example of the challenge new technologies pose for existing intellectual property protection. Computer software unquestionably embodies useful ideas and is a good candidate for some type of intellectual property protection. Indeed, after much consideration, Congress modified the copyright laws specifically to provide protection to software.[3] In practice, however, the use of the copyright laws to protect intellectual property embodied in computer software has not fit comfortably within existing legal doctrine, and courts have struggled to fit the proverbial "square peg in the round hole."[4] As a consequence, intellectual property protection for computer software has severe practical and legal. Costly litigation over the scope of both copyright and patent protection for software continues to be both vigorous and unsettling to software developers. As a result, the scope of the legal right possessed by the intellectual property owner has yet to be clearly defined. limitations (Baird (1984); Galler (1995); Menell (1987); Dam (1995:367-71)).

Given these limitations, software developers have frequently relied on secrecy or privately negotiated contractual restrictions on the use of their products as an alternative to imperfect statutory intellectual property protection (Palmer (1986); Kitch (1980)). These privately negotiated contractual restrictions have raised concerns that have resulted in both private and public litigation. If the

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[3] The 1980 amendments implemented the recommendations contained in the Final Report of the National Commission on New Technological Uses of Copyrighted Works (CONTU) (July 31. 1978), which recommended that the Copyright Act "be amended ... to make it explicit that computer programs, to the extent that they embody the author's original creation, are proper subject matter for copyright. See 17 U.S.C. §101 (defining the term computer program").

[4] *Computer Associates International v. Altai*, 982 F.2d 693, 712 (2nd Cir. 1992).

primary reason that parties agree to such restrictions is to ensure that software developers are able to appropriate a sufficient return on their creative investments in writing software, refusal to enforce restrictive contracts, or vigorous and unpredictable antitrust litigation will generate uncertainty, will limit the software developer's ability to appropriate the returns to its activity, and will reduce investment (Hall (1986)).

Nowhere is this issue more central than in examining whether the application of the antitrust laws to intellectual property industries is likely to increase or decrease social welfare. As Bowman (1973) noted in his seminal work on patent and antitrust law, much attention has been paid to the supposed conflict between antitrust and intellectual property law.

> Antitrust law and patent law are frequently viewed as standing in diametric opposition. How can there be compatibility between antitrust law, which promotes competition, and patent law, which promotes monopoly?

Bowman concluded that this supposed conflict is largely illusory. Indeed, the conflict arises only when one attempts to analyze one aspect of the use/creation tradeoff without simultaneously considering the other. Once both aspects are considered, intellectual property and antitrust law are clearly compatible:

> Both antitrust law and patent law have a common central economic goal: *to maximize wealth by producing what consumers want at the lowest cost*. ... Antitrust law does not demand competition under all circumstances. Quite properly, it permits monopoly when monopoly makes for greater output than would the alternative of an artificially fragmented [inefficient] industry. The patent ... is designed to provide something which consumers value and which they could not have at all or have as abundantly were no patent protection afforded.

This chapter argues that the failure by the courts and the antitrust agencies to adequately consider both aspects of the use/creation tradeoff has led to a confused and uncertain policy with respect to contract enforcement, antitrust and intellectual property laws. The failure to recognize the compatible goals of contracts, intellectual property law and antitrust law has resulted in an ex-post economic and legal antitrust analysis that treats the licensing and sale of intellectual property as a static monopoly pricing problem. Further, similar competition policy arguments have been put forth and accepted by some courts in narrowing the scope of intellectual property rights to computer software.

We argue that this inappropriate ex-post analysis can severely weaken intellectual property protection for software and has resulted in the abrogation of procompetitive contracts and practices. The two-pronged attack on the incentives for investment in the production of software will drive software developers to inefficient secrecy and deter socially efficient investment in the production of original ideas. Moreover, continuing the use of this inappropriate ex-post analysis will lead antitrust agencies disproportionately to select innovative software developers for review, will cause the courts to further weaken the intellectual property right system, and will cripple the incentive for investments in the development and production of software.

A Model of Competition in Computer Software Markets

In this section, we present a model of competition in the development, production, and sale of software. Although the model is highly stylized, we use it to illustrate the competitive effect of changes in both the scope and breadth of copyright protection, and how private contracting, which serves as an alternative to copyright protection, positively affects the market equilibrium and social welfare.

To illustrate the primary issues, we assume software developers are divided into two distinct types, original developers and imitators. Original developers expend resources in designing and developing the source code used in a software program.[5] Imitators expend resources copying the source code of an original developer. We also assume that the relative cost of original development and the cost of imitation can be altered by changes in the level of copyright protection and by contracts between developers and downstream users of the software.[6] Finally, we assume that the strength of copyright protection can be indexed by a single dimensional variable, z, and that the strength of contractual protection can be indexed by a single variable, k.

Let F_O denote the original developer's cost of "developing" the software, and let F_I denote the costs of imitating. We assume that imitation requires at least

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[5] The use of the term original here is consistent with its accepted meaning in copyright law under 17 U.S.C. § 101.

[6] These contracts could include, for example, non-disclosure agreements with employees or even licensees of the software, or organizational arrangements such as vertical or horizontal integration to limit the amount of interfirm dissemination of information (Kitch (1980)).

one original version of source code and that, in the absence of either copyright or contractual protection, imitation versions of the source code cost less to produce than an original.

A well designed copyright law will disproportionately restrict those activities that come closest to outright copying of protected expression. Thus, we assume that the cost of developing an original version of software falls relative to the cost of imitation as z is increased. However, the existence of copyright protection also tends to raise the cost of "original" authorship (Landes and Posner (1989)). Thus, we assume that the costs of producing either an original or an imitation version of source code increase with the strength of copyright protection, z. In reality, even "original" software will borrow from the existing stock of ideas not protected by patents or copyrights. Thus, by reducing the existing stock of ideas that can be legally embodied in new software, increases in the strength of intellectual property right protection for software will increase the costs of producing even an "original" version of the source code.[7]

Once an original developer has successfully developed a copy of the source code, copies of the software embodying the source code can be produced and distributed to consumers at a constant cost equal to a_O by the original developer and a_I by an imitator. Thus, the costs of original development, F_O, and imitation, F_I, are treated as fixed costs that do not vary with the number of original and imitation software units sold, q_O and q_I respectively. We assume that marginal costs, a_O and a_I, can be affected by the contractual restrictions, indexed by k, adopted by original software developers. Specifically, increases in k increase imitators' costs of distribution, so that a_I is increasing in k. However, the effect of increases in k on a_O are ambiguous. For example, imposition of contractual restrictions such as the use of a blanket license can simultaneously increase imitators' costs while decreasing the developer's production and distribution costs. It is also possible that contracts that increase imitators' costs have little effect or even increase costs for the firm imposing the restrictions (Salop and Sheffman (1987)).

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[7] Increases in contractual (or organizational) restrictions aimed at preventing imitation can have a similar effect on F_O and F_I. For example, vertical integration, contractual secrecy requirements, or trade secrecy would make it more costly for imitators to obtain a copy of the source code. However, such devices are both privately and socially costly to implement and enforce. Thus, contractual restrictions or secrecy may raise the costs of producing both original and imitation versions of the source code. Because of the similarity of these effects and the effect of increasing z, we do not model them separately here.

To model the competitive interaction between competing software products, we assume, for simplicity, that with N_O original and N_I imitation source code versions, the equilibrium price, P^*, and quantities of original ($N_O q_O^*$)and ($N_I q_I^*$) of software is determined by a Cournot interaction of these competing firms (Willig (1990); Kwoka (1979); Tirole (1988); Shapiro (1989)). Our use of this assumption is not an endorsement of the Cournot model as a valid or accurate description of behavior in software markets. Rather, our intent is to highlight the shortcomings of the static Cournot model in markets in which intellectual property protection is crucial.

Under Cournot assumptions about software market firm behavior, the equilibrium market price and quantity will be completely determined by the equilibrium number of original (N_O) and imitation (N_I) versions of the source code. The equilibrium number of source code versions are, in turn, determined by the equilibrium profitability of producing either an original or imitation version of the source code.

We use simulations based on this standard model of competition to illustrate market outcomes with varying levels of copyright and contractual protection. The specific assumptions used and the derivations of the results are contained in the Appendix.

[INSERT TABLE 1 HERE]

Table 1 lists the simulated market equilibrium based on the specific functional forms described in the Appendix. The Table lists whether an equilibrium exists and, if one does, the number of each type of firm (N_O, N_I), the equilibrium price, P, and quantity, Q, and both gross welfare (GW) and welfare net of F_O and F_I (NW). The far left column of Table 1 lists the situation where the cost of imitation is relatively low ($F_I = .1$ and $F_O = .4$) and corresponds to the conditions that would exist with a weak copyright regime. Weak copyright protection allows imitators to copy and enables them to produce a version of the source code at relatively low cost. Moving to the right in Table 1 corresponds to increases in the strength of copyright protection, z, which results in an increase in the cost of producing a non-infringing imitation relative to the cost of producing a non-infringing original version.

The first row in Table 1 corresponds to the absence of strong contractual restrictions that serve to disadvantage imitator firms and reflects equal marginal costs of distributing original and imitation software. Moving down the rows in Table 1 reflects increased contractual restrictions used by original developers that significantly increase the relative costs faced by imitators for distributing and

selling their products. In the example, we assume the contracts decrease the costs of distributing original software and increase the costs of distributing imitation software.

Examining Table 1, it is clear that the existence of copyright protection and contractual restrictions that increase the relative costs of producing and distributing imitation software are necessary to produce an equilibrium. In all of the cases where an equilibrium exists, original firms can rely on the existence of some copyright protection and the use of contractual restrictions. In all but one of the cases where an equilibrium exists, the equilibrium outcome results in three original versions of the source code being produced[8] and the complete deterrence of imitator entry. The remaining case has two original firms and one imitator firm competing in equilibrium.

The Table also allows a comparison of the use of restrictive contracts versus stronger copyright laws to deter imitation. The highest net welfare level is achieved when there is "moderate" copyright protection ($z = 1$) and strong contractual restrictions ($k = 9$). Because increases in the strength of copyright protection are assumed to increase the costs of all expression, even original expression, increases in the level of copyright protection beyond those necessary to induce the production of original versions of the source code will begin to reduce welfare. Thus, contractual restrictions that raise the costs of distributing imitation software without increasing the cost of distributing original software will be more efficient and will result in higher levels of net welfare.

Conversely, the absence of either strong copyright protection or strong contractual restrictions results in the non-existence of a market equilibrium. The absence of an equilibrium is a manifestation of the familiar appropriability/free rider problem that differentiates intellectual property and other public good markets from private markets. Absent intellectual property or contractual protection, imitation will be cheaper than coming up with an original innovation, idea, or expression. And when it is cheaper and more profitable to imitate than it is to come up with an original product, firms will choose to imitate, and will appropriate the returns from the original firm's investment. Given this, no firm will want to invest in producing an original version of the source code.

To see this, consider the case where the costs of distributing original and

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[8] The equilibrium existence of multiple original versions of the source code is consistent with current copyright law doctrine, which does not protect copyrightable material from independent creation. See Landes and Posner (1989:344-46), Dam (1995:337).

imitation software are the same, and where copyright law is weakened so that $F_I = .1$ and $F_O = .4$. Under these conditions, it is not surprising that *imitation entry* is relatively attractive, as the cost of imitation is one-fourth the cost of producing an original version of the software. This large scale imitator entry reduces the present value of the gross profits from selling an original version of software below the cost of developing an original version of the source code.

Clearly, no firm that anticipates this outcome would rationally invest in producing an original version of the source code. And the lack of an original version precludes the existence of imitation version. While large scale imitation entry makes a policy of weak copyright laws attractive from a static welfare point of view, it also prevents development of an original version of the source code from being an equilibrium decision.[9]

The results from Table 1 also can be used to illustrate the fallacy of using an ex-post analysis that considers only the price of software or some index of concentration to evaluate the appropriate limits of copyright protection or to justify an antitrust investigation into restrictive licensing practices. An analysis seeking to minimize market concentration and/or to lower the equilibrium price would suggest that the removal of "barriers to entry," such as contractual and copyright restrictions on imitators, would improve welfare. Indeed, under Cournot assumptions, if both copyright protection and contractual protection are removed from firms that have already incurred F_O, the number of firms will rise, the total quantity will rise and the market price will fall.

For example, suppose initially that an equilibrium exists with three original firms in the market, and that all barriers to imitation are removed so that $a_O = a_I = .01$ and $F_I = .1$. Under these conditions, five imitation firms will choose to enter the market. Because at this point the original firms' entry and investment decisions are sunk, the three existing firms will make positive gross profits after imitation entry occurs and thus will continue to produce and sell software. The Herfindahl-Hirshmann Index (HHI) will fall from a "highly concentrated" 3,333 to a "moderately concentrated" 1,250.[10] The market price will equal .12

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[9] In the cases marked with an asterisk, cases exist where imitator entry would not drive original profits below zero. However, these cases are not equilibria, as the marginal original firm would rather be an imitator firm.

[10] The U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines, (April 2, 1992), reprinted in 4 *Trade Reg. Rep.* (CCH) at 13,104, contain specific numerical thresholds associated with the HHI.

(approximately half the level of any equilibrium in Table 1). The market quantity will rise to .88, and static welfare will rise to .484. Thus, *assuming the existence of one or more original firms*, both copyright protection and restrictive contracts that increase the costs of producing and distributing imitation software lead to more concentrated markets, higher equilibrium prices and lower static welfare. This outcome is the standard grounds for condemnation of "barriers to entry" under a traditional static antitrust analysis.

This outcome can be generated only if the original firms were somehow mistakenly induced to develop the software in the first place. Such an outcome could be achieved, for example, by an unanticipated weakening of the copyright laws or an unanticipated antitrust attack on contractual restrictions that increase imitators' costs of distributing software that occurred *after* the investment in the production of an original version of the source code had occurred. If firms are not systematically fooled, however, anticipation that such a policy will be continued will deter *future* investments in the production of original software. And unless the one-time gain from the increased use of existing ideas is more important that the continued maintenance of incentives for future innovation, such a myopic policy would decrease dynamic welfare.

The simulations demonstrate Bowman's (1975) the general welfare point quoted in the introduction of this paper. To the extent that the copyright and antitrust law are viewed as having the same goal, the maximization of dynamic welfare, some tolerance for a more concentrated market structure, higher prices, and greater profits for existing software firms may be necessary. And when compared to increasing the strength and scope of intellectual property rights under copyright laws, practices that have been condemned as anticompetitive, such as contracts that disadvantage rival firms producing imitation software, and horizontal and vertical mergers, can be a more efficient way to provide incentives for the production of original software.

Legal Protection for Software and Databases

In this section, we examine the treatment of databases and computer software under the intellectual property laws. At the outset, we note that the intellectual property laws do not protect costly to produce but non-original works such as databses against of free-riding. In *Feist v. Rural Telephone Services*, the

Court rejected the "sweat of the brow" theory of copyright.[11] The Court held that the contents of a factual work that required great effort to compile (in this case, a telephone directory) were not protectable under copyright if they did not meet a threshold standard of originality.

Protection of non-copyrightable factual works could in theory be protected under state misappropriation laws (Karjala (1994); Paepke (1987)). However, application of state misappropriation laws has been severely limited by federal preemption (Merges, et al., at 750, Epstein (1992), Baird (1983)). It has long been considered legal to copy a competitor's non-patentable product or non-copyrightable expression as long as it has been disclosed to the public. Protection of publicly disclosed ideas under state unfair competition laws is limited to protection against source confusion and does not extend protection more generally against misappropriation by an imitator (Wiley (1989), Lichtman (1997)).

Thus, for ideas and information found to lie outside of the patent and copyright laws, protection of ideas against misappropriation is generally limited to those areas where special *sui generis* Federal legislation has been enacted (Menell (1987), Dam (1995)), to *successfully* hidden trade secrets, (Friedman, Landes and Posner (1989)) and to non-preempted and otherwise enforceable contracts. (Kobayashi and Ribstein (1999)). Where trade secrecy is not an option, and no federal *sui generis* protection is available, contract may be the only option. For example, non-copyrightable databases must rely on contractual restrictions to protect them from misappropriation.[12]

For those works that can be copyrighted, both legal and practical considerations have resulted in copyright being used as the primary means to protect computer software through a system of statutory intellectual property rights. [13] However, the scope of the legal right granted to computer software has

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[11] 499 U.S. 340 (1991).

[12] *ProCD v. Zeidenberg* 86 F.3d 1447 (7th Cir 1996). *Sui generis* intellectual property protection for non copyrightable compilations (such as computer databases or the directory in *Feist*) was eliminated from the final verson of the Digital Millenium Act. See 56 BNA Pat. Tr. & Copy. J. 691 (10/15/98).

[13] CONTU recommended in 1978 use of copyright protection for computer software. This recommendation was included as part of the 1980 amendments to the copyright statute. See 17 U.S.C. § 102. For a more detailed discussion of this issue, see Dam (1995: 338-9). Our analysis does not explicitly address the issue of software patents. For a general discussion of the issue of software patents and their limitations, see Dam

not been clearly resolved.

The primary way in which courts have attempted to define the limits of copyright protection is through application of the idea/expression dichotomy. It is well established in law that the scope of the right given under the copyright laws covers only the form of expression and does not protect ideas.[14] Determining exactly what constitutes copyrightable "expression" and what constitutes noncopyrightable "ideas," however, has proven to be a difficult task to carry out in practice. Courts' inability to adequately deal with this issue has lead to much uncertainty over the scope of the protection afforded by copyright law.

There are two primary economic approaches to determining the scope of copyright protection. The first approach emphasizes the effect that broadening the scope of copyright to include the protection of ideas would have on the cost of developing copyrighted materials, generally (Landes and Posner (1989: 348)). This approach adopts a traditional intellectual property right approach that focuses on the effect changes in the level of protection has on the supply of copyrighted ideas. The second approach adopts a standard competition/antitrust analysis to determine the proper scope of the copyright laws. This approach largely ignores the standard intellectual property issues, and emphasizes the effect that protecting ideas would have on increasing the danger of welfare losses from monopoly (Warren-Boulton, et al. (1995)).

This dichotomy does not imply that the two approaches are always or even largely inconsistent. For example, consider the classic merger doctrine in copyright law, which denies protection when idea and expression merge (Landes and Posner (1989)). Under a competition/antitrust analysis, copyright would be denied because allowing a de facto copyright over an idea would increase the deadweight losses from monopoly. Under an intellectual property right approach, copyright would be denied because the de facto expansion of copyright protection to ideas would increase the cost of producing subsequent original ideas. In either case, the scope of copyright is similarly limited.

In other cases, however, the two approaches have very different implications for where the line between idea and expression should be drawn. For example, consider the case where, out of many ex-ante identical ways to express an idea, one clearly evolves as the industry standard. According to the intellectual

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(1995:367-371), Galler (1995:21).

[14] *Baker v. Selden* 101 U.S. 99 (1879).

property approach that focuses on the cost of expression, the existence of many ex-ante alternatives suggests that property right protection would have little effect on the cost of producing original expressions. Thus, copyright protection would be granted to the expression in this case. However, analyses based on the competition/antitrust theory of copyright focus on the costs of non-compatibility and suggest that, from an ex-post viewpoint, expressions that have become de facto standards have merged with ideas. In this case, application of an ex-post merger doctrine suggests no copyright protection should be enforced.[15]

An examination of copyright doctrine confirms that it is largely consistent with a focus on free-riding. For example, the copyright laws do not protect a copyright holder from the existence of an identical but independent creation, and thus does not seek to grant in any relevant sense "copyright monopolies."[16] Indeed, this is consistent with the results of our simulations, as all of the equilibrium outcomes consisted of multiple firms developing and selling original software based on their own version of the original source code.

Likewise, our approach is consistent with the prohibition against copyrighting works copied from the public domain,[17] from predecessor programs,[18] or from industry conventions.[19] In all of these cases, the ideas preexist

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[15] Dam (1995) notes that these arguments incorporate competition policy arguments to interpret intellectual property laws and suggests that such a policy may be unwise, as it "might well ... undermine the coherence of both fields of law, since the antitrust laws remain available to attack true market monopolies and restraints of trade in software markets. Further, standard competition arguments have been advanced primarily to support "me too" copying, where market power in the antitrust sense did not exist. "Thus, to deny protection on competitive grounds is to introduce a kind of mini-antitrust law for intellectual property cases that we would be unwilling to apply in other areas of law."

[16] Dam (1985:359). Landes and Posner (1989:344-7) also explain the non actionability of accidental infringement based on the effect that avoidance of such duplication would have on the production of originals. In contrast, competition analyses do not generally consider or differentiate between the case where the copying was accidental or not.

[17] *Computer Associates, supra* note 4.

[18] *Apple Computer, Inc. v. Microsoft Corporation and Hewlett-Packard Co.,* 35 F.3d 1435 (1994).

[19] *Id.* Note that a prohibition against copyright protection for works copied from or based on industry conventions does not imply that the industry convention or other types of

in a form that is presumably equally accessible to all who wish to use them. Because no free riding of the type highlighted in our model can occur, copyright protection in these cases is not warranted. Finally, our analysis suggests there are areas where intellectual property right protection would address free riding behavior, but would also increase the costs of original expression. In these cases, enforcement of contracts that prevent misappropriation may be superior to granting broad intellectual property rights (Ginsburg (1997)).

Many important areas of the idea/expression dichotomy remain far from settled, however. A review of the existing case law concerning the scope of copyright for computer software clearly illustrates the tension between the two standard theories and the uncertainty underlying the scope of the legal right held by a software owner. A large number of litigated cases have involved a situation similar to the one contained in the model -- a dispute between the developer of a first-to-market product and an imitator with a directly competitive follow-on "me-too" product. Not only are the competing software programs close substitutes, but the primary issue being litigated often is whether the imitating producer's me-too software program can be made as close as possible, from the buyers' perspective, to the original product (Dam (1995)). And the courts' choice of which one of the two approaches to use in resolving the idea/expression dichotomy has been far from consistent and has often resulted in decisions that severely limit the use of copyright as an predictable or effective tool to protect computer software (Nimmer and Krauthaus (1995)).

The courts' is clearly illustrated by the Second Circuit's influential "filtration approach" set out in *Computer Associates v. Altai*.[20] The opinion clearly signals hostility towards Congress' decision to use copyright to protect computer software.[21] Quite separate from the underlying philosophical issue, the approach set out in *Computer Associates* seems flawed as a means to rationally separate idea and expression. Under the *Computer Associates* approach, an original program is first broken down into component parts at a number of levels (abstraction). The component parts of the program are then put through a "filtration" process where unprotectable ideas and protectable expression are separated. Finally, the allegedly infringing program is compared to the portion of the original program that remains

standards should not be copyrightable.

[20] *Computer Associates, supra* note 4.

[21] The judge in the case explicitly acknowledges that his decision will provide a disincentive for future computer program research and development. *Id.* at 712.

after all of the elements that have been found to be either "ideas or are dictated by efficiency or external factors, or taken from the public domain" have been removed.

If the purpose of this approach is to *reduce* the original program to a "core" level of expression, such an approach seems inconsistent with the doctrine set out in *Feist* that original compilations are copyrightable even though the individual elements of the compilation are not.[22] Alternatively, one could argue that one plausible "level" of abstraction would include subsets of the original compilation, or the compilation as a whole. However, such an approach would require consideration of an infinite number of levels of abstraction, and is unlikely to help in clarifying the bounds of non-literal infringement.

The lack of a coherent approach to copyright protection for computer software has led to inconsistent holdings by the lower courts (Dam (1995)) and to the deadlock reached by the Supreme Court in the *Lotus v. Borland* case.[23] In *Lotus v. Borland*, the district court, in a series of opinions, held that parts of Lotus' 1-2-3 spreadsheet program's user interface, including its menu tree, were copyrightable and infringed by Borland in its competing Quattro Pro spreadsheet.[24]

The district court's decision, written by Judge Keeton, was consistent with his earlier ruling in *Lotus v. Paperback*.[25] In *Paperback*, Judge Keeton found that the Lotus 1-2-3 menu structures were protected expression covered by Lotus copyrights and infringed by similar structures contained in Paperback's competing VP Planner software. Judge Keeton explicitly adopted an intellectual property approach by rejecting the defendant's arguments that there was an ex-post merger of expression and idea because the Lotus menu had become a de facto standard:

> By arguing that 1-2-3 was so innovative that it occupied the field and set a *de facto* industry standard, and that therefore, defendants were free to copy plaintiff's expression, defendants have flipped copyright on its head. Copyright protection would be perverse if it only protected mundane increments while leaving

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[22] 499 U.S. 340 (1991).

[23] 516 U.S. 233 (1996) (summary affirmance due to deadlocked Court).

[24] 831 F. Supp. 223 (1983) (holding that Lotus' 123 menu was copyrightable expression and infringed).

[25] 740 F. Supp. 37 (1980).

unprotected as part of the public domain those advancements that
are more strikingly innovative.

Similarly, in the Borland Litigation, Keeton found that the 1-2-3 menu
structures were copyrightable expression.[26] Keeton explicitly rejected the notion of
ex-post merger being put forth by the defendants in the case:

> [a] very satisfactory spreadsheet menu tree can be
> constructed using different menu commands and a different
> command structure from those of Lotus 1-2-3. ... [I]t is possible to
> generate literally millions of satisfactory menu trees by varying the
> menu commands employed.

The Court of Appeals reversed, holding that the menu tree was not
copyrightable expression, holding that the Lotus menu tree was an uncopyrightable
"method of operation." The court analogized the Lotus 1-2-3 menu to the buttons
on a VCR, and argued that "if specific words are essential to operating something,
then they are a part of a "method of operation" and, as such, are unprotectable."[27]

Arguing over whether the Lotus 1-2-3 menu tree is akin to the buttons on a
VCR seems an unlikely way to determine in a rational or principled fashion the
proper scope of copyright for computer software. Nor does attempting to figure
out what is "essential" or "non-essential" seem more -- it is unclear what, if any,
expression contained in a software program would be found to be "unessential."
Both of the court's suggestions seem to degenerate quickly to futile semantic
exercises, an approach criticized by Landes and Posner (1989):

> We hope that the debate will be resolved not by the
> semantics of the words "idea" and "expression" but by the
> economics of the problem and, specifically, by comparing
> the deadweight costs of allowing a firm to appropriate what
> has become an industry standard with the disincentive
> effects on originators if such appropriation is forbidden.

The court's consideration of "program compatibility" issues and the
argument that a program's attainment of the status as a "de facto" standard should
cut against copyrightability suggests a better articulated economic principle upon

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[26] See *Borland II*, 799 F. Supp. at 216.

[27] 49 F.3d 807 (1st Cir 1995).

which the line between idea and expression should be drawn. In this case, the unique social cost identified by those wishing to condemn copyright protection is that users of original software programs will face switching costs if software is not allowed to be compatible or if follow-on firms are not allowed zero priced access to "de facto" industry standards. In addition, those who would condemn copyright protection in these cases posit that the existence of switching costs can lead to customer lock in, where these customers can remain "captives" of the current program even when a superior alternative comes along.[28] Thus, minimization of these costs require that follow-on programs should be permitted to freely borrow elements of the facto standard.

There are several problems with these arguments when applied to defining the scope of copyright protection. First, and foremost, application of what are essentially competition policy arguments to the problem of whether something is copyrightable will be costly in terms of lost incentives for investments in software. Because the arguments are being used to condemn copyright protection, acceptance of these arguments suggests a move to the system that Judge Keeton pejoratively referred to as one that "stands copyright on its head". That is, as soon as a program attains the status of a de facto standard, copyright protection for those portions of the program become uncopyrightable and part of the public domain -- open to copying by all, including those who wish to free ride on the investments of the original author by simply "cloning"' the now unprotected elements of the original program.[29] Applying the results of our model, such an outcome will, on the margin, result in a loss of incentives for and lower amounts of investment in the production of original software.

Further, it is not at all clear why the mere existence of switching costs yield a compelling reason for the elimination of property right protection through copyright for software. As Dam (1995:351) points out, the existence of switching costs are ubiquitous in all economic decisions, and it is unclear that the failure to switch to a slightly more efficient standard constitutes a market failure or a social loss. Nor, is it clear, as an empirical matter, that the problems of lock-in and the perpetuation of inefficient standards is an empirically relevant issue. As Liebowitz and Margolis have shown in a series of articles, the existence of inefficient

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[28] The example of the persistence of the QWERTY keyboard and the VHS videorecorder are often given as manifestations of this problems. See, *id* at 817.

[29] It is unclear what market share is required to become a de facto standard. Dam (1995:356) reports that Lotus' market share was 37 percent, trailing Microsoft's Excel program, which had a share of 52.7 percent of the spreadsheet market.

standards perpetuated by switching costs and lock-in is an empirical myth.[30]

Finally, even if one accepts that Borland should be able to use the Lotus 1-2-3 menu, it is unclear that the complete condemnation of copyright protection is warranted under these circumstances. As Judge Boudin noted in his concurrence, "a different approach" to that set out by the majority would be to base copyrightability decisions on traditional intellectual property law precedents that are independent of these competition policy arguments. To the extent that access to "de facto standards" is warranted, such access can be granted according to the existing copyright doctrine of "fair use." The advantage of this approach is that it would fall short of punishing success per by preserving rather than eliminating the copyright holders' property right, while permitting limited and specific exceptions to infringement through the well developed doctrine of fair use.[31]

Limitations on Contract

Throughout this paper, the primary problem faced by the developer of an original computer software program is free-riding or misappropriation by imitators

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[30] The prime example of inefficient standards, the QWERTY keyboard, is based on an assertion that is demonstrably false. See Liebowitz and Margolis (1990, 1994). In addition, the fact pattern in the Beta/VHS videorecorder competition, also cited as evidence of inefficient path dependence, and in many of the software application markets, are simply inconsistent with the conditions that the theoretical model suggest are necessary for the perpetuation of inefficient standards. See, e.g., Liebowitz and Margolis, (1995a, b, 1999), Levinson (1995, 1996).

[31] The fair use doctrine is consistent with our efficiency analysis based on the prevention of free-riding. Specifically, the doctrine of fair use distinguishes generally between productive or transformative uses and reproductive uses. For a detailed discussion of the fair use doctrine, see Landes and Posner (1989), Posner (1992), and Landes (1992). In applying a fair use analysis to the Lotus/Borland litigation, Judge Keeton found that Borland's use to have been reproductive, and that the facts failed to support a finding of fair use. See *Lotus v. Borland* 831 F. Supp. 223, 241 (1993). In contrast, courts that have used the fair use analysis where the use has been transformative have found fair use. For example, in cases where the software attached to, rather than replaced, the original program, the courts have accepted the defense of fair use. See, e.g., *Sega Enterprises v. Accolade, Inc.* 977 F.2d 1510 (9th Cir. 1992), and *Atari Games Corp. v. Nintendo of America, Inc.,* 975 F.2d 832 (Fed. Cir. 1992).

caused by the lack of impediments to low cost entry. To the extent that statutory protection under the federal copyright laws yield inadequate or uncertain protection against misappropriation, the developer must turn to alternative means of protecting his investment. Yet the developer selling or licensing software to the public on a large scale may find his non-contractual alternatives severely limited and/or uncertain. Thus, the use of restrictive contracts may be a *necessary* condition for the production of ideas, including original versions of the source code for a computer program or a costly to compile database. Under these circumstances, restrictive contracts that discourage entry into intellectual property industries by imitators can improve incentives for production of these useful programs and databases.

Contractual protection of ideas can be limited through the non-enforcement of restrictive contract terms (Kitch (1980: 685-88). Restrictive terms can be preempted by the federal laws. For example, in *Lear v. Adkins*, contractual provisions that estopped the licensee from challenging the validity of the patent were voided. For computer software, the practical effect of contract preemption may be limited. States can pass laws that provide remedies that are not "equivalent" to copyright. Courts have generally enforced contracts under state contract law under both Section 301 of the Copyright Law and the common law.[32] Non-enforcement of restrictive terms would be generally limited to those terms that would be held unenforceable based on general contract principles, such as defective formation and unconsciability (Lemley (1999); Kobayashi and Ribstein (1999)).

Some have suggested that properly formed contracts should be preempted by the first sale doctrine, which provides that the copyright holder cannot restrict what a purchaser of copy does with *that* copy.[33] Thus application of the first sale doctrine would render restrictive contractual terms attached to a sale unenforceable. However, the extent that the distribution of computer software and databases can be legally characterized as a license, the producers of information, by licensing rather than selling their software, can choose to opt-out of the first

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[32] Under Section 301, a state law can survive if there is proof of an extra element in addition to those required for copyright infringement claim. For contract law, this extra element is the agreement of the parties. See Merges, et al., (1997) at 821.

[33] See Merges, et al. (1997), at 439. Thus, the purchaser may not make additional copies. However, attempts by the copyright holder to limit the way in which the particular copy is used would be barred.

sale doctrine.[34] While some courts have characterized such licenses as sales, and have invalidated restrictive contract terms under the first-sale doctrine, contracting around the first sale doctrine was anticipated by Congress.[35] In addition, the recently passed Uniform Computer Information Transaction Act broadly characterizes transactions as licenses, and supports enforcement of contractual restrictions (Kobayashi and Ribstein (1999)).

Even if contract law allows broad enforcement of restrictive terms in contracts, such contracts are subject to scrutiny under the patent and copyright misuse and the antitrust laws. Standard antitrust analyses, as practiced by federal regulatory agencies and as implemented by the courts, assess the different circumstances faced by original developers and imitators based on the concept of "barriers to entry". Rather than focusing on the benefits of "barriers to entry" which mitigate the advantages the imitators obtain by free-riding on the original developer's work, conventional antitrust analyses focus on entrants' disadvantages *vis-a-vis* the existing "incumbent" firm (Gilbert and Newbery (1982)). The implication of these analyses is that consumers will be best served by encouraging entrants into industries where profits are "high" by eliminating or mitigating the effects of such barriers. The role of the entrant is to stimulate competition, drive prices down, reduce industry profits, and increase consumer welfare. Schumpeter (1942) suggested the misguided nature of this approach:

> In analyzing … business strategy ex-visu of a given point of time,
> the investigating economist or government agent sees price policies
> that seem to him predatory and restrictions of output that seem to
> him synonymous with loss of opportunities to produce. He does

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[34] The ability of copyright holders to make portions of the intellectual property laws default rather than mandatory rules is controversial (Lemley (1989), Kobayashi and Ribstein (1999)). In the case of the first sale doctrine, allowing parties to opt out can be efficient. In effect, the first sale doctrine forces the copyright holder to capitalize any potential for multiple uses into the original purchase price. Allowing the parties to contract for the level of use can allow a more refined level of price discrimination, (e.g., by allowing a potential licensee to agree to limit use in exchange for a lower price) which can in turn be welfare increasing. (*ProCD supra* note 12; Liebowitz (1985); Bakos, et al., (1999); Besen and Kirby (1989); and Meurer (1997)).

[35] The committee report to Section 109(a) of the Copyright Act of 1976 indicates that Congress anticipated that parties might contract out of a first-sale right. See Lemley (1995) citing the Committee on the Judiciary, H.R. Rep. No. 94-1476. Thus, it does not seem that enforcement of a contract that waives the first-sale right would directly conflict with the law or impede accomplishment of Congress' objectives.

not see that restrictions of this type are, in the conditions of the perennial gale, incidents, often unavoidable incidents, of a long-run process of expansion which they protect rather than impede. There is no more of a paradox in this that there is in saying that motorcars are traveling faster that they otherwise would because they are provided with brakes.

The static viewpoint Schumpeter warned against has led to antitrust and misuse attacks on contractual and licensing practices in intellectual property industries. The courts and agencies have used such analyses, for example, to question whether the use of trademarks are anticompetitive because they cause entrants to invest in advertising to promote their product and overcome the brand loyalty associated with the mark.[36] They have also used them to scrutinize whether certain contracts that place limits on licensees, such as tie-ins and restrictions on use beyond the first sale, constitute misuse of patents[37] and copyrights.[38] The history of antitrust law contains many examples where intellectual property,[39] related contracts, licenses, organizations[40] and

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[36] See *Borden, Inc. v. Federal Trade Commission*, 674 F.2d 498 (6th Cir. 1982) (although not implemented, the Commission found that compulsory trademark licensing "within the range of remedies it had the power to impose"). See also Krouse (1984), Posner (1970).

[37] In *Morton Salt Co. v. G. S. Suppiger Co.,* the Court held that patent misuse does not require proof of an antitrust violation. For movement away from this doctrine, see *Mallinckrodt Inc. v. Medipart Inc.* 24 U.S.P.Q. 1173 (Fed. Cir. 1992), and the 1988 amendments to Section 27(d) of the Patent Code (harmonizing tying under misuse and antitrust analyses).

[38] Copyright misuse has been sparingly applied by the Courts as a defense to infringement. But see *Lasercomb America, Inc. v. Reynolds* 911 F.2d 970 (4th Cir. 1990). For an analysis suggesting the expanded use of copyright misuse, see Lemley (1999).

[39] The Supreme Court's hostility to intellectual property in the mid 20th century led Justice Jackson to complain that "the only patent that is valid is one which this Court has not been able to get its hands on." *See Jurgensen v. Ostby & Barton Co.*, 335 U.S. 560, 572 (1949). And just 25 years after the Court's decision in *INS, v Associated Press*, 248 U.S. 215 (1918) (granting the AP a quasi-property in news against its competitors) the government successfully challenged the AP's by-laws on antitrust grounds, *United States v. Associated Press, et. al.* 326 U.S. 1 (1945). The majority opinion upheld the government's successful challenge of AP's by-laws, which prohibited all AP members from selling news to non-members and granted each member powers to block it non-member competitors from membership. The majority's opinion led Justice Murphy to suggest that requiring the

combinations,[41] have been the targets of antitrust enforcement. Perhaps the height of this trend was the definition of the "nine-no-no's" of patent licensing, which included a laundry list of many contracting arrangements that have since been found to be efficiency-enhancing in many contexts.[42]

While subsequent administrations have backed away from the nine-no-no's[43] and the creation of the Federal Circuit Court of Appeals has reduced the judiciary's anti-intellectual property stance,[44] recent developments suggest at least

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Associated Press to share its products with competitors would "discourage competitive enterprise and would carry the anti-trust laws to absurd lengths." For a more complete discussion of the Court's hostility to intellectual property, see Dam (1994), Hall (1986:72).

[40] Fisher, McGowan and Greenwood (1983) (discussion the Antitrust case against IBM in the 1970s).

[41] Bittlingmayer (1988) (discussing the Aircraft Patent Pool).

[42] The nine no-no's include prohibitions against (1) tying of unpatented materials; (2) licensing of future patents; (3) restrictions on resale; (4) restrictions on licensee's activities falling outside the scope of the patent; (5) agreements that the patentee will not grant, without the licensee's consent, further licenses to any other person; (6) an extension of the patent grant to permit mandatory package licensing; (7) basing royalties on an amount not reasonably related to the licensee's sales of products covered by the patent; (8) for the owner of a process patent to attempt to place restrictions on the licensee's sales made by the use of the patented process; (9) for a patentee to require a license to adhere to any specified or minimum price. See Remarks by the Deputy Assistant Attorney General Bruce Wilson before the Michigan State Bar Association, Trade Reg. Rep. (CCH) p. 50, 146 (Sept 21, 1972). For an analysis of patent licenses as cartel arrangements, see Priest (1977). For economic analysis suggesting the efficiency of such practices, see McGee (1966), Bowman (1973), Yu (1981).

[43] Remarks of the Assistant Attorney General for Antitrust Rule, The Antitrust Implications of International Licensing: After the Nine No-Nos, 33 *BNA Trademark and Copyright Journal* 18-23 (November 6, 1986).

[44] For example, in *Abbot Laboratories v. Brennan*, 952 F.2d 1346 (Fed. Cir. 1991), the Federal Circuit has not followed the Supreme Court's ruling in *United States v. Lowes* 371 U.S. 38 (1962) and *Jefferson Parish Hospital District No. 2 v. Hyde*, 466 U.S. 2 (1984) which suggested the existence of intellectual property implied the existence of market power. The Sixth Circuit has also held that market power may not be presumed from the fact that a computer program is protected by copyright. See *A.I. Root v. Computer Dynamics Inc.,* 806 F.2d 673 (6th Cir. 1986). For a recent case, see *C.R. Bard v. M3 Systems, Inc.* 157 F.3d 1340 (1998).

a partial return to attacks on licensing contracts in intellectual property industries.

With respect to computer software, the federal antitrust agencies recently have adopted the view that "network externalities" and "installed user bases" constitute welfare decreasing barriers to entry. As we noted earlier, the phenomenon of network externalities is either simply a recognition of the existence of scale economies in the production of ideas, or an empirically unsupported assertion about the propensity of markets to choose inefficient standards. Neither the existence of scale economies nor the unproven existence of inefficient path dependence suggests a compelling reason to submit software markets to heightened antitrust scrutiny, especially when such scrutiny can result in the destruction of contracts used to encourage the production of intellectual property.[45]

The most prominent examples have been the recent actions of the antitrust agencies against Microsoft and Intel for various licensing practices.[46] The investigation into Microsoft's licensing practices was initiated by the Federal Trade Commission in 1990, and was subsequently taken over by the Department of Justice ("DOJ") in late 1993 after the Commission deadlocked 2-2 over bringing an enforcement action. On July 27, 1994, the DOJ filed a complaint against Microsoft and a motion to approve a consent decree. In its complaint, the DOJ suggests that Microsoft's licensing practices erected or supported barriers to entry arising from the existence of network externalities and compatibility problems that disadvantaged potential rivals. Various contractual provisions Microsoft had with producers of hardware were challenged under the decree, including per-processor blanket licenses, lump sum fees, minimum commitments, long term contracts, tying, and restrictive non-disclosure agreements.[47]

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[45] These antitrust actions are even more problematic when they are initiated by competitors who often have an incentive to subvert competition by interfering with their rivals' efficient contracting practices. *See Matsushita Electric Industrial Co., Ltd. V. Zenith Radio Corporation, et al.* 475 U.S. 574 (1986) See also Baumol and Ordover (1985), Baxter (1980).

[46] See *United States v. Microsoft* 1995 U.S. Dist. LEXIS 1654 (D.D.C. 1995).

[47] See Levinson, (1995), and Warren-Boulton, Baseman, and Woroch (1995) for analyses of the Microsoft consent decree. Judge Sporkin initially refused to enter the decree as final. See 1995 WL 59480 (D.D.C 1995). The D. C. Circuit reversed and instructed entry of the consent order as final. See Docket nos. 95-5037 and 95-5039, U.S. Court of Appeals (D. C. Cir., June 16, 1995)

However, the mere fact that a certain contractual device serves as a "barrier to entry" does not provide, in a more careful analysis, a reason to condemn the practice. The notion that entry barriers can improve welfare was recognized much earlier by VonWeizsacker (1980), and by Demsetz (1982):

> The [entry] barrier may reduce the severity of some externality or it may bring about improved levels of competition in activities other than that of direct concern.

Certainly, in the context of the model set out above, barriers to entry, in the form of some protection against free riding, are necessary to provide incentives for the development of original software programs. If the weakening of copyright protection for computer software prevents original authors from adequately appropriating a return to their investments, erection of "barriers" through use of blanket licenses, long-term contracts, and restrictions on disclosure by independent software vendors may be a necessary condition for the protection of information not adequately protected by software of patent law. Indeed, the use of restrictive non-disclosure agreements may be a prerequisite to the successful protection of information under trade-secrecy law. A decree that prevents use and/or enforcement of such contractual restrictions under these circumstances may serve to eliminate the original software developer's only method of protecting his investment. This can reduce economic welfare by reducing incentives to produce original software.[48]

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[48] While much of the Microsoft case centered around the supposedly anticompetitive effect of contractual restrictions on imitation operating systems (shown to be efficient in the model set out in Section II if such contracts limit free riding), these contracts can, separate from their function as a substitute for intellectual property protection, be defended on efficiency enhancing transactions and information cost grounds. The use of blanket or package licenses in other contexts have often been viewed as efficient contracts. For example, the use of blanket licenses by the performing rights organizations, BMI and ASCAP, are viewed as an efficient mechanism that decreases the transactions costs of collecting royalties for the public performance of copyrighted works (*BMI v. CBS*, 441 U.S. 1 (1979); Landes and Posner (1989:358); Kobayashi and Yu (1995);, and Kobayashi (1998). Likewise, see *United States v. Paramount Pictures, Inc.* 334 U.S. 131 (1948) (block sales condemned) and the economic analysis of block sales (Kinney and Klein (1983); Stigler (1968); and Bernstein (1992)). See also Marvel (1984) and Marvel and McAfferty (1984) suggesting the efficiency of resale price maintenance and exclusive territories, Klein and Saft (1985) suggesting the efficiency of tie-in sales and a movement toward an rational treatment of tie-ins. But see *Eastman Kodak v. Image Technical Services* 112 S. Ct. 2072 (1992), and Klein (1993).

In contrast, the government characterized Microsoft's non-disclosure agreements with independent software developers (ISV) in the following way:[49]

> [They] not only legitimately protect against the disclosure of confidential information to competing developers of operating systems but also discourage ISVs from developing their own competing systems and/or from developing applications for competing software systems.

That is, instead of viewing non-disclosure agreements as a way to reduce the negative externality caused by free-riding and improve the level of competition, as well as the level of welfare, by stimulating the development of original software, they are instead characterized as "overly restrictive and anti-competitive" because they *prevent* free-riding by ISVs and rival operating systems.

Less noticed at the time of the 1995 decree, the anti-bundling provisions contained in Section IV(E)(I), which prohibited the tying of the sale of the operating system to the sale of other products, became the focus of later DOJ actions. In 1997, the DOJ sought to have Microsoft held in contempt for violating this Section of the 1995 decree by tying Windows 95 and Microsoft's web browser, Internet explorer. Microsoft contended that it had not violated the decree, which explicitly allowed them to offer "integrated products". The district court held that Microsoft's practices did not constitute contempt. However, Judge Jackson held that further proceedings were required to determine if the decree had been violated. In addition, Judge Jackson, on his own motion, entered a preliminary injunction (PI) against conditioning the sale of Windows 95 with the Internet Explorer. In January of 1998, the PI was reversed by the D.C. Circuit, which held that, within the meaning of the decree, Windows 95 and IE were integrated products.

The DOJ, along with numerous states, also filed a separate but related monopolization case based on Microsoft's bundling of Windows 95/98 and the Internet Explorer, and on Microsoft's restrictive contracts with Internet Service Providers (ISP) and Internet Content Providers. The recent acquisition of Netscape by America Online, the largest ICP, illustrates the availability of a competitive counterstrategy to Microsoft's challenged contractual restrictions with ISP and ICP, and has been used by Microsoft as a basis for a Schumpeterian argument for why the current action will irrelevant over the long run.

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[49] *U.S. v. Microsoft* 159 F.R.D. 318 (1995), 56 F.3d. 1448 (1995)

At the center of the government's anti-tying claim is a novel "predation of potential competition" theory. According to this theory, Microsoft, by controlling the browser market, is attempting to perpetuate is monopoly in the operating systems market.[50] If non-Microsoft browsers such as Netscape Navigator are not marginalized or otherwise controlled, they will inevitably spread the use of cross-platform languages such as "Java". If Java becomes widely disseminated, programmers would then find it more attractive to write Java based programs, and Microsoft's OS dominance would be threatened.

A necessary condition for this predation strategy to work is that Microsoft's browser, the Internet Explorer, cannot facilitate the dissemination of Java. Although Microsoft licenses Java, the version of Java contained in IE is a modified, Windows-specific, version that Sun Microsystems, Java's copyright holder, claims does not pass the compatibility tests set out as a condition of their license to Microsoft. In response to this, Sun sued Microsoft for copyright infringement and unfair competition, and the district court entered a preliminary injunction that enjoined Microsoft from further distributing non-compatible versions of Java. This injunction was subsequently vacated by the 9th Circuit Court of Appeals. Resolution of this private case in Sun's favor would *de facto* moot this portion of the DOJ's antitrust case against Microsoft.[51] Resolution in favor of Microsoft would highlight the inconsistency between the intellectual property laws and the DOJ's approach to antitrust law.

Without this novel theory, the tying case simply degenerates into a standard predation case (where Microsoft seeks future monopoly profits from a browser monopoly) or a standard leveraging case where the two products are sold in fixed proportions (Lopatka and Page (1999)). The first seems implausible given that the source code for the rival Netscape browser has been released into the public domain, and the second is implausible as a matter of economics.[52] Thus, the

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[50] See Lopatka and Page (1999). This novel theory is distinct from the standard monopoly leveraging theory of tying, or from standard predation theories in which future monopoly profits from the sale of browsers is the goal.

[51] The judge in the *Sun* case noted that the injunctive relief on the copyright infringement issue would eliminate the basis for the unfair competition claims. *Sun Microsystems v. Microsoft Corp.,* 21 F. Supp. 2d 1109 (Nov. 17, 1998), vacated 188 F.3d. 1115 (9th Cir. 1999).

[52] Other possibilities exist. One possibility is that the DOJ is using the antitrust laws to force Microsoft to satisfy those would demand the operating system unbundled from the browser. However, such a duty has been rejected in previous instances. See *BMI*, *supra*

public action against Microsoft relating to predation via tying seems unnecessary once the private intellectual property litigation is considered.

Although not part of the government's current case, some commentators have argued that Microsoft's Windows operating system has attained the status of an essential facility. One suggested remedy is that Microsoft should be required to pre-disclose the content of the APIs to ISVs at the same time this confidential information is disclosed to Microsoft's application programmers. As the court noted in their decision in *Berkey Photo v. Eastman Kodak,* the "inherent uncertainties" associated with such a duty to disclose such confidential information "would have an inevitable chilling effect on innovation. They go far, we believe, towards explaining why no court has ever imposed the duty [to disclose] Berkey seeks to create here".[53]

While not part of the current Microsoft case, the essential facilities doctrine and mandated disclosure is at the center of the *Intergraph v. Intel* litigation.[54] In this case, Intel, in response to patent infringement claims by Intergraph, terminated its disclosure of confidential information provided in existing license contract with Intergraph. Intergraph then added antitrust and state law contract claims to its lawsuit.

The Intel litigation starkly illustrates the perceived conflict between the intellectual property and antitrust laws (McGowan (1998, 1999)). The district court held that Intel was an essential facility, had a duty to disclose confidential information, and entered a preliminary injunction requiring Intel to provide Intergraph with the confidential information covered by the terminated license contract. The district court also condemned Intel's own intellectual property suits as "retaliatory" and a restraint of trade. In doing so, this district court ignored the Supreme Court's holdings that define the "sham" litigation exception antitrust immunity,[55] and instead strikes at the ability of intellectual property right owners to

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note 48.

[53] 603 F.2d 263 (1979)

[54] 3 F. Supp. 2d 1255 (1998).

[55] Those who petition government for redress are generally immune from antitrust liability, unless litigation "is a mere sham to cover … an attempt to interfere directly with the business relationships of a competitor. *Eastern R. Presidents Conference v. Noerr Motor Freight, Inc.*, 365 U.S. 127. In *Professional Real Estate v. Columbia Pictures*, 113 S.Ct. 1920 (1993), the Court held that litigation cannot be deprived of immunity as a sham unless it is objectively baseless. Whether this was the case in the present case was not addressed.

enforce their rights. The court instead condemns Intel's attempts to enforce their intellectual property rights, noting that "[a] monopolist cannot use the pretext of protecting intellectual property in order to violate the antitrust laws." This preliminary injunction was subsequently vacated by the Court of Appeals for the Federal Circuit.[56] Intel's conduct in the private case was also the basis for the FTC's antitrust action against Intel (Papciak (1999)). Given the litigation in the private antitrust case, it is unclear what marginal value is provided by the public antitrust case.

The DOJ's evaluation of horizontal mergers in software markets also provides an illustration of the use of an ex-post analysis that minimizes intellectual property concerns.[57] In their evaluation of non-intellectual property horizontal mergers, the antitrust authorities have largely adopted the static approach and explicitly consider market structure and barriers to entry as a primary factor in determining the competitive conditions of an industry and in determining whether the proposed merger should be allowed under the federal antitrust laws.[58]

Similarly, the DOJ and the Federal Trade Commission have adopted specialized Guidelines in evaluating licensing and other contractual arrangements

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[56] 1999 WL 1000717 (Nov. 5, 1999).

[57] As scholars of the theory of the firm have pointed out, contractual restrictions and mergers are simply alternative forms of contract. See Bittlingmayer (1988), Williamson (1985), Klein Crawford and Alchian (1978). Our analysis also would apply equally to Microsoft's use of blanket licenses with hardware manufacturers, challenged by the Antitrust Division as an anticompetitive practice, and Apple's longstanding use of vertical integration and proprietary operating systems. Certainly, the comparison between the treatment of Microsoft's relationship with independent hardware manufacturers, and the treatment of Apple, who, until recently, was completely vertically integrated into software and hardware, illustrates this point. Thus, concerns over the use/creation tradeoff should extend into the area of both horizontal and vertical mergers.

[58] Typically, the analysis begins by calculating market shares and concentration indices in markets defined as "relevant." Based on these statistics, the agencies make a determination of whether the industry is or is not concentrated and the extent to which the merger will increase the level of concentration. If the market is determined to be concentrated, the agencies consider whether entry by a new firm would be "timely, likely and sufficient" to counteract what they perceive would be anticompetitive effects of the proposed merger. If entry does not meet these criteria, or if the agencies believe that particular barriers to entry exist, it is likely they will oppose the merger or require the parties to restructure the transaction that would alleviate their concerns.

between firms in intellectual property industries.[59] Like the analysis of mergers in non intellectual property markets, the intellectual property guidelines find the potential for competitive harm depends on structural and static characteristics of the market such as concentration and barriers to entry into innovation markets.[60] While the introduction of the specialized intellectual property guidelines suggests an awareness that some special attention should be given to the use/creation tradeoff, nowhere in the set of examples that make up the guidelines are any indications that enforcement under these guidelines will do so in a serious fashion.

These market structure and innovation inquires are often linked to Joseph Schumpeter. However, such analyses seem to stand Schumpeter writing on its head. Indeed, Schumpeter explicitly rejected the static structuralist approach:

> [E]conomists who, ex-visu of a point of time, look for example at the behavior of an oligopolist industry – an industry which consists of a few big firms – and observe the well-known moves and countermoves within it that seem to aim at nothing by high prices are restrictions of output are making precisely [the mistaken hypothesis that there is a perennial lull].

One example of the federal antitrust agencies' reliance on the structural and static analysis is the acquisition of Ashton-Tate Corporation ("Ashton-Tate") by Borland International ("Borland"). The DOJ concluded that the market for relational database management software systems (RDBMS), which included both Ashton-Tate's dBASE and Borland's Paradox, was concentrated, that the proposed merger would significantly increase the level of concentration, and that entry into the antitrust market was difficult and time consuming. Based on this analysis, the DOJ filed an antitrust complaint alleging that the acquisition would lessen competition in an antitrust market for RDBMS.

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[59] See Antitrust Guidelines for the Licensing of Intellectual Property, (IP Guidelines) issued by the U.S. Department of Justice and the Federal Trade Commission, April 6, 1995. The IP Guidelines provide a nonexhaustive list of typical practices that could raise antitrust concerns, including licenses between horizontal competitors (Sec. 5.1), resale price maintenance (Sec. 5.2), tying (Sec. 5.3), exclusive dealing (Sec 5.4), cross licensing and pooling arrangements (5.5), grantbacks (Sec. 5.6), and acquisition of intellectual property rights (Sec. 5.7).

[60]IP Guidelines, Sec. 4.1 See also Arrow (1960), Kamien and Schwartz (1982) Loury (1979), Dasgupta and Stiglitz (1980). For a critique of the static market structure approach, see Demsetz (1969), Nelson and Winter (1982).

In both its competitive analysis of the industry and in the conditions included in the Final Judgement, the government took the position that the imitator firms, the producers of xBASE clone software, were important and valuable competitors in the market .

In evaluating the competitive effects likely to result from the acquisition, it was particularly relevant that several of the smaller competitors in the RDBMS software market offer compatibility with the dBASE standard by using some of the command names, menu command hierarchies, command languages and other features of the dBASE programming language. As a result, dBASE customers can switch to those products (known as "xBASE clones") at lower cost than to other products.

Subsequently, a consent was entered into whereby the government would allow the transaction to proceed if the parties agreed to certain conditions.[61] In the decree, the government required Borland to dismiss Ashton-Tate's copyright infringement claims against Fox Software Inc., the largest producer of the xBASE clone software, and enjoined Borland from asserting claims of copyright infringement related to the dBASE family of products.[62]

In effect, by eliminating the ability of the copyright holder to enforce their intellectual property rights, the DOJ'S consent encourages imitation through the creation of an open standard and achieves the same result as the *Lotus v. Borland* case (Levinson (1996)). Through their endorsement of the imitators, the government clearly failed to consider the potential implications of their actions on the incentives of Ashton-Tate as well as other software firms for the future development of new products in the future. The government's intent was explicit:

> ...the essence of this Final Judgment is prompt and certain remedial action to ensure that, ... Defendants' ability to exercise market power and restrain competition in the sale of relational database management system software is *not enhanced by an attempt to enforce claims to certain alleged intellectual property*

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[61]See Final Judgement, *United States v. Borland International, Inc., and Ashton-Tate Corporation,* Civil Action no. C 91-3666 MHP, (October 22, 1991).

[62] According the DOJ, the dBASE family of programs had become an industry standard with other companies in the industry marketing "xBASE clone" imitation programs. Paradox was seen to be the major competitor of dBASE and the xBASE clones.

rights. [emphasis added] [63]

Conclusion

In a consistent framework, both the antitrust and intellectual property laws should point toward the same goal: the maximization of social welfare. The attainment of such a compatible goal suggests that both sets of laws should be harmonized to attain this common goal and come to a joint solution with respect to the use/creation tradeoff.

However, an examination of the state of antitrust and intellectual property right protection for software does not suggest movement toward the goal of maximizing welfare. There is little evidence that the antitrust enforcement agencies consider seriously the unique appropriability and free riding problems facing intellectual property owners. As a result, the history of antitrust enforcement has been hostile to intellectual property contracting and intellectual property industries. Further, ex-post competition arguments are now being used in support of weakening copyright protection. The outcome of this two-pronged attack is unlikely to yield a rational solution to the use/creation tradeoff.

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[63]Final Judgement, *supra* note 61.

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Appendix

In this appendix, we set out the model and specific assumption used to generate the simulation results listed in Table 1. At the time the decision to invest in producing an original or imitation version of the source code, the profit functions for each type of inventor equal:

(1) $\qquad \pi_O = [P(Q) - a_O]q_O - F_O$

(2) $\qquad \pi_I = [P(Q) - a_I]q_I - F_I$

where Q total quantity of software units produced and sold, and $P(Q)$ is the market demand function.

The first order conditions for profit maximization equal

(3) $\qquad [P(Q) - a_O] + q_O \partial P(Q)/\partial q_O = 0$

(4) $\qquad [P(Q) - a_I] + q_I \partial P(Q)/\partial q_I = 0.$

Solving these equations for q_O and q_I yields the individual firms' reaction functions.

Under the further assumptions of linear market demand, we can derive the Cournot quantities and profits for each type of firm for a given period. Let there be N_O original and N_I imitation versions of the source code. Imposing symmetry restrictions across firms of the same type, and assuming that market demand $P(Q) = 1 - N_O q_O - N_I q_I$, the first order conditions become

(5) $\qquad q_O = (1 - (N_O-1)q_O - N_I q_I)/2$

(6) $\qquad q_I = (1 - N_O q_O - (N_I - 1)q_I)/2.$

Solving for q_O in (5) and q_I in (6) yields the following reaction functions:

(7) $\qquad q_O = (1 - a_O - N_I q_I)/(1 + N_O)$

(8) $\qquad q_I = (1 - a_I - N_O q_O)/(1 + N_I)$

Simultaneously solving this system of equations yields the equilibrium Cournot quantities for each type of firm in any given period:

(9) $\qquad q_O{}^* = (1 - a_O(1+N_I) + N_I a_I)/(1+N_I+N_O)$

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(10) $\qquad q_I^* = (1 - a_I(1+N_O) + N_O a_O)/(1+N_I+N_O).$

Assuming that the static per-period profits are collected in perpetuity, the present value of Cournot profits net of the costs of authorship or imitation eual

(11) $\qquad \pi_O^* = [(1 - a_O(1+N_I) + N_I a_I)/(1+N_I+N_O)]^2/r - F_O$

(12) $\qquad \pi_I^* = [(1 - a_I(1+N_O) + N_O a_O)/(1+N_I+N_O)]^2/r - F_I,$

where r is the appropriate discount rate. This assumption is made for expositional convenience, and is not crucial to the analysis. Nor is the assumption that original and imitator versions of the software are sold in all periods crucial to the analysis. A more realistic assumption would be that the original inventor obtains a first mover advantage, in which he and the other original inventors obtain higher profits for a short time period prior to the onset of imitation entry. It is sufficient to note at this point that the effect of a first mover advantage is analytically identical to decreasing the difference between F_O and F_I. Thus, that inclusion of these considerations at this point in the analysis would unnecessarily complicate the analysis without changing the implications of the analysis.

The equilibrium market price is given by

(13) $\qquad P^*(Q^*) = 1 - N_O q_O^* - N_I q_I^*$

The equilibrium present value of total welfare equals

(14) $\qquad TW^* = (1 - P^*(Q^*))(N_O q_O^* - N_I q_I^*)/2r + \pi_O^* + \pi_I^*$

While traditional antitrust models based on the Cournot model treat the number of firms as exogenously determined, the number of firms in our model is endogenously determined. Thus, our analysis now turns to the determination of the equilibrium number and distribution of firms. We assume that, given the existence of at least one version of the original source code, the marginal firm can choose to enter either with its own original version of the source code or with an imitation version of the source code. Thus, a distribution of firms (N_O^*, N_I^*) is an equilibrium if the following set of conditions are met. First, given the requirement that imitation versions cannot exist in the absence of at least one *original* version of the source code, the existence of an equilibrium requires that

(15) $\qquad N_O^* \geq 1 .$

Second, further entry by either an original or imitation firm cannot be profitable, i.e.

(16) $\qquad \pi_O(N_O^*+1,N_I^*) < 0$

(17) $\qquad \pi_I(N_O^*,N_I^*+1) < 0$

Third, no existing firm of one type can make higher profits by changing its decision on whether to produce an original or imitation version, so that

(18) $\qquad \pi_O(N_O^*,N_I^*) > \pi_I(N_O^*-1,N_I^*+1)$

(19) $\qquad \pi_I(N_O^*,N_I^*) > \pi_O(N_O^*+1,N_I^*-1).$

Finally, all existing firms must expect that the present value of their investment in producing an original or imitation version of the software program must be profitable, so that

(20) $\qquad \pi_O(N_O^*,N_I^*) > 0.$

(21) $\qquad \pi_I(N_O^*,N_I^*) > 0.$

In order to generate the simulation results reported in Table 1, we made specific assumptions about the relationship between the level of copyright protection z and the cost of producing an original and imitation version of the source code. Absent copyright protection, the cost of imitation is assumed to be less than the cost of producing an original, i.e., $F_O(0) > F_I(0)$. In addition, we assume that both $F_O(z)$ and $F_I(z)$ are assumed to be increasing in z, and that increases in z disproportionately affect the cost of imitation, i.e., $F'_O(z) < F'_I(z)$.

Finally, we assume that the level of contractual restrictiveness affects the marginal costs of distributing software. We assume that $a_O(0) = a_I(0),$ and that $a'_O(k) < 0$ and $a'_I(k) > 0.$ Specifically, we assume that

(22) $\qquad F_O(z) = .4 + .05z$

(23) $\qquad F_I(z) = .1 + .10z$

(24) $\qquad a_O(k) = .01 - .001k$

(25) $\qquad a_I(0) = .01 + .01k$

Table 1
Simulation Results

	A. (z = 0) $F_I = .10$ $F_O = .40$	B. (z = 1) $F_I = .20$ $F_O = .45$	C (z = 2) $F_I = .30$ $F_O = .50$	D. (z = 3) $F_I = .40$ $F_O = .55$	E. (z = 4) $F_I = .50$ $F_O = .60$
I. (k = 0) $a_I = .010$ $a_O = .010$	No Equilibrium	No Equilibrium	No Equilibrium	No Equilibrium	No Equilibrium
II. (k = 1) $a_I = .020$ $a_O = .0095$	No Equilibrium	No Equilibrium	No Equilibrium	No Equilibrium	No Equilibrium*
III. (k = 3) $a_I = .030$ $a_O = .0090$	No Equilibrium	No Equilibrium	No Equilibrium	No Equilibrium*	No Equilibrium*
IV. (k = 4) $a_I = .040$ $a_O = .0085$	No Equilibrium	No Equilibrium	No Equilibrium*	No Equilibrium*	$N_O,N_I=3,0$ P = .256, Q = .74 GW = .46 NW = .28
V. (k = 5) $a_I = .050$ $a_O = .0080$	No Equilibrium	No Equilibrium	No Equilibrium*	$N_O,N_I=2,1$ P = .267, Q = .73 GW = .45 NW = .30	$N_O,N_I=3,0$ P = .256, Q= .74 GW = .46 NW = .28
VI. (k = 6) $a_I = .060$ $a_O = .0075$	No Equilibrium	No Equilibrium*	No Equilibrium*	$N_O,N_I=3,0$ P = .256, Q = .74 GW = .46 NW = .30	$N_O,N_I=3,0$ P = 256, Q = .74 GW = .46 NW = .28
VII. (k = 7) $a_I = .070$ $a_O = .0070$	No Equilibrium	No Equilibrium*	$N_O,N_I=3,0$ P = .255, Q = .74 GW = .46 NW = .31	$N_O,N_I=3,0$ P = .255 Q = .74 GW = .46 NW = .30	$N_O,N_I=3,0$ P = .256, Q = .74 GW = .46 NW = .28
VIII. (k = 8) $a_I = .080$ $a_O = .0065$	No Equilibrium	No Equilibrium*	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .31	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .30	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .28
IX. (k = 9) $a_I = .090$ $a_O = .0060$	No Equilibrium	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .33	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .31	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .30	$N_O,N_I=3,0$ P = .255, Q = .75 GW = .46 NW = .28