Back to the Future: Can copyright owners appropriate revenues in the face of new copying technologies?

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> For economic incentives to work appropriately, property rights must protect the rights of capital assets….At present…severe economic damage [is being done] to the property rights of owners of copyrights in sound recordings and musical compositions…under present and emerging conditions, the industry simply has no out…Unless something meaningful is done to respond to the…problem, the industry itself is at risk.

1. Introduction

The above quote appears to be taken from today's headlines. Yet the quote had nothing to do with digital copying. In fact, it predates MP3 files and is essentially contemporaneous with the introduction of the IBM PC. The quote is from Alan Greenspan in 1983, before he became chairman of the Federal Reserve.[1] His concern was with the specter of home audio taping, but he was writing as a paid consultant to the recording industry which perhaps explains his bit of hyperbole. Time has shown that the industry did not fail. As we all know, LP records morphed to a digital format now known as CDs, and the industry continued in relatively good health. Although one can debate whether copying technology hurt copyright owners to any measurable extent, it certainly did not undo the industry.

My talk today is going to focus on the impact of copying on copyright holders, their ability to appropriate revenues, and our understanding of the economics of this relationship. It is a subject that I have thought about for a long time. It is a subject that has become increasingly newsworthy as intellectual property becomes a greater share of the economy and as technologies for copying these properties become increasingly efficient at doing so.

It is unclear whether copyright, can continue to provide ample incentives for artistic creation. Will authors be able to appropriate more or less of their works' value than they have in the past? How does digital storage change the balance between authorized and unauthorized use? What legal rules strike the best balance between consumptive efficiency and productive efficiency? What pricing schemes are likely to arise? That is, how do we maximize use and creation at the same time? And a question I find increasingly puzzling: why hasn't the rampant

downloading of MP3 files, which would otherwise seem to actually surpass legitimate sales, had a measurable impact on CD sales? I will return to this later.

These are important questions. They are questions that we have been trying to answer for several decades. They are questions still in search of answers that can be stated without being categorical.

For perspective, we should remember that copying technologies have been in existence for several generations.[2] It is useful, to understand any real world phenomenon, to know something of its history. For those coming to this area in the last few years, I present a little history of the economic analysis involved, which naturally also has at least a slight involvement with what was going on in the world.

2. What do we know of The Economic Impacts of Copying?

Not as much as we would like to.

The issue at the heart of copyright, indeed of all intellectual property law, is the degree to which the copyright owner can appropriate the value produced by the consumption, or appreciation, of his work by others and the degree to which this appropriation hinders consumption.[3]

The correct level of appropriation is at the center of many disputes, both current and historical. How much appropriation is the right amount?[4] Is it possible to have too much

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[1] From Greenspan's testimony in 1983 on the Home Recording Act . Hearings before the Subcommittee on Patents, Copyrights and Trademarks, October 25, 1983.

[2] The concept of Indirect appropriability, to be defined in more detail below, was first propounded in my 1981 monograph for the Canadian Government "The Impact Of Reprography On The Copyright System," Copyright Revision Studies, Bureau Of Corporate Affairs, Ottawa, 1981 but the actual term "indirect appropriability" was coined in my 1985 paper "Copying And Indirect Appropriability: Photocopying Of Journals," *Journal Of Political Economy*, October, 1985,pp. 945-957.-30 cites). The 1981 monograph is available at http://papers.ssrn.com/sol3/papers.cfm?cfid=565423&cftoken=13632430&abstract_id=250082)

[3] This focus leaves aside the *moral rights* to that value that are so important under Napoleonic legal systems, but is in keeping with the practical purpose of intellectual property laws in countries such as the U.S.

[4] One school of thought at the extremity of these debates is populated by those who believe that no copyright is required at all for an efficient functioning market for artistic and creative goods. The members of this group believe either that being first in the market provides sufficient appropriability that no additional legal protection is required, or, that sufficient incentive to produce these products exists with other forms of remuneration, perhaps of a

appropriation? What impact do technologies have on appropriation? Economists studying the impacts of copying were at first mainly interested in determining the amount of harm to copyright owners, and whether, copying would engender any net harm at all to the rest of society. Later, the question of whether the copyright owner would be harmed was itself questioned.

A. The 'old' literature

Economists historically have tended to focus on the tradeoff between consumption efficiency (maximizing the net value consumers get of any produced intellectual product) and production efficiency (preserving incentives to create these products efficiently). On the one hand, if the copyright holder could not appropriate any revenues, the creators of intellectual properties would be expected to produce too few intellectual products, probably far fewer than would be optimal.[5] On the other hand, by providing some degree of control over the use of these products to copyright owners by restricting others' ability to make copies, consumption of these products is decreased from "ideal" levels.[6]

In reality, the "monopoly" conferred by copyright is no greater than the monopoly that each worker has on his or her efforts, or that each firm has on products bearing its name. Still, monopoly power or not, the ideal number of reproductions of a public good—a public good being defined as a good that does not get used up when consumed, what is called non-rivalrous

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nonpecuniary nature, such that legal rules restricting the control of these products to their creators is unnecessary. The former school of thought is represented by Arnold Plant "The Economic Aspects of Copyright in Books." *Economica*, (May 1934): 167-95, and R. Hurt, and R. Schuchman, "The Economic Rationale of Copyright.," *American Economic Review*, May 1966. The latter school of thought is represented by organizations such as the Free Software Foundation (at http://www.gnu.org/fsf/fsf.html).

[5] In truth, there is virtually no empirical evidence on the extent to which copyright owners require remuneration to create their artistic works. However, the claim that production requires, to at least some extent, remuneration of the producers, is fully consistent with the usual market principles adduced from numerous other instances. Adam Smith's famous quote about how production doesn't come from the "benevolence" of butchers, bakers, or candlestick makers, but instead derives from their self interested behavior, certainly has a plethora of empirical evidence to support it.

[6] This restriction in use is sometimes carelessly referred to as a loss due to the "monopoly" of the copyright owner. As Edmund Kitch (a law professor at the University of Virginia who has written extensively on intellectual property issues) correctly points out, providing property rights does not confer economic monopoly—which would imply that consumers have only a small number of alternative products that are not very good substitutes. See Edmund W. Kitch, "Elementary and Persistent Errors in the Economic Analysis of Intellectual Property" 53 *Vanderbilt Law Review*, November, 2000, p. 1727.

consumption—would require a quantity of reproductions above the level that copyright owners would find in their best interest to produce, and thus too few reproductions would be created.[7]

In this tradeoff, copying was not an issue. The choice was one between lengthier or shorter copyright protection, and as such I believe these tradeoffs are correct as they stood.

Economists, however, like nothing better than to overturn previously held notions. After all, how else is science to progress? And how else are we going to get published if we can't say something that seems new?

The early articles on the subject are Ordover and Willig (1978), a comment on them by Liebowitz and Margolis (1982), Liebowitz (1981), Johnson (1984) Novos and Waldman (1984, and Liebowitz (1985).[8] These papers had different models of how copying harm might be modeled. Of course, this is a relatively small literature that has barely made its way out of the rather narrow circle of economists who study the issue.[9]

Ordover and Willig had a model where libraries can perfectly appropriate value from readers and publishers can price discriminate between libraries and individuals. Although this is not exactly a case of copying, the sharing of goods in the library is certainly a close cousin. Ordover and Willig claimed that it is efficient for libraries to impose a usage fee on library

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[7] There are actually two definitions of public goods in the economics literature. The first defines them as goods with non-rivalrous consumption, as in the text. The other, more prevalent definition, is due to Paul Samuelson. It has an additional component to the non-rivalrous consumption assumption. The additional component is the inability to exclude individuals from consuming the good, as would be the case for national defense or any good without defined property rights. I believe this latter definition to be far les useful since it conflates two independent ideas that need not have anything to do with one another. Any good for which non-excludability is a property will not be efficiently produced in markets. And non-excludability usually has more to do with the laws and technology than with the good itself.

[8] I include the number of cites to indicate just how small this literature is. Ordover JA and Willig RD "Optimal Provision of Journals Qua Sometimes Shared Goods," American Economic Review 68 (3): 324-338 1978 [17 cites, 0 Law Review]; Liebowitz SJ and Stephen E Margolis, "Journals As Shared Goods: Comment," American Economic Review, June, 1982, Pp. 597-602 [1 cite, 0LR]; Liebowitz 1981, see footnote 2 [9 cites, 0LR]; Novos, Ian E. and Michael Waldman, "The Effects of Increased Copyright Protection: An Analytic Approach" Journal of Political Economy, April 1984, pp. 236-246, Vol. 92, No. 2) [21 cites, 3LR]; Johnson, William R. "The Economics of Copying," Journal of Political Economy 93 (February 1985): 158-74 [22 cites, 3 LR]; Liebowitz 1985, see footnote 2 [30 cites 5 LR].

[9] Contrast these cites with the paper on copyright by Landes and Posner, which has generated 126 cites, with over 75% coming from law reviews. This should tell economists that if they want to have an impact they need to think about reaching an audience outside of economics journals, particularly an audience of law professors. And perhaps they need to be as good as Landes and Posner.

patrons instead of perfectly appropriating funds through lump sum levies. This is counterintuitive, and the Liebowitz-Margolis comment claimed that it was also incorrect. The library usage fee, if paid to the publisher, can be interpreted as the imposition of a copyright royalty, which is one linkage to the copying/copyright literature.

Novos and Waldman modeled a variant of the underproduction and underconsumption tradeoff and reached conclusions that they claimed are quite different from the traditional tradeoff notions mentioned above. To my mind, however, Novos and Waldman generated their results more by altering the definitions of the tradeoff than by any new insights. The typical underproduction/underconsumption tradeoff is in terms of *quantity* of intellectual property titles created and *quantity* of the duplicates made from each title. Novos and Waldman modeled *quality*, not quantity, and are thus not able to explicitly compare their results to the traditional findings. Many results in economics that hold for quantity do not necessarily hold for quality. For example, monopolists reduce quantity but they do not necessarily reduce quality. So it isn't clear that their results run counter to any previously held findings.

Novos and Waldman do add into their model the fact that the copyrighted item can be illicitly copied. In their model, consumers can switch back and forth from being legitimate purchasers to larcenous copiers. This was certainly a useful novelty to the model. There is also the assumption that copying is a less efficient technology than producing originals and so a new form of welfare loss is possible when copies replace originals and the production costs rise above efficient levels. Johnson, as did Novos and Waldman, models social welfare when potential consumers copy instead of purchase a product. His emphasis is on the cost differential between the commercial publisher of originals and the inefficient home copier. Both models conclude that copying harms the copyright owner, and are mainly concerned with whether society is harmed or not. The answer, in both cases, is maybe.

The break with the claim that copying necessarily harms copyright owners starts with my 1981 study for the Canadian government. I borrowed a theoretical model of the market for new and used goods from Benjamin and Kormendi and applied it to the case of copying (several years later Besen and Kirby extended my theoretical model). The major insight is an understanding that the price of the original might go up if copies can be made since consumers of originals

value the ability to make copies (as CD producers are likely to discover when they implement their anticopying technology in a serious way). If the amount of copying is fairly uniform, the copyright owner merely has to raise the price of the originals to capture this value. If the amount of copying is variable, then the copyright owner would need to charge higher prices to those consumers of originals making the most copies, in other words, he needs to be able to price discriminate. In my 1985 paper I used the term "indirect appropriability" to describe this situation. The idea often seems somewhat unlikely to occur, but I think that it has greater applicability than generally understood. And unlike many other models, it has empirical work to support its basic conclusions.

My 1981 and 1985 papers also used the term 'exposure effect' to describe an instance of sales going up because copying allowed users to become familiar with products that they might eventually buy. This concept plays an important role in the defense made by Napster, although the concept now goes by the name 'sampling'. As I showed in my 1981 paper and repeat below, however, sampling or exposure does not have an unambiguously positive impact on the copyright owner, contrary to current claims.

B. The newer literature

The copying literature received a slight rekindling of interest from the network effects literature that developed in the mid 1980s but more fully blossomed in the 1990s. Network effects exist when the value of a product to one consumer changes (increases) the more other consumers of the product that there are.[10] A fax machine, for example, becomes increasingly valuable when there are additional other fax machines to which faxes can be sent or from which they can be received.

If network effect exist and are strong, one can imagine that illicit copying provides value to legitimate purchasers, and it become conceivable that illicit copying might benefit copyright

[10] See, for example, Stan J. Liebowitz and Stephen E. Margolis "Network Effects and Externalities" entry in *The New Palgrave's Dictionary of Economics and the Law*, Macmillan, 1998, Vol. 2, pp. 671-675.

owners. This is the key idea behind several papers. The key papers in this area are Conner and Rumelt, Takeyama, Brynjolfsson.[11]

An example of network effects for products prone to piracy might be word processing software that becomes more valuable to a user the more other individuals are using the same word processor. With more users, it becomes easier to exchange files with a greater number of people. In such an instance, it is conceivable that the extra value that paying customers receive from the larger user base that is enhanced by users of pirated versions might outweigh any revenues lost by the copyright holder from being unable to prevent piracy. Conceivable, but in my opinion unlikely, given that network effects are very unlikely to be very strong in most of these markets.

If the prevention of copying would result in few former pirates paying the asking price, the prevention of unauthorized copying might prove financially harmful to the interests of the copyright owner. Of course, if all or enough of the pirates were to become purchasers of authorized versions when pirating was no longer possible, then the prevention of piracy would still be remunerative for the copyright owner even in the presence of network effects.

Note that models where network effects make authors better off are clearly models where appropriability is diminished since there is no appropriation of the value generated by the illicit copiers.[12] In terms of a simple analogy, if we increase the size of the pie, even a smaller share might lead to a piece that is of larger absolute value. In such a case, the copyright owner would still suffer harm compared to an instance where appropriability was kept constant (unless it were impossible to increase the size of the pie without also decreasing the share going to the copyright

[11] See Lisa N. Takeyama, "The Welfare Implications of Unauthorized Reproduction of Intellectual Property in the Presence of Demand Network Externalities," *Journal of Industrial Economics*, 42, 1994, pp. 155-166; K. R. Conner and R. P. Rumelt, "Software Piracy-An Analysis Of Protection Strategies," *Management Science* 37 (2): Feb. 1991, pp. 125-139.; Oz Shy and Jacques-Francois Thisse, "A Strategic Approach to Software Protection," *Journal of Economics and Management Strategy*, 8, 1999, pp. 163-190.

[12] One could, however, alter the nature of imperfect appropriation before the advent of illicit copying so that after the network effects kicked in, appropriation from legitimate purchasers went up, but this would be a narrow theoretical possibility inconsistent with the flavor of this model.

holder).[13] This distinction is relevant to discussion of the impact of technologies on the financial remuneration achieved by copyright holders.

3. Economic Factors that might Ameliorate the Impact of Copying Technology

The basic concern that copying is likely to be harmful should probably be assumed to be correct in most circumstances. What I describe below are the exceptions to the more general rule that allowing potential consumers to pirate copies of a work is likely to reduce the revenues available to the copyright owner. It is an empirical question just how likely

A. Indirect Appropriability

As noted, sometimes copyright owners are able to collect revenue from unauthorized copiers by charging higher prices for the originals from which the unauthorized copies are made, a result known as "indirect appropriability." The basic mechanism is simple: if the copyright owner knows which originals will be used to make copies, a higher price can be charged for them, allowing the copyright holder to capture part, all, or more of the revenue than might have been appropriated through ordinary sales if unauthorized copying could be prevented.

This can be made clear with a simple example. Assume that each and every purchaser of a compact disc makes a single audiocassette copy to play in their automobile. No one makes copies from borrowed CDs. Assume further that this copying, although illegal, is unstoppable. What would be the impact on the copyright holders who, in addition to selling compact discs had also planned to sell pre-recorded tapes?

Since each original CD will have a copy made from it, and since it is reasonable to infer that the consumers of originals place some value on the ability to make a copy, each consumer's willingness to pay for the original CD is higher than it would otherwise be. The copyright owner

[13] This might seem to complicate the policy issues, but it actually simplifies them. If a technology decreased appropriability but increased payments to copyright holders, then it would both provide greater incentives to create the copyrighted material and also provide greater value to consumers who get to keep the non-appropriated value. Removing this technology would decrease value regarding both the number of titles and value received for each produced title, and couldn't be economically beneficial.

can capture some of this additional value by charging a higher price for the CD.[14] This is the basic idea behind indirect appropriability. The logic here is the same as would be true for any durable good that can be resold into another market. If automobiles could not be resold, for example, the price that consumers would be willing to pay for new autos would undoubtedly fall.

Whether the copyright owner is better off or worse off in a regime of unfettered copying depends on the particular circumstances. Assume, for example, that all consumers would be willing to pay $9 for a particular CD and would also be willing to pay $4 for a cassette tape of the same music that they can play in their automobile cassette players (assume they do not have CD players in their cars). If home taping were allowed and consumers made cassettes, the sellers of CDs would discover that they could raise the price of CDs to $13 without any loss of sales (assuming zero cost for the cassette and the time to make the tape). If home taping were disallowed, under the same assumed circumstances, the seller of pre-recorded tapes could charge a price of $4 and capture this group's value. In this case (where the costs of making cassettes is assumed to be zero), the seller would be unharmed by the copying, and thus presumably indifferent to whether copying was allowed or not.

If there are costs in making copies, whether preventing taping would be profit enhancing or decreasing would depend on the relative cost between individuals and firms of making and delivering copies. If it is much less expensive to make pre-reordered cassettes commercially than to have them made at home, one at a time, then it would be inefficient to have personal copying replace commercial production and the copyright owner will not be able to net as much from the home-taping consumer (who deducts the cost of the blank cassette and time from his willingness to pay) as he would from a sale of cassettes. Note, however, that costs include shipping, inventorying, and delivery to the consumer, not just manufacturing, so that the cost advantages of pre-recorded tapes are at least questionable.

Another complicating possibility would arise if there is a sub-group of music listeners that purchases pre-recorded tapes for the home instead of purchasing CDs. If the price that had been established for this group was also $9, say, then the seller of prerecorded tapes is in something of

[14] Unless, that is, the extra value that the marginal purchaser of originals receives is zero. This would seem unlikely, however.

a bind in terms of capturing revenues from both groups of cassette listeners. If the price of pre-recorded cassettes were lowered to $4 to capture the value from the automobile cassette users, the seller would lose $5 from those individuals who would be willing to pay $9 to purchase prerecorded tapes for home-listening**.** If the seller keeps the price at $9 then he will make no sales to those wishing to listen to cassettes in automobiles.

In this case allowing copying would benefit the copyright owner. Indirect appropriability would allow the seller to capture the $4 from CD purchasers by raising the price of CDs to $13, and the seller could still collect the full $9 from those who buy pre-recorded tapes for the home (the assumption that no copies are made from borrowed CDs is still in place). In this instance, allowing copying is more profitable for the seller of tapes and CDs. Of course, many other possibilities can be imagined, but the result that allowing unfettered copying *may* improve the revenue position of the copyright owner, is clearly feasible.

Note that indirect appropriability implies that the purchasers of CDs in the previous example actually pay copyright owners, albeit indirectly. Fair use, a defense to copyright infringement that allows copying in certain cases (discussed in more detail below), might protect the copiers from legal liability, but it does not prevent the "fair-users" from indirectly paying the copyright owners.

There is at least one documented instance where the impacts of indirect appropriability are strong and where unauthorized copying appears to have benefited copyright owners—that is the case of photocopying discussed below.

Of course, just because indirect appropriability might be capable of securing profits doesn't mean that it will succeed in any particular case. An important factor that influences the likelihood that indirect appropriability might work is the variability in the number of copies made of each original. Note that in the CD automobile-cassette example, each CD was used to make one tape, therefore no variability existed in the number of copies per original. If each CD had been used to make two cassette copies that would not have changed the story since there still would not have been variability. But if some CDs were used to make no copies and others were used to make 1000 copies, then indirect appropriability becomes difficult or impossible.

In the photocopying case to be discussed below, the number of copies made from originals is quite different for two types of originals in since library users make many photocopies from each original whereas personal subscribers make few copies. Because the seller could distinguish between the two groups, however, and charges different prices, indirect appropriability was able to work. But the greater the variability in the number of copies made from each original, the more difficult the task becomes of identifying how many copies are made from each originals and charging appropriate prices that match the number of copies made. In many cases it will be impossible to charge different prices to different users for identical originals, since one can not usually identify the purchaser's copying intent when the original is purchased.

Therefore, in an atmosphere of rampant copying and variability in the number of copies made from each original, the seller will generally find it impossible to identify which originals should have the higher price and successfully charge higher prices for them. That is why instances of illicit organized copying, where a single original might be used by a copier to make thousands of copies, are so much more dangerous to copyright holders than unorganized copying where individuals make one or two copies for themselves.

Note also that when copying occurs, the least variation in the number of copies made from originals tends to occur when *copying is* ubiquitous *and similar*. Thus if some copying is difficult to stop it might be profitable for copyright owners to encourage everyone to engage in the same degree of copying because that can afford the copyright holder some degree of appropriability. This has interesting implications for Napster and other digital distribution techniques as discussed below.

There is one other form of indirect appropriation worth noting. In some instances legislation may allow copyright owners to collect revenue in a manner other than charging for use. So, for example, a tax could be imposed on blank audiotapes or recorders.[15] But this would not directly charge users for the right to copy, since audio tapes can be used to tape works for which copyright clearance was given or for taping non-copyrighted works. For example, people buying digital audio tapes pay an additional amount that goes to the copyright owners, but is

[15] Such payments are quite common and can be found in many countries including Canada and much of Europe. These payments would normally go to an organization or collective representing copyright owners.

only indirectly related to copying. We can refer to this as *explicit* indirect appropriability as opposed to the *implicit* indirect appropriability described earlier. On the other hand, an organization such as the Copyright Clearance Center (CCC) tries to directly appropriate revenues for the copyright owners. The CCC gathers rights from publishers and licenses libraries to make copies upon the payment to the CC—with the payment being a function of how much and what is copied based on CCC surveys of copying in the libraries,

B. Exposure Effects

Then, of course, there is the possibility that peer-to-peer systems might help copyright owners by making it easier for users to sample songs. If Napster were merely used to "try out" a song or an album, as might be done alternatively in a record store or by listening to the radio, then Napster use would be a complement to a CD purchase, not a substitute. In fact, Napster's experts in its court hearings have made this claim, the evidence for which will be examined in more detail in the next section. Of course, the difference between listening to a song in a store or on the radio and listening to the song using Napster is that in the latter case an actual physical representation of the song is in the possession of the user whereas in the former cases only the memory of the tune remains in his possession.

Even if it were the case that Napster were used merely for sampling, its impact on the CD market need not be the benevolent one espoused by Napster's supporters. The usual assumption is that if Napster merely helps people to decide which CDs to purchase, that it cannot be harmful and would most likely be beneficial to the copyright owner. Since Napster is only providing information to consumers, or so the argument goes, this activity must benefit society and copyright owners. From this perspective, because of Napster consumers are better able to select songs that provide the greatest enjoyment for the time and money. It seems natural that they should then be willing to pay more for the CDs they purchase.

As appealing as this story is, however, it is not correct and can be quite misleading.[16] The fact that the consumer is better able to satiate his desire for music with the CDs that he purchases implies that the number of CDs purchased quite possibly would fall.

With better sampling, CDs purchased provide greater utility because they better fit the desires of consumers, therefore consumers have a higher willingness to pay.[17] But assuming that CDs all basically meet the same need for music consumption, the CDs purchased provide greater value and do a better job of satiating the desires of the consumers. So consumers may discover that they do not need to purchase as many CDs since their thirst for music can be quenched with fewer of them.[18] Depending on supply conditions, it can be shown that the total quantity of CDs, their price, and the total revenue in the market may go either up or down.[19]

This can be fairly easily demonstrated using supply and demand. In essence, the ability of consumers to better select CDs will rotate the market demand curve for CDs clockwise, from D1 to D2 in Figure 1. The demand curve rotates in this manner because the initial CDs purchased now provide greater utility because they better fit the desires of consumers, therefore consumers have a higher willingness to pay. But, assuming that all CDs all basically meet the same need for music consumption, there is less value placed upon the purchase of later CDs since the need for music is met so well by the early CDs purchased. Depending on the position of the supply curve,

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[16] A typical view is espoused in the expert reports put forward by Napster in its defense. One of those reports, by Robert Hall, states on page 2: "the exchanges of music facilitated by Napster stimulate the demand for the plaintiffs' CDs by allowing consumers to sample CDs and develop interest in CDs that they subsequently purchase." The reports from Napster's experts can be found at: http://napster.com/pressroom/legal.html. Several, but not all, of the RIAA's reports can be found here: http://riaa.com/napster_legal.cfm.

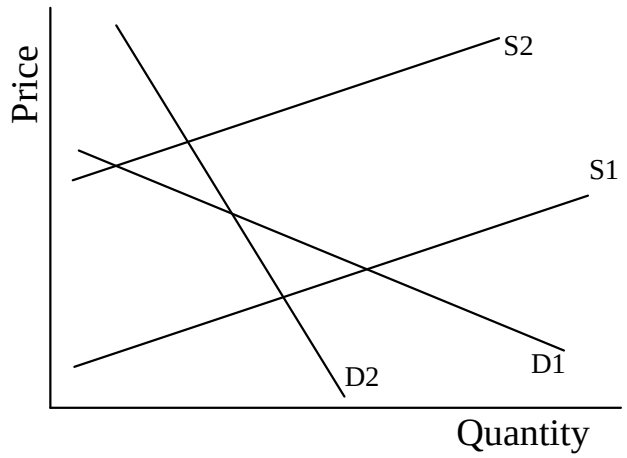
[17] In essence, the ability of consumers to better select CDs will rotate the market demand curve for CDs clockwise.

[18] Another way of looking at this is to imagine that some CDs that are now purchased are "mistakes" due to insufficient information. With the additional information provided by the Napster experience, fewer of these mistakes are made and fewer CDs are purchased.

[19] By analogy, it is as if CDs were chocolate bars (or light bulbs). These bars are bought in order to eat the chocolate. If each bar were to contain more chocolate (or each bulb were to last twice as long), holding the price of a bar constant, the number of bars sold could go up or down depending on the elasticity of demand for the underlying product of interest, chocolate. If the elasticity of demand for chocolate were greater than one, the now lower effective price of chocolate would lead to an increase in total revenue spent on chocolate and with the price of bars constant the number of bars sold would increase (This relationship between elasticity and revenue can be found in any introductory microeconomics text). But if the demand for chocolate were inelastic, the number of bars sold would decrease. Although it could be argued that the demand for any particular CD is elastic, since otherwise the seller would find it profitable to raise its price, it need not be the case that overall demand for CDs is elastic. CD prices are not set individually (see Silva and Ramello in footnote 32) and CDs often would seem to be close enough substitutes for one another as to classified in the same market.

the total quantity of CDs, their price, and the total revenue in the market may go either up or down.

Figure 7.1



With a supply curve such as S2, both the price and quantity of CDs purchased go up when better sampling shifts demand from D1 to D2, so that Napster would increase revenues and quantity in this instance. However, with a supply curve such as S1, lying below the intersection of the two demand curves, the quantity, price, and revenues will fall when better sampling causes demand to shift from D1 to D2. Note, of course, that the area under D2 must be greater than the area under D1 at the two intersections because greater information leads to greater efficiency.[20] Thus with S1, the quantity of CDs, the revenue generated, and the degree of appropriability all fall when sampling is enhanced.

C. Less Exotic instances of harmless copying

Except for indirect appropriability and exposure (sampling) effects, pirating of copyright materials would be harmful to the interests of copyright owners.[21] This is because piracy is often

[20] The area under these demands measure total value, and better sampling increases the total value for any given number of CDs purchased.

[21] For a review of the economic impacts copying see Richard Watt, Copyright and Economic Theory: Friends or Foes? Edward Elgar: Cheltanham, 2000. This is the most thorough review of this material that I have found. My only quibble is that he attributes most of the modeling that was originated in my 1981 monograph (see footnote 8) to Stanley Besen and Sheila Kirby, (1989) "Private Copying, Appropriability, and Optimal Copying Royalties," Journal of Law and Economics" 32, 1989, pp. 255-280).

expected to prevent the copyright owner from appropriating any of the value created by his work to the users engaged in piracy. The mechanism by which unauthorized copying may harm the owners of intellectual products is straightforward enough that no detailed explanation seems necessary. Potential consumers no longer are compelled to purchase the product from the copyright owner when the option of using unauthorized copies is available to them. Defections from the legitimate market are normally expected to reduce the revenues that can be earned in the market.

In some instances, however, the piracy impacts on the copyright holder's ability to appropriate will be negligible. One obvious instance is the case where the individual engaging in pirating would not have purchased an original even if pirating were not an option.[22] In this case, the prevention of piracy would provide no pecuniary reward for the copyright owner and would only diminish the gratification of the individual engaged in piracy.

4. The role of theory versus empirical work

Most academic writing has been theoretical in nature—economists creating models of copying, lawyers theorizing about the impacts of particular legal rules such as fair use—with but a few major attempts to empirically analyze what has actually happened and is happening in the markets. I suspect that there has been an non-optimal number of theoretical papers relative to the number of empirical studies, with the balance tipped too far in favor of theory. In part, the dearth of empirical work has been due to the difficulty in obtaining useful data sets and high cost of creating such a data set from scratch.

Governments have been at the forefront of efforts to answer some practical policy questions regarding copying. The two government forays that I am most aware of was an attempt by the Department of Intellectual Property in Canada in the late 1970s to determine how copyright laws might be altered to respond to the then relatively new technologies of photocopying and cassette tapes, and an attempt by the US Office of Technology Assessment

[22] One neglected point here is the price that is proffered to the pirate that would lead to his decision to forgo the product as opposed to making a legitimate purchase. There is presumably some price above zero at which the pirate would make a purchase when confronted with this choice. The ability to price discriminate or not is crucial here and generally important in judging the impact of copying.

(OTA) in the late 1980s to determine the impact of home copying. Naturally, both these organizations, as a reward for their unusually productive efforts, have failed to fit into the normal government mold—each no longer exists.

The Canadian government series of papers is one that I am most familiar with since my involvement with copyright issues began as a result of being commissioned to do two of their studies, one on photocopying and the other on cable retransmission of television signals. As a part of that series they also commissioned studies on audio taping, performing rights, the term of copyright, and so forth.

The OTA studies were predicated on the creation of a large survey that described audio copying behavior in some detail.[23] Several papers were written trying to use the results of the survey to answer questions about Unfortunately, in my opinion, the survey was inadequate to answer many of the questions that are at the center of the copying controversy. The papers tended to focus on overall welfare impacts from a ban on home taping although it wasn't clear the results were particularly robust (or in some cases, even believable). Surveys of users are, in my opinion, a less than ideal methodology for answering the questions at the heart of this issue.

What is missing is any sort of serious attempt to measure the impacts of copying on the industry whose work is being copied. This would require either a time series measuring any linkage between copying and sales in the industry, or perhaps, if a time series were unavailable, a cross section across localities with different degrees of copying. The latter approach is difficult because international differences are so vast, although it has been attempted occasionally (e.g., Hui and Png in footnote 33).

Most of the empirical work that has been done in this area comes from proponents of either the copyright industry or representatives of copying-enhancing technologies, which is less than optimal when it comes to finding the truth.

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[23] See "Copyright and Home Copying: Technology: Challenges the Law," October 1989, available at: http://www.wws.princeton.edu/~ota/ns20/year_f.html.

5. What Does Empirical Work Tell Us?

Each new copying technology might appear to require fresh analysis, as each generation argues that the new technologies created during its watch require total upheavals of the status quo, whether it be the advent of sound recordings, television, photocopiers, or in the most recent instance, the Internet. But history tells us that when it comes to copyright, the more things change, the more they remain the same. I believe that copyright law has generally been successful in balancing the costs and benefits to both users and producers as technologies have changed. The trick, or course, is in getting it right. Some of the major technological challenges are listed below.

A. Photocopying

The ability to photocopy all books and magazines with ease might have been thought to jeopardize the livelihood of authors and publishers. After all, anyone could take a copyrighted work and make copies on the photocopier without paying the copyright owner. Yet the photocopier proved a boon to those whose works were most frequently copied.[24]

This occurred for two reasons. First, publishers were able to appropriate a portion of this additional value, thanks to indirect appropriability. Second, the convenience of being able to make copies was so great that the nature of scholarship changed among the academic communities that used so much of the copyrighted materials that were copied, and the market for journals grew relative to the market for books.

The mechanism underlying this growth in journals was indirect appropriability.[25] Publishers were able to identify those locations where photocopying copyright materials most frequently occurred—libraries and other similar institutions—and which materials were most frequently photocopied—academic journals. Publishers then began charging a much higher price for library subscriptions relative to personal subscriptions, often two, three or four times as

[24] The claims in this section are documented in Liebowitz, (1981, 1985).

[25] It is also true that the Copyright Clearance Center (CCC) came into existence to allow copiers to make direct payments to copyright holders. But the improvement in the economic well-being of journal publishers occurred quite independent of the CCC, since the CCC was not organized until well after the market for journals had experienced enormous growth. See Liebowitz (1981) page 64-68.

much. The price differentials that are practically ubiquitous now among publishers of academic journals did not exist before the photocopier arrived on the scene.

Further, prior to the advent of the photocopier, researchers needed to either have a personal subscription to a journal, or to take notes in a library. Books tended to be on single topics, as opposed to journals which contained articles on varying topics which would have different levels of attraction to different scholars. Books were a key form of scholarship and were deemed of great use. Photocopying changed this relationship. The inconvenience and cost of photocopying entire books were prohibitively high so that they were rarely copied. Articles in journals, on the other hand, were well suited to the photocopier and became the major target of copying activities. Photocopying articles was fast and cheap. Subscriptions were no longer necessary except for those individuals who valued a large percentage of articles in a journal. Having a photocopy of an article was such an improvement over handwritten notes taken in the library, in terms of convenience and accuracy, that articles and journals became a far more important means of transmitting information than had previously been the case. Books, on the other hand, were significantly diminished in importance.[26]

The price discrimination that the advent of the photocopier engendered may or may not have increased overall appropriability. The evidence does not allow sufficient precision to know the answer to this question. Clearly, however, photocopying did not harm copyright owners of photocopied materials, as made clear by the growth in the number of academic journals and the financial health of the publishers**.** The claims to the contrary by journal publishers, and there were many, were an example of crying wolf.

B. Videocassete Recording: The Betamax Case

The "Betamax" case **(**Universal Studios Inc. v. Sony Corporation of America) played a central role in the Napster defense.[27] The Supreme Court ruling allowed individuals to make

[26] Book expenditures were more than three times that of periodicals from the 1940s until the 1960s when the ratio began to fall dramatically and fell to about 1:1 in the early 1980s (Liebowitz, 1985). In 1996, expenditures on serials outpaced that of books and bound periodicals by 8:5. See table 11 in "The Status of Academic Libraries in the United States" U.S Department of Education; Office of Educational Research and Improvement; NCES 2001-301; May 2001.

[27] Universal Studios Inc. v. Sony Corporation of America, 1984. The original district court ruling was in 1979.

private recordings of television shows on their videocassette recorders (VCRs). The Betamax case (so called because at the time the case was brought, VHS had not yet begun its obliteration of the Beta video format) represented an instance where copying was unlikely to harm copyright owners as detailed below.[28]

Almost all television viewing in the early 1980s was of advertising-supported over-the-air broadcasts, particularly those of the then big three networks—ABC, CBS, and NBC. The original Betamax had only a one-hour recording time. The major use for VCRs was expected to be the "timeshifting" programs for more convenient viewing. Although VCR controls made it possible for viewers to fast-forward through commercials, close attention had to be paid to avoid fast-forwarding through the programming.[29] Thus, time shifting was unlikely to significantly lower the revenues that would be derived by television broadcasters.[30] The Court concluded that time-shifting was unlikely to harm copyright owners.

Although the Court did not rely on this argument, it was also fairly clear that the amount of time shifting would be small. For one thing, a single VCR could either make a recording or play one back, but it could not do both simultaneously. Combine this with the fact that the average household viewed six or seven hours of TV a day, including virtually uninterrupted viewing during prime time programming, and very quickly a constraint on behavior takes hold. If a family was going to watch three hours of prime time television on Monday, say, they could not also watch a tape. If they watched a tape of the previous night's programming, they could not record the programming that was on while they watched the tape (unless they had a second VCR,

[28] This material is based on Stan J. Liebowitz, "The Betamax Case," 1984, unpublished manuscript to be available on the Social Science Research Network (SSRN.com) now that Wendy Gordon has found and old copy I had sent her.

[29] It was also the case that remote controls at the time were tethered by wires to the VCR, thus making their use not very convenient.

[30] Defendants in the Napster and MP3.com cases argued that their products "space-shifted" music from a CD to a computer, a putative analogy to the time-shifting that occurred in the Betamax case. A problem with this analogy is that without indirect appropriability, space shifting would decrease revenues to copyright owners, a result not analogous to that of time shifting since the VCR users still were exposed to commercials. A more important defect with this analogy in the case of Napster, is the fact that what Napster does is not actually space-shifting. Since Napster users do not download their own files into their computer, but instead download files from others, it is better described as user-shifting than space shifting. User shifting could, in other circumstances, be considered a euphemism for "theft" except that the theft is from the copyright owner in the form of a lost potential sale, rather than the user who voluntarily provides the original to be copied.

which was quite rare at that time). Therefore, when it came to taping broadcast television, it was apparent that not that much taping was going to occur.

Of course, in hindsight we know that VCRs are primarily used to play back prerecorded tapes. Ridiculing the difficulty of setting up VCRs to tape programs unattended has become a staple of second rate comedians, and time shifting has not played the damaging role that copyright owners expected it to play. Nor is there much evidence that individuals have been copying prerecorded video tapes to any large extent, although it is the case that many prerecorded tapes do have a fairly primitive anti-backup technology built in.

The difficulty of avoiding commercials, combined with the fact that the amount of time-shifting had to be small, made it apparent that videorecording was not going to harm copyright owners substantially. Fortunately, the Court managed to get it right, albeit by a narrow, 5-4 vote. Several years later, Hollywood learned that by lowering the price of popular prerecorded movies from $100 to $20, they could sell far more of them. Today, the sale of videotaped movies generates more revenue than theatrical showings.[31] Hollywood's claim of impending doom was one in a string of instances of copyright holders crying wolf.

C. Audio Taping

Even without a high profile case such as Betamax, audio taping was a significant issue in the early 1980s, as illustrated by the quote from Alan Greenspan at the beginning of this paper. The basic mechanism of how indirect appropriability might work with respect to audio tapes was illustrated above. Note that if unauthorized copying were prohibited, copyright holders might actually be worse off. In a world with no copying, record producers might find that consumers would be unwilling to pay as much for CDs, lowering revenues and profits. (It is not clear how many, if any, of the former copiers would purchase legal copies).[32]

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[31] According to the US Statistical Abstract, table 909, theatrical movie revenues were $32 per person per year in 1998 whereas revenues from prerecorded movies was $92.

[32] Silva and Ramello argue that unauthorized home taping helped producers largely by allowing low-valuation consumers to become music listeners and that these users later became the high valuation listeners that record producers wanted. This would be a particularly slow type of exposure effect. Francesco Silva and Giovanni B. Ramello, "Sound Recording Market: the Ambiguous Case of Copyright and Piracy" 9 *Industrial and Corporate Change*, 2000, pp. 415-442.

As noted, controlling the variability in the number of copies made from each original was crucial for allowing indirect appropriability to work. It is most likely the case that instances of home audio taping were common and similar enough to one another that no great harm was likely to be done to copyright owners. Despite dire predictions, the recording industry went on its merry way, merely substituting CDs for vinyl recordings as time progressed.[33] Inaction on the part of Congress and the presumption that most of the copying that was going on was unstoppable and a legitimate exercise of fair use was almost certainly the correct decision.

Congress, in response to the dire warnings from the recording industry, considered legislation, but it wasn't until a decade later that the Audio Home Recording Act of 1992 was passed, and it was largely concerned with digital tape recording. That act, which was considered a compromise between creators and users, allows personal copying, but requires that recording devices include systems to prevent "serial copying," i.e., making second generation copies, or copies of a copy. Additionally, the law has provisions to require producers of these recording devices and recording mediums pay a tariff for each unit produced or imported. The original target of this law, digital audio tapes (DAT), never achieved any serious market penetration. The devices that have achieved much greater penetration, CD writers on computers, are not considered recording devices, do not have these copy protection features, and the producers have not been paying duties. Since the anti-copying technology built into DAT players didn't envision the advent of MP3 files (which are very compressed versions of the digital file format found on CDs) the entire MP3 phenomenon would have bypassed these controls on copying anyway.

D. Digitized Networked Copying: Lessons from the Napster Case

As we have seen, the entertainment industry has often exaggerated the damage to itself that each new copying technology would bring—from cassette tapes and videorecorders, to MP3s and Napster. Crying wolf too many times, however, shouldn't by itself negate claims that a new

[33] The recent paper by Hui et. al., attempts to estimate the harm brought about by the pirating of CDs. They report a very small negative impact but this was after the first draft reported a large negative impact. They do not attempt to measure the impact of indirect appropriability. See Kai Lung Hui and I. P. L. Png "Piracy and the Legitimate Demand for Recorded Music" working paper, November 2001.

technology will harm copyright owners. Napster and its descendants (as well as movie and electronic book copying technologies) appear to be instances where real harm is a possibility.

The Napster program, created by then-teenager Shawn Fanning, provided users the ability to search for songs encoded in the MP3 format and download those songs from other computer owners willing and able to transfer those songs. Programs that allow one computer user to interact and exchange files located on other computers that are not full-time servers create a type of network that is known as peer-to-peer. Napster was a peer-to-peer based program, albeit with a central server to allow users to find one another. Napster grew at an explosive pace and soon had tens of millions of users.[34] As Napster grew in popularity, so did potential investors, interested in the brand name and the millions of eyeballs reached by the Napster program and its website.

Some Napster supporters claimed that the online sharing of songs is a latter-day Betamax scenario. They argue that Napster users actually purchased more CDs because Napster allows listeners to sample music with which they might otherwise be unfamiliar. But given the fact that files downloaded from Napster were, or at least were soon to be, very good substitutes for the original, and since they could an be "burned" onto CDs and copied to increasingly popular MP3 players, it seems likely that these files will substitute for the actual purchase of authorized CDs.

Unlike the audiocassette example mentioned above, Napster-style copying is unlikely to allow record companies to indirectly capture the value of the copies being made from legal originals since some originals will have dozens or hundreds of copies made, and others none. Nor does it seem likely that the amount of copying will be small—the current evidence, if it is to be believed, indicates that downloading is rampant. Finally, copies would seem likely to serve as substitutes for the purchase of originals in this case. The people making the copies are the very group that was expected to purchase originals.

[34] In February of 2001 2.8 billion files were downloaded, the peak number in its history. By April, after Napster was ordered to stop allowing copyrighted music to be transferred, the number had fallen to 1.6 billion. See "Napster Downloads Drop 36 Percent" *Reuters*, May 2, 2001.

i. The Napster Evidence

In the Napster case (A&M Records v. Napster) a group of record companies brought suit in the Northern District of California against the leading online server based peer-to-peer system, Napster. The hearing occurred in the fall of 2000 and a preliminary injunction barring Napster from allowing users to download copyrighted files was granted in March of 2001. The evidence put forward in the hearings on the preliminary injunction against Napster consisted of a set of expert reports that were mainly focused on two issues.[35] First, whether or not Napster was likely to have increased or decreased sales of CDs in the market. Second, whether or not Napster's existence as then configured would handicap the nascent market for the legitimate *selling* of music online.[36]

A majority of the reports focused on whether or not Napster was decreasing the sale of CDs. Although this is the central question that needs to be answered before we can attempt to answer questions about the impact of copying on overall welfare, its prominence here was of far more prosaic kind—the plaintiffs were asserting harm, and the plaintiffs were the CD producers.

In an attempt to demonstrate harm, the plaintiffs had as their centerpiece two reports—one that examined the pattern of CD sales in stores near college campuses (the Fine Report) and the other a survey of college students asking them about their views on Napster and its impact on some of their musical habits (the Jay Report).[37] The defense had its own survey of Napster users (the Fader report) and several critiques of the Fine report.

I have already expressed my misgivings with surveys. For one thing, surveys are self-reported and most Napster users were likely aware that Napster was in legal difficulty. For this

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[35] There were several other reports that were difficult to classify. Lawrence Lessig submitted a report that the Court rejected out of hand stating: "The Lessig Report merely offers a combination of legal opinion and editorial comment on Internet policy. Therefore, this court grants plaintiffs' motion to exclude it."

[36] These expert reports were conducted for the purposes of the hearing on the preliminary injunction to stop Napster from transmitting copyrighted materials and not for a complete trial. Therefore, it is to be expected that these reports might not have the level of sophistication and completeness that might come about in a full case. Nevertheless, the hearing on the injunction had very high visibility and several of the experts were quite well known.

[37] These reports are so named in the "Memorandum And Order Re Admissibility Of Expert Reports" issued by the trial judge. Plaintiffs also had a declaration by Charles Robbins, a store owner claiming that Napster had largely destroyed his business, but this report was thoroughly discredited by the Fader report (mentioned below) who

reason, survey respondents might have found it in their self-interest to minimize any evidence that Napster actually decreased their purchases of CDs. Further, even if respondents had told the truth, it is unclear they would have actually known what impact Napster had had on their behavior. Unless they had tracked their expenses very carefully, their impressions of the impact of Napster on their behavior may very well be incorrect.

Statistical analysis of actual sales is really the only way to determine what Napster's impact was. Unfortunately, the statistical analysis of CD sales reported in the Fine report provided ambiguous answers. The Fine report examined sales at CD retailers near college campuses and compared the sales trends in those stores to those of other CD retailers.[38] The theory was that students at college campuses use the Internet and Napster more than do typical consumers. Therefore, any differences in the behavior of sales between the two groups of stores was to be assigned to Napster. Although Fader, one of the Napster experts, criticized the focus on college students, this focus is a very practical way of isolating the overall impact of Napster, even if imperfectly. Despite claims to the contrary, it seems unlikely that the behavior of Napster users who are not college students (many of whom are high school students) is so different as to counteract the measured impact on college students.

This particular design, although potentially useful, also had some serious problems. One major problem with the Fine study, as both Fader and Hall point out at length, was that it neglected to control for the impact that the arrival of online purchasing might have had on brick-and-mortar record stores near college campuses. It would be easy to confound the cause of decreased CD sales at local merchants if both online purchasing and downloads had occurred at the same time, which they had. Did Internet merchants such as Amazon and CDNOW increased their CD sales during the period of Napster's growth? Of course. Did college students merely

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pointed out that the store had changed locations and switched from selling new CDs to selling used records and CDs during the period that its sales declined.

[38] Actually, the Fine study looks at three groups of brick-and-mortar retailers: the overall set, a set of retailers near the 40 most heavily wired college campuses, and a set of retailers near college campuses that have banned Napster. Napster's expert Hall makes much of the fact that this latter group of retailers shows the same decrease in sales as the others, claiming that for this group sales should improve if Napster were having a negative impact on sales. Such a claim is unwarranted since we do not know how long Napster had been banned at these campuses and how successful the ban was.

shift their patronage from brick-and-mortar retail outlets to online retailers? Unfortunately, we do not know.[39]

Napster experts Hall and Fader claim the Fine Report is fatally flawed by this oversight. In principle, however, it could be corrected if data were available for online retailers and the two groups of brick-and-mortar retailers on, say, a monthly basis, along with the number of songs being downloaded on Napster.[40] Instead, the Fine study presents data that is very coarse; once-a-year quarterly data from the first quarter of 1997 to the first quarter of 2000. Given Napster's brief existence (it became publicly available in August of 1999) the data that is supposed to reveal Napster's influence amounts to but a single before and after snapshot of the impact of Napster.

What does the Fine study find? Fine focuses on the fact that from the first quarter of 1999 to the first quarter of 2000, a 12-month period during which Napster came into existence at about the midpoint, sales at brick-and-mortar CD stores near colleges fell by 2-3 percent but rose at other brick-and-mortar CD stores by approximately seven percent. From this Fine concludes that Napster has led to a decrease in sales of CDs. Fine's conclusions are undermined, however, by his data for earlier years. From 1998 to 1999, a year preceding Napster's existence, sales near colleges fell by about five percent while rising elsewhere by approximately three percent. Since year-to-year changes at brick-and-mortar CD retailers near colleges were not performing as well as other brick-and-mortar CD retailers prior to Napster's introduction, the fact that they continued to do relatively poorly after Napster's introduction can hardly be taken as evidence that Napster is responsible for the difference. The data, in fact, are more consistent with the theory that online sales were replacing brick-and-mortar sales than with the claim that Napster was hurting sales.[41]

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[39] It is unfortunate that online CD retailers probably had not achieved an equilibrium market position prior to Napster since comparing the sales of online retailers to brick-and-mortar retailers would have provided what probably would have been a better test of Napster's impact, with online sales changes being the proxy for Napster's impact.

[40] Fine reports that online sales figures were first collected in the first quarter of 1999.

[41] The court also was aware of these problems: "The Court finds some aspects of the Fine Report troubling—especially the fact that its shows a decline in retail sales prior to the launching of Napster. This limitation, combined with Fine's decision not to track Internet music sales, reduces the study' probative value."

Napster's experts preferred to focus on the continued robust growth of CD sales overall, after even after Napster's birth. Certainly, this growth, the seven percent figure at brick and mortar stores reported above, is inconsistent with the idea of "irreparable" harm claimed in the preliminary injunction, particularly considering that Napster downloads were reported to be four times as large as the number of legitimately purchased songs. But it hardly demonstrates that Napster had a benign impact on CD sales since there might well have been other factors at work and the increase in CD sales might have been even larger without Napster's impact.

A major impediment to measuring Napster's long-term impact during this period is that MP3 files, the format of music files used on Napster, were not initially very good substitutes for CDs (though they have since become better substitutes, and continue to improve). At first, MP3 files could generally only be listened to only on computers and could not be played on the home audio system (unless the computer was hooked up to the home system). That may help explain why Napster's negative impact on sales was not apparent. As MP3 use has increased, however, more and more audio components have been converted to play MP3 files. Also, most users were downloading files over slow telephone modems so the impact was probably not as large as it would have been had higher bandwidth connections been more readily available.[42] As more computer users adopt CD writing hardware, MP3 files are being converted back into CD formats that are playable through normal audio systems. Over time, it is likely that MP3 files would have become better substitutes for CDs and would have been played more frequently on primary audio systems. If this had happened, then the true negative impact of Napster would have been felt if it had not been shut down.

The other category of report presented in the Napster case is based on surveys. As noted, the results from surveys should be regarded with great skepticism. The Recording Industry Association of America presented a survey of college students by Deborah Jay, a marketing consultant, that attempted to infer whether Napster increased or decreased the purchase of CDs based on answers given to questions that do not directly address the point. Jay concluded that 41

[42] Nevertheless, at its peak Napster downloads were estimated to be in the vicinity of 2.8 billion files per month, which would roughly be the equivalent of 250 million CDs per month. According to the Fine report, US national sales ran approximately 60 million CDs per month. So even with the slow bandwidths, the potential impact may have been large. See "Music Downloads soar" *Reuters*, September 6, 2001, available at: http://news.cnet.com/news/0-1005-200-7080479.html.

percent of Napster's subscribers used it in ways that displaced the purchase of CDs. But the fact that Jay does not ask this question directly of her subjects makes her conclusions suspect. Further, her categorization of answers as enhancing or decreasing CD sales is questionable and seems to favor a negative finding about Napster's impacts. On the other hand, the bias from respondents trying to support Napster might work in the other direction.

As an example of these problems, consider her classification of responses to an open-ended question asking respondents why they use Napster. Two of the categories of answers, "buy fewer CDs" and "make my own CDs," are classified as indicating a substitution of Napster files for CD sales. The first answer obviously fits this characterization. The second, however, is not at all clear. If someone wished to sample music for later purchase, and created a CD to sample the music on a stereo system, Jay would classify that answer as indicating that the respondent uses Napster to decrease CD purchases. The fact that Jay doesn't provide separate numbers for each of these two answers makes it impossible to determine whether this is a potentially serious problem or not. Further complicating this issue is the fact that 22 percent of respondents say they either buy fewer CDs or make their own CDs, whereas 8.4 percent say they purchase more CDs.[43] This classification seems capricious. Why not just tell us how many say they purchase fewer CDs instead of lumping them in with those who make their own CDs?

Peter Fader, a Marketing Professor from Wharton hired as an expert by Napster, criticized Jay for using only college students and also for her interpretation of open ended questions. Although I do not believe his criticism on the use of college students is valid, the concern with Jay's interpretation of open-ended questions seems quite legitimate.

Fader conducted his own survey for Napster that tries to answer the same question. He concludes that Napster decreases CD sales for 8.1 percent of the respondents but increases sales for 28.3 percent of the respondents, virtually the opposite of the conclusion reached by Jay. Fader, however, was harshly criticized by Judge Patel who questioned his credentials and the

[43] Jay includes "getting free music" and "getting music that one wants" as other answers that reveal substitution of sales. Although this might be true, it is not clearly so, and this interpretation problem could have been avoided if more direct questions were asked.

degree to which he participated in the conduct of the study bearing his name.[44] It appears that he did not supervise the execution of the study as closely as he might have. Nevertheless, the harshness of the court's criticism of Fader contrasts with its generally benign view of the problems in the Jay report.

There were other reports, particularly those by economists David Teece on behalf of record companies, and Robert Hall on behalf of Napster. Teece's report is unavailable due to its frequent use of confidential information. Teece appears to have examined the impact of Napster on the current CD market as well as nascent or planned online sales of music by copyright owners. He concluded that damage to copyright owners is clear. Hall, on the other hand, concluded that Napster increased CD sales because, in his view, it largely allows users to sample music before purchase.[45] Once again, the Court was much harsher in its discussion of the Napster expert Hall than in its discussion of Teece.[46] Without seeing Teece's report, however, it is hard to gauge the validity of the court's relative rankings.[47]

All in all, the plaintiffs in the case failed to make as persuasive a case for harm as the defense did for the lack of harm.[48] There are several reasons why this harm was not found. It may be due, in part, to the fact that the MP3 files were not yet good substitutes for CDs—most ordinary stereo systems could not play mp3 files and CD writers were not yet prevalent enough

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[44] The Court states: "He considers himself an expert on consumer surveys…However, he admitted in his deposition that he has never before prepared a consumer survey for litigation and he is unfamiliar with the standards set forth by federal courts for the reliability of such surveys." Lack of familiarity with legal standards hardly disqualifies someone as an authority on surveys in general. The Court continues: "In short, his claim to have designed and overseen the Greenfield survey appears exaggerated, and the generality of his report renders it of dubious reliability and value."

[45] Hall assumes that any music sampling by Napster users benefits the CD market, an assumption that we demonstrated to be incorrect in the above subsection on exposure effects.

[46] The court stated: "Hall relied too heavily on outside studies that favored defendant without performing any analysis of the Jay Report… these shortcomings are not grave enough to warrant exclusion of his expert opinion. Insofar as the Hall Report assumes the requested injunction would put defendant out of business, it tends to corroborate plaintiffs' argument that Napster has no legitimate non-infringing uses…they [the plaintiffs] would be wise not to object too strenuously to admission of the Hall Report."

[47] One potentially questionable point, according to Hall, is Teece's use of the concept of path dependence to argue that consumers will be locked-in to Napster and will not then purchase music online from the copyright owners. Hall notes that Teece cites the QWERTY keyboard as an example of such lock-in. There are two problems here. First, the keyboard story has no evidence to support it. Second, it is hard to imagine what the coordination problem might be that would have to underlay a case of lock-in since network effects are not sufficient for there to be for lock-in without some form of coordination failure. See Stan J. Liebowitz, Stan J and Stephen E. Margolis "The Fable of the Keys" *Journal of Law and Economics*, April 1990, Pp. 1-26. (This article also cited by Hall.)

to allow most users to convert MP3s to audio CDs, and even with the equipment the conversion takes some effort. But given the enormous amount of copying that Internet measurement companies are reporting, we should be seeing a strong impact on CD sales, if copying has an impact and we should be seeing it soon. The alternative is to explain why copying doesn't impact measurable CD sales.

6. Some New Hypotheses We Need to Consider

Sometimes people don't act as we might predict. One reason could be that our economic models are just wrong about certain activities. Another possibility is that we are ascribing certain parameters to utility functions that are not appropriate.

In the case of copying, there seem to be considerable behavior that doesn't fit nicely into our models. I am referring to the continued purchase of legitimate copies at the same time that, if the statistics are to be believed, a tidal wave of illicit copying of occurring.

Of course, we do not know if this is really new. One new factor that comes from having copying taking place over computer networks is the ability to count, with seemingly great precision, the amount of copying that is taking place.

There is one fact that just screams out for explanation: the amount of personal copying being reported is larger than the size of the legitimate sales market.[49] How could this not impact sales of CDs? Here is my list, in what I consider a descending order of likelihood.

a. The living room/computer dichotomy perseveres and is due more to the time and inconvenience costs of creating CDs than to the lack of CD burners. This means that MP3s are *not* substitutes for CDs.

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[48] The judge's readings of the reports seem, to me, to have been biased against Napster even though I think her decision was in the end correct even if not supported by the evidence at hand.

[49] The number most widely seen is something like 3 billion MP3 songs downloaded per month. Assuming ten songs on a CD, that works out to more than 3 billion CDs in a year. According to the IFPI, total sales of CDs worldwide are less than two and a half billion.

b. Use of MP3s is a form of sampling.

c. People are honest and want to purchase legitimate CDs even when they have MP3s (so why do they downloading).

d. This degree of copying has gone on for a long time so nothing is new and we don't measure any changes.

e. A small number of individuals do a disproportionately large amount of copying and their reduced legitimate purchases are too small to notice.

f. Copying is of oldies and hard to find songs, and is temporarily as high as it is because copiers have 40 years of old songs to dig up. It will eventually return to much lower levels.

7. Conclusion

The impact of pirating has often been misunderstood and copyright owners have frequently claimed harm when little or none was occurring. Economists have been good at theorizing about these issues but much weaker at bring data to bear on them.

Inexpensive copying technologies, which have been with us for at least 40 years, do not as yet appeared to have caused great damage. Our understanding of why this is so, or if it is really so, leaves much to be desired. Our understanding of when copying might not be harmful would lead us to believe that use of MP3 files downloaded in peer-to-peer networks must be harmful. Although it is possible that the current generation of copying technologies will in fact live up to the dire predictions of doom forthcoming this time not only from the copyright owners but from our current understanding , the evidence doesn't yet support that claim. This issue will soon come to a head. It is important that we discover if there is something important going on in these markets that we have not put in our models.