

Copyright Amid Piracy

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Introduction

Copyright in the 21st century faces a single debilitating obstacle—piracy—to which the only sustainable solution for sustaining our current level of creative expression is a transition to public provisioning of that creative content. Where copyright was once able to provide sufficient rents to creators to compensate for the high initial cost of creation, the newly negligible costs of non-commercial copying and redistribution of digital creative content has substantially undermined the effective control granted by copyright for digital works. As decreasing effective copyright controls has rendered such works increasingly non-excludable, and thus subject to free riding in the form of piracy, various attempts to re-establish copyright's effectiveness through prevention of piracy have proven ineffective, and prevention becomes ever more futile as the costs of copying digital content become ever lower. This lowered effectiveness of copyright as a means to encourage creativity cannot be addressed through the traditional policy approach of altering the contours of copyright, but instead requires a fundamental shift away from relying upon an increasingly unenforceable right towards public provisioning.

This paper is divided into 6 sections: Part I covers the background of copyright, and a framework from which its contours can be examined. Part II looks at why copyright has been sufficient for promoting creative expression until recently; how recent, technological changes have increased the viability of piracy, rendering copyright less effective; and looks briefly at how much of an effect piracy has on different creative content industries. Part III examines various approaches used

within the current copyright system to combat the piracy problem, and considers the effectiveness and drawbacks of those approaches. Part IV looks beyond the current copyright model of funding creativity to different suggested models of creative content provisioning, examining existing and proposed provisioning models with a particular focus on public provisioning. Part V concludes and Part VI suggests future research directions concerning creativity.

I. Copyright background

Copyright, fundamentally, has evolved over the past 300 years to promote creative expression through a time-limited, exclusive right to make copies of an that creative expression. The system is largely supported by the simple premise that increasing expenditure on creativity will effect additional creation¹. Traditionally, copyright has been sufficient to provide this increased expenditure by providing legal control over the production of copies of the work, permitting (low-cost) copies to be sold at a price providing a profit, thus compensating the creator for the high initial, fixed cost of the work. The critical factor to the success of such a system is the strength of the legal backing of copyright: when laws governing copyright—and equally important, the *enforcement* of those laws—weaken, the ability to profit from a copyright system weakens, thereby leading to a decrease in creative expression.

¹ Such an assumption is admittedly imperfect; an amateur musician or open source programmer, for example, might be less motivated to create when the creativity involves a monetary reward. See, for example, the analysis of Frey and Oberholzer-Gee (1997) on motivation crowding-out. Regardless of possible motivation crowding-out effects, this paper relies only on the assumption that, for most creativity, there is a positive correlation between reward and creation.

The typical response to weakening copyright incentives involves adjusting the contours of copyright to increase the available rents. Under an effective copyright system it is useful to consider the easily adjustable dimensions of copyright. Of primary consideration are four: the entry requirement, “length,” “width,” and “height” of copyright².

The entry requirement of copyright concerns the action necessary to receive a copyright. There are two main components to this: first, eligibility: the item being covered must be some form of creative expression, must possess some originality, and must not infringe the copyright protection of another work, whether by innate characteristics or agreement with the copyright holders of otherwise infringed upon works. The second part of the entry dimension is the requirements for receiving a copyright; under current copyright, this is extremely low: one need only write, record, perform, paint, or otherwise fix the expression to receive copyright protection.

The length is the easiest dimension to define and understand: it is simply the amount of time for which a copyright persists. Extensions to the length of copyright can increase the value of the copyright on a work, and thereby inducing new

² Some authors (e.g. Varian (2005)) use the term “height” to refer to what I have termed the entry requirement. While this is a useful distinction for other areas of intellectual property, such as patents, when copyright is considered, with its negligible entry requirements, I find that the use of “height” for such a dimension does not fit as well with the metaphors of “length” and “width” governing the size of the protection itself, and find it more useful to use height to describe the relation between a work and subsequent works that build upon it. There is some overlap between (my) width and height dimensions—one could consider the height dimension as merely a component within the width—but a distinction is nonetheless useful.

creation, but there are two important points that must be made. The first is that the value of an extension depends on the existing length of copyright; any length change must take into account the present value of the extension at the time of creation.

Second, retroactive extensions to copyright—that is, extensions that apply to already-created works—cannot encourage creativity, but only increase rents for those who have already created³. When terms are short, increasing copyright length may be an effective way to increase creative output; when long, increases have a much smaller effect on the present value of a work⁴. Longer terms, however, may also have a counteracting negative effect on creation, as they delay works entering the public domain where they may induce useful, derivative creativity.

The width of a copyright concerns how widely a copyrighted work is protected from similar works. If defined too narrowly, one can legally create close substitutes for the original work, thereby potentially depriving the original author of the opportunity for profit granted by copyright. Defined too broadly, and legitimate creative expression is prevented because it becomes more costly to create without infringing another's work.

³ Unless, of course, prior retroactive extensions lead creators to have an expectation that retroactive extensions will occur in the future, thereby increasing their expected copyright term length.

⁴ A couple of demonstrative examples can be useful: with a discount rate of 5% and a constant rate of profit, a 50 year copyright captures 91.3% of the present value of a perpetual copyright; at a discount rate of 10%, a 50 year copyright captures 99.1% of the discounted perpetual value. For the vast majority of recorded copyrighted works, where the rate of profit decline over time—because most who want the work have already purchased a copy and have little use for an additional copy—these numbers are on the low side: anticipating a 5% annual decline in profits result in 99.3% and 99.93% for 5% and 10% discount values, respectively.

The height of copyright controls the extent to which derivative or referencing works may be created without infringing copyright. Under this dimension fit primarily exceptions to copyright, such as referencing materials⁵; updates, add-ons, and other enhancement of existing material; and remixing existing materials into new expression. In general, the main policy tool for adjustment of height is through the use of fair dealing (or fair use) provisions. Again, too low a height may restrict potential earnings of creators more than the gain in relevant creativity, while too large a height may overly restrict socially valuable, complementary creation.

II. The rise of non-commercial digital piracy

Copyright's latest, and largest, challenge has been the enormous decline in the marginal costs of copying and disseminating copies of creative works, which has led to fundamental changes in the environment and market of creative works. Never before has copying of content been so easy: copying a digital work often entails no more effort than instructing a computer to copy one sequence of bits from one place to another⁶, whether that copy is made from a CD, a file on a computer, or an internet website or network. It has been made so simple that almost any individual can make such copies at very low costs. Contributing to reduction in copying cost is that, because the creative content we consume is increasingly digital, copies of

⁵ For example, the Harry Potter referencing book "The Lexicon," was originally

⁶ e.g. performing a "copy-and-paste" operation on a "file"—though the specific techniques of copying can extend beyond those usage metaphors.

copies of copies are just as good as the original, and are just as easy—and often easier—to copy than the *first* copy of the original.

The critical change to copyright leading to piracy has, then, become a matter of who performs the copying. Copyright worked—that is, it provided the desired profit incentive—in its 18th century origins, where there was a substantial barrier to entry into copying: one had to own a printing press. Because infringers were typically those with commercial interests, identifying an infringer and seeking legal relief was relatively straightforward: a printer was not difficult to find, owners of printing presses were relatively few in number, and the cost of owning and operating an infringing device (i.e. a printing press) was high. The transaction costs associated with identifying and dealing with infringers were thus relatively small compared to the payoff of larger profits from the restoration of the copyright holder's exclusive right.

The modern equivalent of a printing press for digital works—a personal computer with an internet connection—is often owned for personal, not commercial, reasons; is difficult to uniquely identify; is one of a widely diversified many; and is cheap to own and operate. This transition from few to many, expensive to cheap, has brought with it a significant increase in the transaction costs incurred in dealing with myriad infringers. Whether through legal sanction or private negotiation, the transaction

costs in identifying and stopping individual copyright infringers has increased⁷, while the gains of preventing a single, individual case of infringement are negligible. This radically reduced cost and consequential multitude of infringers has led to traditional methods of dealing with infringement—legal sanctions and private settlements—being no longer effective because of the crippling costs in dealing with enough infringers to substantially curtail piracy. This trend, as much as copyright holders might otherwise desire, cannot be reversed: the ongoing march of technological improvement, further lowering marginal reproduction and dissemination costs, shows no signs of relenting.

The impact of piracy is not, of course, uniform among all creative content industries. In particular, the losses from piracy (and thus the benefits of an alternative approach to content provisioning) greatly depend upon various attributes of the types of creative work under consideration, most critically, the interruptibility of the performance and the extent to which the type of work can be effectively recorded digitally. Unsurprisingly, works that are more difficult to interrupt and harder to accurately represent digitally are inherently less vulnerable to piracy, while easily interrupted, easily and accurately recorded copies have the most to lose from piracy.

⁷ Primarily in terms of the search costs in identifying those infringers. In contrast to commercial entities, individual infringers have little incentive to be easily identifiable (beyond, perhaps, reputation, which is sufficiently served by an anonymous internet pseudonyms), in contrast to a commercial entity that requires some visibility in order to profit through the sale of copies.

Uninterruptible performances⁸, such as music concerts, movie theatre productions, stage plays, etc., are a relatively straightforward case: reproduction is not practical. Though recordings (and copies of those recordings) can be made and distributed at low cost, these offer a very different experience from the original, source performance. Copying such a performance typically involves either substantial cost in terms of equipment—in which case piracy may be preventable by the reduced number of possible pirates—or in significantly reduced quality—in which case the pirated copy provides a poor substitute for the original, thus not substantially reducing demand for the original performance.

Live (or nearly live) performances that are digitally transmitted, where a substantial portion of the value is derived from it being “fresh”—for instance, a daily news broadcast—are less impacted by piracy than many other types of creative works. Though piracy is still possible, the delay involved in the act of pirating the content—recording, distributing, and subsequent downloading—likely sufficiently reduces the value of the pirated copy of the broadcast as to not significantly impact the value of that broadcast. Note that a broadcast merely being live is a necessary but not sufficient condition to reduce the value of piracy: live broadcasts that have sufficient rebroadcast value do not fit into this category as piracy substantially erodes that rebroadcast value.

⁸ It is important to note that this refers to *naturally* uninterruptible performances; artificially induced uninterruptible performances (e.g. preventing you via technological means from pausing the playback of a movie) aren't included at all: in fact, pirated copies in such a case would presumably not include this limitation, thus allowing pirated content to offer a copy of the same work at *increased* value relative to the original.

Recorded, creative content—movies, television programmes, musical recordings, audio performances⁹, and similar works—are significantly impacted by piracy. As discussed, preventing such piracy has proven impossible, and efforts to curtail such piracy have proven too costly. At this level, copyright amid piracy starts to break down: the cost of dissuading or preventing a huge number of individuals from pirating is enormous, individuals are difficult to identify, and thus enforcement costs are prohibitive.

Books are an interesting case on their own, primarily because they have thus far largely resisted a move to an easily copied digital form. The reasons for this may be largely technological: until very recently, the technology has not existed for displaying an electronic version of a book without substantial disadvantages compared to a printed, professionally bound version of that book. Very recent technologies have started to break down this boundary, with devices such as the Amazon Kindle able to display electronic books in comparable quality to printed versions¹⁰. Book publishers have adopted such technologies hesitantly by demanding heavy technological protections on digital versions of books¹¹, but as history has taught with music and films, this protection is unlikely to prevent pirated versions of popular books from becoming available once devices capable of displaying digital books with little degradation in quality become widely used. Once

⁹ For example, audio plays, radio interviews, etc.

¹⁰ At least, according to the current producers of the technology. In any case, even if the comparison currently favours printed books, the technology will undoubtedly advance over the next few years to the point that reading from a digital reader offers as least as good an experience as reading from a printed book.

¹¹ This sort of protection and its implications are addressed in detail in Part III.

such devices become the norm, rather than a geeky novelty, the gains from piracy are likely to be comparable to the gains currently available in aural and visual works.

Commercial computer software forms an interesting case in that, by its interactive nature as a program, it can incorporate more sophisticated versions of copy protection. In some cases, software piracy can be effectively prevented by the nature of the software itself—principally, where the software requires an online component that cannot be circumvented¹². It must be pointed out, however, that copyright offers little benefit in such a case: the real value of such software can be captured through selling the access to the online component, rather than selling copies of the software itself. In cases where an online component is difficult, cumbersome, or otherwise undesirable—various types of productivity software and single-player (rather than online) games—piracy is again a significant problem. The costs of the initial copy is often higher than that of movies and music¹³, but the easy availability of virtually all new software titles suggests that, similarly to music and movies, efforts to combat software piracy have little effect.

An interesting point needs to be made regarding open source software, which relies on copyright not at all as it was intended: rather than an effort to recoup a large

¹² A game designed to be played by multiple players, interacting online, for instance, where accessing the online community requires authentication.

¹³ Primarily because, as software, sophisticated encryption programs may be included as part of the software itself, and can continually evolve as new software is released, while video discs are confined to a single standard that, once cracked, provides easy breaking of the digital locks on all other discs using that standard.

fixed cost, the philosophy behind most free, open source software is simply that the software, and any derivatives of the software, remain free and open¹⁴.

Fundamentally, this relies upon accepting a licence for the software; copying and using the software without agreeing to one of the various open source software licences amounts to copyright infringement. In the case of free, open source software, piracy is irrelevant, but the copyright protection is not.

III. Forging ahead under current copyright

Before analysing potential alternative systems in response to the piracy problem, it is useful to first contemplate the alternative, “do nothing” option: leave copyright as it currently stands. It is tempting—but wrong—to consider a world without piracy as the alternative: as much as we might socially prefer such a system, it is simply not an available option without tremendously costly action to significantly curtail piracy. As internet speed and availability increase, and access costs decrease, the main costs associated with pirated content—the time to download, and time-versus-quality trade-off inherent in download times¹⁵—are correspondingly being reduced. Search costs for finding pirated material are likewise low: finding content is often a

¹⁴ Specific definitions of “open source software” and “free software” vary widely, ranging from “do whatever you want with this software” (essentially equivalent to placing the software in the public domain) to much more restrictive “you can see, but can’t change” restrictions on software. Here I adopt essentially the Free Software Foundation’s definition, <http://www.gnu.org/philosophy/free-sw.html>

¹⁵ From a technically point of view, when encoding a digital work for distribution, there is always a trade-off: one can decrease the file size of a copy by reducing its quality, thus trading off visual or aural quality against download time. The value of this trade-off to individuals varies significantly with consumers’ preferences, and similarly varies among pirated content originators: for a great many pirated works, the pirated copies are, as should be expected, available in a spectrum of quality levels.

matter of typing the title of the work into one of the many BitTorrent-hosting websites, and clicking a search result. Absent change, piracy will only increase as piracy costs (i.e. internet bandwidth costs) continue to decline. Moreover, we have to assume that piracy will spread to new types of creative works as technologies matures, allowing them to effectively move into the digital domain¹⁶. Given this expected piracy increase, the baseline, “do nothing” policy approach from which we need to examine other solutions is a severe reduction of the efficacy of copyright as a means to sustaining creative output due to a significant increase of non-commercial piracy of copyrighted works¹⁷.

Pirated content serves as a low-cost, high-quality¹⁸ substitute for an authorized copy of the original content, which content creators have an obvious incentive to eliminate. Faced with this competition in their creative works, content providers can be expected to—and are engaging in—several approaches to address piracy through artificially increasing the costs of piracy, thereby decreasing the competition posed by pirated content. The first approach is an attempt to raise the

¹⁶ The next likely target of widespread digitization is, as mentioned earlier, literature, predominantly using devices such as the Amazon Kindle (or subsequent versions of it). We are currently in the infancy of such devices, but as display technologies continue to develop, future iterations of these devices are likely to decrease in cost and, in functionality, become better substitutes for physical books.

¹⁷ The effect of *commercial* copying is a different matter, which I address later.

¹⁸ Typically lower quality than the authorized copy (due to a desire to lower the cost of download times—see note 15), but in some cases, pirated content may offer *higher* quality, such as a high definition television recording being offered when the alternative version for sale is a lower quality DVD release. I make the assumption here that pirated content has roughly the same quality as authorized content; even where that is not currently the case, increased internet speeds (i.e. decreasing download costs) and high definition screens (i.e. increasing benefits of higher quality downloads) should, over the next few years, lead to increased quality of pirated content.

expected cost of pirated content through legal threats, proceedings, and settlements. This we observe most notably in the slew of “pre-litigation settlements” between US music producers and individuals accused of downloading music over the past few years in the United States¹⁹. A very small number of these cases have proceeded to trial, and, as of this writing, only two have concluded, with findings of statutory damages in the ranges of \$675,000 to \$1.9 million²⁰. Both the settlements and court findings are likely to have at least some effect on piracy by raising the expected cost of that piracy²¹, and amplifying this effect through individuals’ risk aversions, especially for very large potential damages²². The social efficiency of this approach is somewhat doubtful, however, as it incurs significant costs in court time in an attempt to prosecute against a common behaviour. Furthermore, a litigious approach may, especially when the piracy costs are not significantly altered, also

¹⁹ Somewhere around 18,000 individuals have been sued, and the vast majority of those individuals settled for amounts around \$3000-5000. See, for example, <http://arstechnica.com/tech-policy/news/2009/07/has-the-riaa-sued-18000-people-or-35000.ars>

²⁰ *Capitol Records, Inc. v. Thomas-Rasset*, and *Sony BMG Music Entertainment, et al. v. Joel Tenenbaum*. The award in the former was \$1.92 million, \$80,000 per track for 24 tracks, increased from an initial \$222,000 award on retrial. The award in the latter case was \$675,000, \$22,500 for each of 30 works shared.

²¹ Though likely not very significantly. Using conservative estimates, if we assume that 10% of the population engages in file sharing, 18000 individuals each paying \$5000, 5 individuals each paying \$2 million, and assuming that individuals are typically not caught multiple times given the low probability of any individual being caught, the total expected cost of *all* of an individual’s piracy amounts to merely \$3—spread over 100 or 1000 downloaded works, this comes out to \$0.03 or \$0.003 per work. This is, admittedly, a very crude estimate: in reality the chance of being caught increases, of course, with the number of works shared, but it is unlikely that, in purely expected cost terms, the per-work cost is particularly large.

²² For all intents and purposes, an award of a million dollars or more is rarely going to be collected in full, but instead lead to a total loss of the individual’s wealth, and as such represents an extreme case of risk aversion.

lead to increased demand for pirated content as the search and litigation costs in combating piracy are likely to lead to higher prices for legitimate content.

Another possible legal approach, also common, is to sue facilitators, rather than distributors, of pirated content—typically, websites dedicated to locating pirated content. The effectiveness of this solution is at best questionable: while the initial case against the highly visible Napster²³ was successful, rather than eliminate piracy, this simply prompted piracy decentralization; rather than one large file sharing entity, there now exist several, many of which are deliberately established in countries with laws—or enforcement of those laws—more favourable to content piracy. Aside from the location of tracking websites, the software used to obtain pirated software is increasingly decentralized; litigation that successfully shuts down one tracking website has little effect when individuals can nearly costlessly switch to dozens of other sites. As with targeting file sharers individually, the added costs of litigation lead to higher prices, which in turn leads to increased demand for the pirated substitute.

A third approach is one of increasing the costs of making an *initial*, unauthorized copy. The most obvious form of this increase is some form of digital encryption system, commonly referred to as “digital rights management” (DRM) protection. There are many such forms of this protection, ranging from requiring an internet account to authenticate your use of the work, to requiring keys stored on physical

²³ *A&M Records, Inc. v. Napster, Inc.* was the first case addressing copyright infringement among peer-to-peer piracy.

hardware specially designed and approved for playback of the work. Producing an unauthorized copy from a legitimate copy is thus made more costly by requiring decryption of the work before it can be copied. On an individual, single work, this added cost is likely to dissuade copying, but once the same encryption system is used on hundreds or thousands of different works²⁴, the prize for breaking the digital lock becomes significantly greater. It is important to note that such systems only impose a fixed cost on a single individual for pirated content: once the lock is broken, there is no change in costs whatsoever on further copying of the content.

While DRM systems, if effective, provide some copyright infringement protection, the downsides are significant²⁵. First, DRM protections do not expire—they extend the length of protection of the work to infinity. One of the most significant consequences of this is that DRM protected works do not properly enter the public domain; even when *copyright* protection on a work has expired, its *DRM* protection does not. As a result, that work can never be copied, modified, remixed, or otherwise enhanced. From the point of view of works created now, this isn't much of a problem—the difference in discounted value between copyright's current term

²⁴ For example, the encryption system used by DVDs is, by necessity, standardized: one needs to be able to play a standard DVD in a standard DVD player.

²⁵ The following considerations rest on the assumption that the protection remains effective—that it has not been defeated in some way. While perhaps an unrealistic assumption, various laws and treaties (such the Digital Millennium Copyright Act in the United States, European Directive 2001/29/EC, aborted Bill C-61 in Canada (and its successor, currently under government consideration and consultation), and, behind all of these, the provisions of the 1996 World Intellectual Property Organization Copyright Treaty), all contain provisions prohibiting circumvention, often without exceptions for various, otherwise legitimate purposes.

and infinity is small²⁶—but from the point of view of policy that needs to address both current and future creative output, this use of technological measures to extend copyright length is a significant problem. Similarly, DRM protections enable enlargement of the height of copyright protection: various uses allowed under fair use provisions that are socially valuable, but not valuable to the creator of a specific work, is also prevented. In effect, the social benefit of an increased public domain store of creativity, and fair use of creativity not yet in the public domain, is weakened when technology is used to enact restrictions that far exceed the dimensions of copyright.

DRM protection, while often justified in terms of preventing piracy, is often also used to assign control over the use of copies of creative works that extend far beyond the controls over reproduction granted by copyright. One such use of technological restrictions, rather than being used to prevent piracy, is instead used to increase market power. Region coding of DVDs²⁷, for instance, serves to aid price discrimination by providing market segmentation. DRM protections that require internet access or a particular hardware system to enable access provide no guarantee that the copy will be available in the future: a purchased copy may

²⁶ An exact calculation of the difference is difficult, since copyright terms in many jurisdictions are based on the life of the author (e.g. copyrights expire seventy years after the death of the author, in the United States). However, even a 50-year copyright term with a 5% discount factor yields less than a 10% discounted value between a 50 year and infinitely long copyright.

²⁷ Region coding is a practice where DVDs carry a “region code” (one of 7 defined regions for DVDs; this was reduced to 3 different regions for Blu-Ray video discs) that prevent a DVD from being played in a DVD player from another region (unless, of course, the player is cracked to ignore region codes entirely).

become inaccessible (in effect, destroyed) if the creator or publisher of the work shuts down the required internet servers, or the decryption hardware or software becomes no longer available. This assigns a dangerous control: technological measures have extended copyright to include an ability to revoke access to a purchased, creative work. A recent case illustrates this point disturbingly well: internet book seller Amazon, in selling e-books for its Kindle e-book reader, was notified by the publisher of two works being sold that those being sold were not, in fact, authorized copies. Amazon acted immediately not only by removing the electronic versions of the books from sale, but also by removing copies of the works from the Kindle readers of all those who had purchased copies of the e-books²⁸. Similar cases where a purchased copy of a work has become inaccessible because of a change in technology or decision to no longer pay the maintenance costs of authentication servers are unfortunately quite common²⁹.

A related problem of DRM protections concerns the legitimate use of works under fair use/fair dealing provisions present in all copyright regimes. DRM, through preventing copying, casts on overly large net, allowing market control restrictions at

²⁸ The particularly ironic part of the story was the books themselves: George Orwell's *Animal Farm* and *1984*. News coverage at:

<http://www.nytimes.com/2009/07/18/technology/companies/18amazon.html>

²⁹ For example, Wal-Mart decided to transition their online music store to offering DRM-free music in 2007. In 2008, Wal-Mart decided to shut down their DRM authentication servers, preventing access to DRM-protected music that had been purchased through the store (though Wal-Mart relented by agreeing to keep the servers online for an additional year): <http://arstechnica.com/old/content/2008/09/wal-mart-latest-to-shut-down-drm-key-servers.ars>. Similar inaccessibility of content occurred when Major League Baseball decided to change its DRM system (<http://arstechnica.com/old/content/2007/11/major-league-baseballs-drm-change-strikes-out-with-fans.ars>).

odds with fair use. The end result is that DRM-protected content cannot, without circumventing the protection, be accessed at all except in the methods specifically intended by the content producer. This has fairly serious consequences: protected media is entirely excluded from open source software³⁰; DRM-protected CDs cannot be copied for use on a portable media player³¹; DRM-protected films (and until recently, music) downloaded from the Apple iTunes store can only be played on Apple hardware and software; Amazon e-books, even of public domain works, can be viewed only on the Amazon Kindle, not any of the competing e-book readers; DRM-protected, digitally distributed copies—i.e. downloads—can rarely be loaned or resold. Reusing pieces of a copyrighted work for critique, analysis, or other (fair use) expression is similarly prevented. DRM protections thus go far beyond preventing illegal copyright infringement, by allowing content producers to place restrictions on the use of content that, unintentionally or otherwise, also impede other, legal uses of the work.

³⁰ This prevents, for example, Linux users from playing DRM-encrypted content—if open source software were available to decrypt the content, the lock would be, for all intents and purposes, broken as anyone could access, copy, and use the decryption code. This is the case with DVDs, where software libraries to decrypt DVDs exists, but their legality is questionable in many jurisdictions, particularly those that have passed strong anti-circumvention laws, such as the United States' Digital Millennium Copyright Act (DMCA).

³¹ Most CDs are not protected, as the CD was designed well before significant use of DRM protection for creative content. Some CDs, however, contain deliberate errors that do not significantly interfere with normal playback, but do interfere with copying. Other CDs contain software that, when the disc is inserted into a computer, is automatically installed that prevents copying. The most infamous example of this was the “Sony rootkit”, where the software installed to protect against copying was not only uninstalleable, but contained security vulnerabilities that could be easily exploited by other malware.

Quite aside from the restrictions and consequences to creativity inherent in DRM protections, of primary importance to copyright discussion is the effectiveness of DRM in significantly curtailing internet piracy. The widespread availability of pirated content copies, especially of widely distributed, popular content, from sources originally protected by DRM suggests that the protections indeed don't appear to have a substantial effect at curtailing widespread, digital, internet piracy. The protections thus appear to serve more as a method of offering more restrictive licensing terms to individuals, while preventing some casual piracy, than an effective deterrent to curtailing internet piracy³².

Attempts to increase piracy costs are met by consumers, as should be expected, with attempts to avoid those increased costs. Applications abound that block access to shared peer-to-peer content by known or suspected piracy-detecting firms; distribution itself is increasingly pseudonymous, untraceable to private individuals; cracks to DRM protections emerge relatively quickly as new formats and DRM systems emerge. While we can reasonably expect the efforts put into increasing piracy costs to have an immediate, short term effect, it is unlikely that these can be increased sufficiently to counteract the increasing quality and decreasing costs—primarily search costs and download speeds—associated with the inevitable technological improvements leading to faster internet connections.

³² Individual level piracy (e.g. copying a CD for a friend or family member) may be a different matter, but it is not clear that curtailing such piracy offers substantial benefits to producers: see for example Bakos, Brynjolfsson, and Lichtman (1999) and Varian (2000, 2005), who demonstrated that, at least in some circumstances, the increased value to purchasers associated with being able to share among small groups with non-uniform content valuations may increase the overall profits of content providers.

Another possible enforcement approach is to move the digital copyright enforcement responsibilities from content creators to internet service providers (ISPs). The main argument for this is, at first glance, compelling: ISPs are the best positioned to monitor their clients' traffic, and, presumably, can do so at the lowest cost. This would, however, have some unfortunate implications—notably including moving away from the current trend of considering ISPs common carriers—and might, in any case, not be particularly effective: increased efforts to avoid detection (most likely through some form of traffic encryption) would be the inevitable outcome. In effect, ISPs appear to be the best placed to police copyright infringement only because they currently do not do so: shifting the burden of detection to ISPs would induce a change in consumer behaviour not towards buying content instead of pirating it, but simply towards making themselves invisible by encrypting pirated content transmission³³. Even aside from these likely, and mitigating, consequences, to be particularly effective such a system would also require aligning ISPs' incentives with that of content providers, an outcome which might well prove difficult, given that the typically proposed penalty of internet disconnection of offenders is at odds with ISPs' business interests.

If the costs of finding, using, and creating pirated copies of content cannot be sufficiently increased, the only viable alternative for providing copies of content

³³ Of course, encryption would not be added directly the users themselves, but the programmers of peer-to-peer software. Encrypting transmissions is, from a programmer's point of view, an almost trivial task, and typically used explicitly to protect discovery of the contents of a transmission. Though encrypted traffic can often be identified generally (for example, as "BitTorrent traffic"), identifying the actual content being transferred and distinguishing it from *legitimate* BitTorrent traffic is not feasible.

involves offering copies at prices that are competitive with pirated copies of that content³⁴. Absent the increased profits available from an effective copyright system, such pricing necessitates a decline in expenditure on creative content—and therefore, by assumption, a decline in creative output³⁵. Varian (2005) suggests several alternative profit mechanisms that could act as a substitute for this loss, including selling physical complements, support contracts, personalized presentation of content, media taxes, and public provisioning. The last two of these are particularly interesting possibilities, and are discussed below. The first suggestions, however, don't seem solutions to compensating for the loss of expenditure, but merely the leftovers of a failed copyright system—specifically, these are approaches in which content creators are already engaging; there is no obvious reason why a decline in copyright should lead to a substantial increase in these tangential markets.

It is not the case, however, that prices need to descend to the same, negligible price as piracy: a price premium may be possible if the official content can be differentiated in some value-adding way. The reputation of Apple's iTunes Music Store, for instance, might induce a music listener to pay a small premium for a track

³⁴ At least for non-commercial piracy. Commercial piracy, where it can exist, may be a different matter: the relatively high costs involved with commercial distribution means effectively combating commercial pirates may well be possible. In any event, I largely ignore this point: given the negligible cost of pirated content, commercial pirated content enterprises are unlikely to be successful for the very same reasons that creators struggle to profit.

³⁵ Specifically, the assumption (that also backs the justification of copyright) that the *ceteris paribus* effect of decreased expenditure is decreased creative output, in terms of a composite measure of both the number of works, and the quality of those works.

for the convenience of easily obtaining that track from a trusted source. The size of premiums, however, is bounded by the availability of pirated copies: the rents effectively available amount to little more than the possible reduction in search costs, expected costs of using pirated content, plus a premium to account for individuals' risk aversions³⁶.

IV. Beyond copyright

As technological advance makes piracy less costly, the associated increase in piracy and decreased effectiveness of copyright makes creative expression an increasingly public good: digital copies are inherently non-rivalrous, and in the face of increasingly ineffective copyright, are increasingly becoming non-excludable. This implication necessitates a look at other solutions for inducing creative content that are not rendered ineffective under piracy.

One possible solution is a return to the commercial broadcast model: supporting content with advertising revenue. This solution is not, however, immune from the effects of piracy. The technological ability to easily skip through content diminishes the value of that advertising, necessitating some form of system to prevent the user from skipping advertising, such as locking down the hardware on which content can

³⁶ For works where future updates occur and are a valuable component of the work—for instance, computer software with associated (free) updates that fix problems and add functionality—where the producer can reasonably easily distinguish between valid and invalid copies in subsequent updates, the maximum available profit would also include the $\min(u_l, u_p)$, where u_l is the discounted present value of future software updates included with a legal license, and u_p is the discounted present cost of obtaining pirated versions of those updates.

be played—returning to DRM and its caveats to do so. Injecting advertising into distributed content, and preventing users from skipping such advertising, is a significant increase in the cost of the content, thus increasing the demand for a pirated copy—with advertising removed, of course. A possible extension of the advertising approach is to increase the use of advertising within the content itself—for instance, a character enjoying and endorsing a particular beverage as part of a creative work. This solves the problem of the advertising being easily separated from pirated copies of the work, but it seems unlikely that such advertising could sufficiently fund content industries, and furthermore may provide significant distortions of the content itself that reduce the value of the works in question³⁷.

Several countries, including Canada and many European countries, have pursued levies on blank media as a source of public funding to compensate for losses from piracy. This has some merit in addressing casual copying in a media-based creative world—making copies of a CD for a friend, or for a car stereo, for instance—but in an increasingly digital age, where a great deal of media is stored ephemeraly or on relatively enormous capacity devices, the vast majority of pirated content is never recorded on blank media at all. Instead it simply resides on hard drives, often in computers or computerized devices connected to large screen televisions. The more digital distribution is used, the less useful and harder to price such a media levy

³⁷ One can imagine, for instance, the Mona Lisa being rather less valuable had it been commissioned featuring an “Enjoy Coca-Cola” message. A counterpoint, however, exists in art whose main focus is the brand itself, such as Andy Warhol’s *Campbell’s Soup Cans*. Such works are, however, an exception, rather than the norm, in creative expression.

becomes³⁸. More problematically, any such media levy is poorly targeted: it increases prices not only for those using pirated content, but also those using media for entirely legal purposes. Media levies look like an increasingly dated solution, designed for an era where most piracy existed in the creation of physical media copies of creative content, rather than designed to target the current threat of large, reusable digital media storage.

A stronger potential solution is to shift creative content provisioning to a more direct public provisioning framework. Such a system already works to a significant extent in academic writing, where professors are paid through salaries and grants to research and create³⁹. In the provision of more entertainment-oriented works, examples abound of public provisioning, including the aforementioned media levies; in Canada, funding of the Canadian Broadcasting Corporation and the Canada Council for the Arts; in the United States, the National Endowment for the Arts; and in Britain, the British Broadcasting Corporation. Various countries, states, and provinces have a host of subsidies encouraging creativity—most visibly credits for film industries—and a large number of theatres, symphonies, and orchestras are supported through significant public funding.

³⁸ A good example of this is, as of this writing, Apple's iPod music player with 160GB of storage: according to Apple's advertising literature for the device, this capacity is sufficient for storing "40,000 songs." Attempting to put a media levy on the device of only 1 cent per song-storage-capacity would still result in a levy nearly double the cost of the device. In any event, such storage capacity is only weakly correlated with the amount of piracy such a device enables: even a device able to store only a small handful of songs is still useful

³⁹ Academic writing is still protected and covered by copyright, of course, but copyright doesn't appear to be necessary for such writing to occur. It likely does, however, assist in dissemination because the primary motivator of academic writing is motivational

A sort of public provisioning of output already plays a large role in academic works, where authors are compensated not through selling copies of their work, but through salaries and grants. It is not entirely clear that copyright serves as a useful incentive to such creativity: even in the absence of copyright, research work would still be performed: that is, compensation to the authors is not required and, in most cases, is not granted. Academic journals currently work within the copyright system, but given that academic work is already funded and has reputation as its primary remaining motivator⁴⁰, there is every reason to suppose that academic journals would still exist in some form without copyright, though likely under a different funding system than relying on selling copies.

One of the above mentioned examples, the BBC, is one of the most interesting examples of a working, public provisioning system: BBC funding is derived mostly from a fixed fee of about £140 per year⁴¹ charged to all households with television signal receiving equipment⁴². This funding allows the BBC to produce multiple, commercial-free television and radio channels, including funding of the creative content available on those channels. One particularly intriguing aspect of such a licence system is the separation between the funding levels and government policy makers: cutting BBC funding cannot be used to directly offset increased expenditure

⁴⁰ I simplify somewhat: reputation, in many cases, may have an associated financial incentive (promotion, future grants, etc.), but that incentive is typically smaller and much less direct than that for an author whose income is most closely derived from selling copies of a work.

⁴¹ Various details at <http://www.bbc.co.uk/info/licencefee/> and <http://www.tvlicensing.co.uk/>.

⁴² Not strictly televisions: computers able to receive TV transmissions, for example, also require a licence.

in other government programs. On the other hand, such a funding system is strongly regressive, and scaling such a system beyond its current, not insignificant fees would pose increasingly serious welfare concerns. It is worth noting that, in spite of being publically funded, the BBC maintains copyright over its content. As a solution to piracy, such copyright control is more difficult to justify than that on privately produced works: since the creation of the produced works is already funded, there is little justification (within a closed system) for receiving a copyright designed to recompense creation of the work. One significant justification for the BBC solution as it currently exists is the availability of another source of income for the BBC: the sale of broadcast rights in foreign markets.

The biggest problem with public provisioning of works is the difficult in assessing the value of a work. Under a copyright system, determining that value is relatively easy: through choices to purchase or not purchase a particular work in favour of another, relative success and value of a work can be determined *ex post*.

Determining the value of a single work *ex ante* is more difficult; there are countless, notable unexpected commercial successes and failures of various creative endeavours. Given this lack of perfect information, a common approach for publishers to mitigate risk is to pool several works, in the hope that some of the works in that pool will become successes that provide, on average, profitability for the pool. While value determination is more difficult without a market, it is not impossible: in the aforementioned academic journal system, for instance, editors and reviewers ultimately determine the value of a particular work through accepting or rejecting the article. In the BBC example, various individuals within the

BBC must make trade-offs between different programmes based on an anticipated value of a new work or continued run of an existing work.

An alternative approach to direct public funding of works exists in the form of awarding prizes to a subset of creators, based on some metric of quality of the work. As long as there was a number of awards spread across a sufficiently large spectrum of works, this would serve as a quality incentive for produced works. This would not guarantee direct compensation for each work according to its value, but could, at least on average, properly compensate. Publishing companies would then agree to publish various works with the hope that a certain percentage of those works win the available prize—much as occurs in the current, market-based approach. The difference is that the funding would be principally derived from public, rather than private, funding. Determining the value of the work, and determining which works win a prize, still face a significant information problem: government, or some delegated organization, would have the responsibility of picking winners. Aside from the difficulties of selection itself, keeping such an authority independent and sufficiently isolated from both government and industry influences, while preventing specific targeting by creators, would be crucial to efficient functioning of such a system.

Another alternative version of public funding could exist in the form of creative funding based on the *ex post* popularity of a work, perhaps based on the number of downloads of a work, audience sizes, etc. An interesting exploration of this model exists in the work of Netanel (2003), who proposes a “Noncommercial Use Levy”

involving payment based on file sharing popularity and use of content, while removing a significant incentive for individuals to mask their own activity—individuals would presumably no longer have a desire to engage in avoidance efforts. Some differentiation among categories of works would be required—for instance, a movie might have a higher rate than a (digital) book, which might have a higher rate than a television episode, which might have a higher rate than a song recording. In each period of time, creators would be compensated based on the popularity of their work, determined by the number of downloads. This would still be inferior to a no-piracy, market-based approach, unfortunately: it would ignore intra-categorical differences. That problem could be addressed by narrowing the breadth of categorization—for instance, instead of treating “music” as a category, perhaps multiple divisions within music by groups of genres would be more efficient—at the expense of additional costs associated with categorizing individual works. Additionally, creator incentives under such a system would shift towards wider distribution, where a market system allows for a smaller distribution at a higher price to a group with higher individual demand for the content. Indeed, the incentive to produce higher quality, where such quality improvements only drive higher prices rather than an increase in market, would vanish entirely under such a system⁴³.

⁴³ It is worthwhile pointing out that digital music sales in recent years have followed this exact path, by moving to fixed, per-track costs; unfortunately, identifying a metric of quality, to determine whether music has suffered as a result of this or other factors, is exceedingly difficult.

Kremer (1998) has proposed a notion of buyouts of intellectual property, primarily aimed at patents, utilizing an auction system to determine value. This system, while appealing in patent cases, cannot solve the fundamental problem of piracy in copyright: as piracy decreases the value of copyright, potential bidders for a particular copyrighted work would reduce their bids, reflecting the lower profits available to be earned for a copyrighted work. Shavell and Van Ypersele (2001) compare a reward system with an intellectual property rights system and conclude that the intellectual property rights system holds no fundamental advantage over a reward system—though again, their model was based on patents, where infringement can be efficiently prevented, rather than copyright, where increasingly it cannot.

V. Conclusion

There is little doubt that the ease and prevalence of piracy has spelled the end of copyright as a viable system for much creative content. With prohibitively high prevention costs, and extremely low marginal costs of reproduction, copyright cannot offer sufficient profits to sustain development of creative content at recent levels; where producing copies of copyrighted content was once efficiently excludable, such excludability no longer exists. Sufficient funding of creativity can no longer be derived from selling copies above marginal cost: creativity has become a public good.

The future funding of creativity as a public good must increasingly come from public sources. There are several alternatives for this funding—whether using a prize,

reward, per-copy payment, or direct funding system—but fundamentally, piracy has broken copyright as a mechanism for providing the necessary incentives. Some funding may be indirect—for example, the author of a book selling the book’s movie rights to a movie producer—but ultimately, that value comes from the value of the final goods, which cannot, in an increasingly digital world, be provided through a market approach of selling copies.

Fundamentally, this requires not an abolishment, but a shift in copyright away from attempting to prevent individual copies towards selling creativity to a small number of buyers: whether directly to government, or through publically funded organizations responsible for purchasing the content. In terms of policy this need not be a sudden shift to public funding; endeavours such as the BBC provide us with useful and successful examples of how content can be publically provided without necessitating the sudden dismantling of copyright. As copyright’s efficacy continues to decline, the future of creativity depends upon a transition to alternative sources. Piracy cannot be stopped; instead we need to adapt to the changes it imposes by recognizing that many forms of creative expression, which could once be effectively provided through the market, are becoming public goods. In the long term, we need to treat them as such or risk losing substantial future creative expression.

VI. Future research

One of the most difficult aspects of researching copyright and piracy is a lack of solid data with which we can determine the current scope of the piracy problem, and the relevant effects (both positive and negative) to industries of attempts such as DRM,

lawsuits brought against file sharers, large infringement fines, etc. Where data exists, it tends to be heavily biased—for instance, numerous industry-sponsored reports, with political interest in showing large losses, tend to produce questionable numbers, often determined by considering each pirated copy a loss at current prices. Given the extent to which piracy has been driven underground, determining rates of piracy is similarly difficult: consumers are understandably reluctant to admit to engaging in downloading copyrighted works, and likely to underreport the amount of the activity when admitting it at all; fewer still are likely to admit to being an original provider of copied, copyrighted material. Furthermore, many of the habits of consumers can only be expected to change substantially as internet access becomes cheaper and faster, as piracy prevention efforts increase, and as the divide between public and private funding of creativity changes. More, and more consistent, data collection is needed.

Concerning the notion of public provisioning of creativity, more investigation into the efficiencies of different provisioning systems is needed. The successes and failures of the BBC model (charging households a flat fee), for instance, need to be compared to the benefits and drawbacks of a more progressive, but potentially closer to government, system of creative funding. More research is also needed on the trade-offs of *ex ante* and *ex post* payment systems as they relate to creative content production: fundamentally, we need research into how we can effectively determine quality of output without the price mechanism provided by copyright.

Some significant extension of this research would be to look at different models of combining copyright with public provisioning. Specifically, what strings should be attached to publically provided content, beyond the basic allowance of consumption of content—should publically funded content be freely available for *commercial* copying? Similarly, what about non-commercial remixing of publically funded creative content? What significant trading implications would there be for nations involving publically-funded creative content—and more critically, how can we prevent free-riding at the international level, since content freely available in one country is likely highly difficult to exclude from others not providing adequate creative content funding?

Many of these topics have been explored in the related area of patents, often with an implicit, though naïve, assumption that the same mechanisms should apply to copyright. This sort of assumption ignores substantial differences between the two systems that are only becoming wider as piracy becomes easier and cheaper; overlooking these differences through attempting to apply a modified version of a patent system to creativity risks losing a substantial amount of socially beneficial creative output. Most importantly, more research is needed that recognizes copyright as only one of many possible means to an end: encouraging creative expression.

Bibliography

- 2d Cir. (1992). *Computer Associates International, Inc. v. Altai, Inc.*, number 982 F.2d 693, 1992.
- Bakos, Yannis, Erik Brynjolfsson, and Douglas Lichtman (1999). Shared information goods. *Journal of Law and Economics*, 42(1), 117–155.
- Baumol, W. J. and W. G. Bowen (1965). On the performing arts: The anatomy of their economic problems. *The American Economic Review*, 55(1/2), 495–502.
- Benkler, Yochai (2004). Sharing nicely: On shareable goods and the emergence of sharing as modality of economic production. *Yale Law Journal*, 114(2), 273–358.
- Copeland, Brian R. and M. Scott Taylor (2009). Trade, tragedy, and the commons. *American Economic Review*, 99(3), 725–749.
- Free Software Foundation. *The free software definition*, version 1.79.
<http://www.gnu.org/philosophy/free-sw.html>. Retrieved 14 June 2009.
- Gervais, Daniel J. (2004). The price of social norms: Towards a liability regime for file-sharing. *Journal of Intellectual Property Law*, 12(1), 39–74.
- Ginsberg, Jane C. (2001). Copyright and control over new technologies of dissemination. *Columbia Law Review*, 101(7).
- Gordon, Wendy J. (1982). Fair use as market failure: A structural and economic analysis of the “betamax” case and its predecessors. *Columbia Law Review*, 82(8), 1600–1657.
- Gowers, Andrew (2006). *Gowers review of intellectual property*. HM Treasury.
http://www.hm-treasury.gov.uk/d/pbr06_gowers_report_755.pdf. Retrieved 27 August 2009.
- Kremer, Michael (1998). Patent buyouts: A mechanism for encouraging innovation. *The Quarterly Journal of Economics*, 113(4), 1137–1167.
- Landes, William M. and Douglas Lichtman (2003). Indirect liability for copyright infringement: Napster and beyond. *The Journal of Economic Perspectives*, 17(2), 113–124.
- Landes, William M. and Richard A. Posner (1989). An economic analysis of copyright law. *The Journal of Legal Studies*, 18(2), 325–363.
- Landes, William M. and Richard A. Posner (2003). Indefinitely renewable copyright. *The University of Chicago Law Review*, 70(2), 471–518.

- Lessig, Lawrence (2008). *Remix*. The Penguin Press.
- Litman, Jessica (2006). *Digital Copyright*. Prometheus Books.
- Musick, Nathan (2004). Copyright issues in digital media. *Technical report, Congressional Budget Office*.
- Netanel, Neil Weinstock (2003). Impose a noncommercial use levy to allow free peer-to-peer file sharing. *Harvard Journal of Law & Technology*, 17(1).
- Oberholzer-Gee, Felix and Koleman Strumpf (2009). File-sharing and copyright (Working paper). <http://www.hbs.edu/research/pdf/09-132.pdf>. Retrieved 25 July 2009.
- Polinsky, A. Mitchell and Steven Shavell (1998). Punitive damages: An economic analysis. *Harvard Law Review*, 111(4), 869–962.
- Samuelson, Pamela (2007). Preliminary thoughts on copyright reform. *Utah Law Review*.
- Shavell, Steven and Tanguy Van Ypersele (2001). Rewards versus intellectual property rights. *Journal of Law and Economics*, 44(2), 525–547.
- Siebrasse, Norman (2001). A property rights theory of the limits of copyright. *University of Toronto Law Journal*, 51(1).
- Slive, Joshua and Dan Bernhardt (1998). Pirated for profit. *The Canadian Journal of Economics*, 31(4), 886–899.
- Takeyama, Lisa N. (1997). The intertemporal consequences of unauthorized reproduction of intellectual property. *Journal of Law and Economics*, 40(2), 511–522.
- Varian, Hal R. (2000). Buying, sharing and renting information goods. *The Journal of Industrial Economics*, 48(4), 473–488.
- Varian, Hal R. (2005). Copying and copyright. *The Journal of Economic Perspectives*, 19(2), 121–138.
- von Hippel, Eric (2005). *Democratizing Innovation*. The MIT Press, Cambridge, Massachusetts.
- Waldman, Michael (1997). Eliminating the market for secondhand goods: An alternative explanation for leasing. *Journal of Law and Economics*, 40(1), 61–92.
- Wright, Brian D. (1983). The economics of invention incentives: Patents, prizes, and research contracts. *The American Economic Review*, 73(4), 691–707.