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Fixing Safe Harbor: An Economic Analysis

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Abstract: When a pirated version of a copyrighted work is shared over the Internet, many online intermediaries may participate, exposing these firms to liability through legal concepts such as direct, contributory and vicarious infringement. Safe harbors largely shield intermediaries from “crippling liability” in return for cooperative action on infringing materials. Yet, digital piracy remains a problem. In this POLICY PAPER, we offer a simple economic model of safe harbor protection, demonstrating that de minimis liability for these platforms promotes infringing platforms to the detriment of responsible ones. Increasing the risk of liability for infringement results in a “separating equilibrium,” with one platform offering only legitimate and high-value content and another offering a combination of illegitimate and low-value content. Effective platform liability should ultimately change the structure of the platform industry, which we believe should improve enforcement of copyright law. Legal changes similar to those prescribed here were recently been proposed in the European Union.
I. Introduction

When a pirated version of a copyrighted work (or other objectionable or illegal content) is shared over the Internet, many online intermediaries may participate, including the broadband companies that provide the connections, the search services that facilitate finding the material, the owners of the servers that store the infringing files, and the software and technology companies whose platforms effectuate the transfer. The intermediaries’ role in the infringing or illegal acts may expose these firms to liability through legal concepts such as direct, contributory and vicarious infringement.\(^1\) The United States Congress, faced with an

“epidemic” of digital piracy yet concerned about “crippling liability” on the growth of the Internet, crafted as a solution the safe harbor provisions of the 1998 Digital Millennium Copyright Act (“DMCA”). Conditions and limitations of the safe harbor outlined in Section 512 of the DMCA aimed to balance “the interests of the owners of copyrighted works with those who use or facilitate the use of those works in the digital age.”

History demonstrates the safe harbors have created an environment well suited for the rapid growth of user-uploaded content (“UUC”) platforms, producing Internet institutions like Google, YouTube, Twitter, and Facebook, among others. Yet, while Congress intended to craft a “legal framework to ensure [rightsholders] can protect their work from piracy,” digital piracy remains rampant on UUC platforms. In light of these facts, in 2015 the U.S. Copyright

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3 SENATE CONFERENCE REPORT, id. at S11889. Section 230 of the Communications Decency Act of 1996 (“CDA”) does the same for illegal activity unrelated to intellectual property, though its limitations on liability are much broader. See 47 U.S.C. § 230.


Office initiated a review of Section 512. Likewise, reforms to the safe harbors of the Communications Decency Act of 1996 (“CDA”), which also have failed to sufficiently curtail illegal communications, have been proposed. The embedded imbalances in the U.S. system warrant study both for improving U.S. law and aiding the reform of copyright law in other nations.

With that in mind, we offer in this POLICY PAPER a simple economic model that reveals how the limited liability afforded by safe harbor protection of UUC platforms affects the evolution of these platforms. Our model demonstrates that de minimus liability for these platforms promotes the success of platforms with high shares of infringing material to the detriment of platforms that properly vet uploaded files for illegal materials using the increasingly effective content identification systems. That is, vetting is costly, putting responsible platforms at a disadvantage in a competitive platform market. Increasing the risk of liability on UUC platforms that host infringing (or otherwise illegal) material, while offering safe harbor to those that vet the uploads of their users, results in a “separating equilibrium,” where two types of these platforms arise—one offering only (or mostly) legitimate content, and another offering a combination of illegitimate and low value content. Thus, the introduction of effective platform

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8 See, e.g., the content ID product available from Audible Magic Content ID (https://www.audiblemagic.com).

liability should ultimately change the structure of the platform industry by allowing legitimate platforms that vet their content to thrive.

In turn, this separating equilibrium aids copyright enforcement, especially with respect to site blocking, which is sometimes claimed to have a “wide net” problem. By separating the platform wheat from the chaff, so to speak, better safe harbor policies not only make the legitimate site business model feasible, but also provide the opportunity for more effective and less controversial site blocking by providing a “clear shot” at mostly infringing platforms, reducing the social cost of unintended sanction.

II. Background

As a compromise intended to protect copyright holders from digital piracy while also protecting “passive” online intermediaries from an avalanche of lawsuits resulting from the infringing uploads of their users, Section 512 of the 1998 Digital Millennium Copyright Act (“DMCA”) established a “safe harbor” for


11 Mixing infringing and legitimate content may be used by defendants as shield against liability. See, e.g., Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 442 (1984) (“the sale of copying equipment, like the sale of other articles of commerce, does not constitute contributory infringement if the product is widely used for legitimate, unobjectionable purposes. Indeed, it need merely be capable of substantial noninfringing uses.”); Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd., 545 U.S. 913, 918-19 (2005) (“under what circumstances the distributor of a product capable of both lawful and unlawful use is liable for acts of copyright infringement by third parties.”).
online intermediaries. In the U.S., safe harbor covers many different types of Internet intermediary services, including (a) transitory digital network communications (e.g., ISPs); (b) system caching (e.g., the temporary storage of web content to improve search and download efficiency); (c) information residing on systems or networks at the direction of users (e.g., YouTube, chat rooms, personal websites); and (d) information local tools (e.g., search engines).

For these online intermediaries, the safe harbor is “not presumptive, but granted only to ‘innocent’ service providers...” Among other things, to enjoy the safe harbor, online intermediaries must be highly passive in nature, meaning that they: (a) must not have actual knowledge that the material is infringing; (b) must not be aware of the facts or circumstances which infringing activity is apparent (“red flag” knowledge); (c) must not engage in “willful blindness” of infringing activity; (d) must not interfere with standard technological measures used by copyright owners to identify or protect copyrighted works; and, perhaps more critically, (e) must not receive financial benefit directly attributable to the infringing activity. Intermediaries must also have “reasonably implemented” policies for addressing “repeat infringers.” For certain online intermediaries including UUC

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12 47 U.S.C. § 512. See also ALS Scan, Inc. v. RemarQ Communities, Inc., 239 F.3d 619, 625 (4th Cir. 2001) (“The DMCA was enacted both to preserve copyright enforcement on the Internet and to provide immunity to service providers from copyright infringement liability for ‘passive,’ ‘automatic’ actions in which a service provider’s system engages through a technological process initiated by another without the knowledge of the service provider” (citing DIGITAL MILLENNIUM COPYRIGHT ACT, HOUSE CONFERENCE REPORT, REPORT NO. 105-786 (October 8, 1998) at 72; HOUSE REPORT, supra n. 4 at 11 (1998); B.T. Yeh, Safe Harbor for Online Service Providers Under Section 512(c) of the Digital Millennium Copyright Act, Congressional Research Service 7-5700 (March 26, 2014) (available at: http://www.ipmall.info/sites/default/files/hosted_resources/crs/R43436_140326.pdf); SENATE REPORT, supra n. 1 at p. 65 (“to ensure that the appropriate copyright protections are in place around the world and to foster the enormous growth of the Internet and other digital computer networks”); J. Litman, DIGITAL COPYRIGHT: PROTECTING INTELLECTUAL PROPERTY ON THE INTERNET (2000).


14 ALS Scan, supra n. 12, 239 F.3d at 625; see also Capitol Records Inc. v. MP3Tunes, LLC, 821 F. Supp. 627, 365 (S.D.N.Y. 2011) (“... the DMCA’s safe harbors, as with all immunities from liability should be narrowly construed.”)

15 See 17 U.S.C. § 512(c)(1).

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Since the passage of the DMCA, the Internet has flourished. At the end of 1998, there were 147 million Internet users worldwide, while today there are four billion, or half the world’s population.\footnote{INTERNET WORLD STATS: USAGE AND POPULATIONS STATISTICS (available at: http://www.Internetworldstats.com/stats.htm).} In the U.S., Internet adoption has risen from 160 million in 2000 to 270 million in 2015,\footnote{A. Perrin and M. Duggan, Americans’ Internet Access: 2000-2015, PEW RESEARCH CENTER, INTERNET & TECHNOLOGY (June 26, 2015) (available at: http://www.pewinternet.org/2015/06/26/americans-Internet-access-2000-2015); U.S. population: https://www.census.gov/data/tables/2016/demo/popest/nation-total.html.} and the world has witnessed the rise of corporate giants such as Google, eBay, Amazon, Alibaba, Baidu, Twitter, Netflix, and Facebook, among others.\footnote{The 25 Largest Internet Companies in the World, Worldatlas.com (Feb 13, 2017; visited July 19, 2017) (available at: http://www.worldatlas.com/articles/the-25-largest-internet-companies-in-the-world.html).}

With respect to Section 512’s objective to “foster the enormous growth of the Internet,” recent history is extremely favorable.\footnote{SENATE CONFERENCE REPORT, supra n. 2 at S11891.}
With regard to protecting intellectual property rights, however, Section 512 has failed to reduce digital piracy to manageable levels. Over the years spanning 2000 through 2015, as Internet adoption rapidly grew, U.S. sales of recorded music fell 65% in real terms, a devastating decline attributable in no small part to digital piracy. According to Google’s TRANSPARENCY REPORT, in 2016 the company executed nearly 3 million takedown requests per day for its search engine alone. Notice-and-takedown has proven little more than a game of Whack-A-Mole for rightsholders, where removed content is often quickly replaced with new infringing files. Site blocking and other legal actions against the worst infringing platforms has helped curb digital piracy, but some rebalancing work seems called for to address the persistence of digital piracy under the privilege of safe harbor.

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Despite the extensive availability of legal online services distributing creative works, Section 512 has largely failed to protect owners of both large and small portfolios of creative property.

Recent technological and legislative developments offer some hope for improvement. A number of nations have passed site-blocking laws, thereby easing enforcement actions against the most egregious sources of infringing materials. Evidence suggests site blocking has proven an effective tool for reducing digital piracy. Also, frustrated by notice-and-takedown’s effect on the user experience and fearing the loss of safe harbors by directly benefitting financially from infringing materials (by Section 512(c)(1)(B)), many larger UUC platforms have incurred the cost of implementing content vetting algorithms to detect infringing materials. YouTube designed its own system (Content ID), as have others, but there are also third-party solutions available like Audible Magic.


26 Id.


YouTube claims it is now able to detect 99.5% of infringing materials (which may still result in millions of infringing acts), though the effectiveness of the system is contested. Even if imperfect, these content vetting technologies demonstrate that UUC-platforms are capable of vetting content and thus these platforms can no longer claim that they are helpless with respect to the infringing activities of their users. This important development in the UUC-platform market plays a key role in our analysis.

These vetting systems also shed light on the proper role of notice-and-takedown procedures. Notice-and-takedown has proven ineffective as a front-line defense against digital piracy. Instead, with content identification technologies, notice and takedown seems better suited as a backstop effort for the few instances where infringing material escapes detection. In modern times, it seems reasonable that a formal vetting system, mechanical or manual, should be a predicate for safe harbor. Also, we believe modifying Section 512(c)(1)(B)’s “financial benefit” language to more clearly limit the application of safe harbors to plainly “passive” rather than “active” business plans of online intermediaries may nudge the UUC.


platforms to act more responsibly. Modifications along these lines are already under consideration in the European Union. Article 13 and 14 of the Digital Single Market Directive Proposal requires online intermediaries to “prevent the availability” of infringing works with measures “such as the use of effective content recognition technologies.” Also, the Directive Proposal more clearly limits the safe harbor to “passive” intermediaries, thereby requiring “active” intermediaries to obtain licenses for copyrighted content. An “active” intermediary is one whose service goes “beyond the mere provision of physical facilities and performing an act of communication to the public” but engages in activity such as “optimising the presentation of the uploaded works or subject-matter or promoting them, irrespective of the nature of the means used therefor.” This proposed policy approach remains a proposal and there are details to work out, but these proposed changes to the safe harbor are shown here to have an economic basis and, we suspect, will encourage more responsible behavior by online intermediaries with respect to copyright infringement.

Protecting intellectual property in the digital age is a challenge for policymakers and rightsholders alike, and our analysis is admittedly limited. A variety of Internet intermediaries participate in the distribution of infringing materials. Allocating liability across this ecosystem with the goal of minimizing


32 Id. at p. 38.

the cost of reducing infringement by a fixed amount is a complex problem.\textsuperscript{34} Effectively allocating liability requires evidence on the information available to the intermediary, the mitigation cost of the intermediary, the cost of administering the liability regime, and the net-costs of unintended consequences. We do not seek here to solve this difficult problem. Instead, we rationally limit our attention on what appears to be the primary facilitator of infringement in the modern Internet ecosystem—platforms that host, index, and/or distribute user-uploaded content, no small portion of which is infringing. These platforms include, most obviously, torrent sites, file search platforms, cyberlockers, aggregators, and audio and video-streaming services known for, and often designed for, the illegal indexing and distribution of copyrighted content.\textsuperscript{35}

We do not address in this PAPER the full implications of safe harbors. For instance, safe harbors may distort the bargains between UUC platforms and rightholders for licenses, as has been claimed in the “value grab” debate.\textsuperscript{36} Such distortions may be significant for rightsholder income, both directly and indirectly by reducing the value of the content to platforms that must obtain rights through

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normal channels (e.g., Netflix, Google Play, and so forth). Such concerns are left to others or for future research.

III. An Economic Model

Our analysis of the effects of safe harbor and similar legal limitations of liability on the structure and performance of the UUC platform market is predicated on several essential facts about this business. Although all economic models are, to varying degrees, significant simplifications of complex issues, it is nevertheless vital that the most important aspects of the problem be retained. To this end, it appears to us that any credible analysis needs to incorporate the following features:

A. Viewers/consumers of online material are largely or completely indifferent to its legal status;

B. Verification of the legal status of uploaded works by the hosting platform is costly;

C. The UUC-platform industry is competitive, with profits driven towards competitive returns over time;

D. Those uploading material, both legal and infringing, select their uploading locations based on the net private benefits they receive from their choices;

E. Safe harbor provides a specified liability shield which reduces the probability that a qualifying website is subject to legal sanctions for infringement that disrupts its business.

The reasoning underlying these core assumptions is straightforward. First, in the great majority of cases, it is probably practically impossible for a consumer of online content to determine the legal status of viewed material. Though there are often good clues that the material is infringing, such as the use of rights management information, a retail market for the material and, often, the name of the site (e.g., piratebay.com).

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37 Id.

38 Though there are often good clues that the material is infringing, such as the use of rights management information, a retail market for the material and, often, the name of the site (e.g., piratebay.com).
Similarly, observed practice in the uploading marketplace does illustrate that vetting of uploaded material is possible: programs such as Content ID, Audible Magic, and similar measures, which require set-up and operating costs, are imperfect but improving in their effectiveness in detecting infringing material. Unlike unsupported notice and takedown schemes, in which stolen material is often rapidly uploaded again under another account name, pre-upload identification of intellectual property prevents the most egregious abuses (Assumption B).

Such technologies, however, are costly and someone must pay these costs. How these costs are shared between the platform and its users is ultimately determined by the structure of the UUC platform industry and the nature of the market for its services. We assume the long-run profit rates of UUC platforms are driven towards competitive returns over time (Assumption C). This assumption, in turn, implies that users of UUC platforms will, in some form or fashion, bear at least a portion of the costs of any content verification system over time. Thus, we will assume that uploaders using platforms that engage in costly vetting will face higher private costs from uploading there than at alternative platforms that expend no resources reviewing uploads beyond responding ex post to specific takedown requests. Accordingly, inducing uploaders with non-infringing property to upload on any platform engaging in costly vetting of material necessarily involves offering them some offsetting benefit (Assumption D).

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40 T. Ingham, YouTube’s Content ID Fails to Spot 20%-40% of Music Recordings, MUSIC BUSINESS WORLDWIDE (July 13, 2016) (available at: https://www.musicbusinessworldwide.com/youtubes-content-id-fails-spot-20-40).
because end users will not favor viewing legal material over infringing content, and the platform must pay for costly policing of their uploaders.

Our most important assumption is Assumption (E): safe harbor is a liability shield that reduces or eliminates the threat of legal sanction against the protected platform. To be effective, this sanction must materially impact the platform, creating costs for its owners and, given Assumption (C), causing some costs to rebound onto its users. As we will see, in order for uploaders of non-infringing material to accept the higher costs of uploading on well-vetted platforms, there must exist some countervailing incentive that creates a differential in favor of the legal-only platform. Restricting safe harbor protections to such platforms is one such countervailing incentive.

A. The Model

We begin our analysis with a simple description of the universe of potential uploaders of content. Potential uploaders engage with content of two types, “Legitimate” and “Infringing.” Each uploader is assumed to know her own type, and each decides whether or not to upload her material, and where to attempt to upload it. In particular, we posit the existence of a continuum of each type of uploader, with their types uniformly distributed on a finite interval \([a, b]\). Without loss of generality, we take \([a = 0, b = 1]\). The type of a potential uploader we will interpret as the private value or benefit (labeled \(p\)) they potentially receive from uploading.

Uploaders can incur costs up front from uploading their material, and we interpret these as private costs they incur through their efforts at complying with the uploading requirements of a particular website. Websites are taken to be of two particular sorts, “Open,” at which anyone can upload without screening for infringement, and “Vetted,” which prevent infringing material by pre-screening uploads. Since only the difference in the incremental uploading costs will matter for our analysis, we normalize the uploader’s cost at an Open site to be zero, while attempting to upload at a Vetted site costs \(c > 0\). In the interest of simplicity, we assume that Vetted sites enjoy a safe harbor (or safe harbor like) protection, and
are never held legally liable for infringing uploads, while Open sites face potential liability.\textsuperscript{41}

We consider first the decisions of potential uploaders of various types. To do this, we introduce the possibility, inherent in the lack of safe harbor protection that a uploader of non-infringing material on an Open site may suffer from legal action taken against the site for infringement. In particular, let $p$ be the type (value) of uploading to a user with non-infringing content. If the user uploads on a Vetted site, then her profit or benefit $U$ is:

$$U = p - c.$$  \hspace{1cm} (1)

As shown in the expression, this cost ($c$) need not be in the form of a direct financial payment by uploaders for uploading content to a UUC platform. All that is required for a positive $c$ is that the vetted site reduces the uploader’s value of his or her material in some way. For instance, if the UUC platform requires viewers to watch advertisements to cover the costs of vetting, then the value of uploading to the site is reduced, in part because the ads will reduce consumption.

If, however, she uploads on an Open site, her benefit or profit is:

$$U = (1 - \pi)p,$$  \hspace{1cm} (2)

where $\pi$, $0 < \pi < 1$, represents a loss of expected value or income due to possible sanction of the platform by legal authorities. Thus, $\pi$ represents the consequences of the lack of safe harbor for the Open platform. If safe harbor protection were very broad and extended to unvetted Open sites, then for example $\pi = 0$, while a larger value for $\pi$ will imply that, for some types $p$, uploading on the Vetted site may be more privately beneficial. It is perhaps easiest to think of $\pi$ as the probability the platform is site blocked so that none of its content is available for viewing. The value to the uploader of her content is that it will be viewed by others, so a large $\pi$ implies a lower net value to the uploader.

1. **Uploading Non-Infringing Works**

Up loaders with infringing content are for simplicity assumed literally unable to upload on a Vetted site. Thus, their only decisions will concern whether to upload on the Open site, or not at all. We will begin by assuming all material, infringing or not, will be uploaded, and move to consideration of the extensive margin later in the analysis (that is, we assume for now a fixed quantify of content). Setting the extensive margin aside, the only issue at this stage concerns the behavior of an uploader with non-infringing property. Following Assumption (D), we find that a non-infringing uploader of type \( p \) will upload on an Open site in preference to a Vetted site if and only if:

\[
p - c < (1 - \pi)p \quad \Rightarrow \quad p < c / \pi,
\]

which simply states that the uploader will choose the platform type offering the largest net benefit. In the presence of both sorts of sites, the fraction \( \min\{c / \pi, 1\} \) of legitimate uploaders will upload on the Open site, while the fraction \( \max\{1 - (c / \pi), 0\} \) will upload on the Vetted site. Given our assumption that the cost of uploading on an Open site is zero, and that the lowest value of uploading an infringing work is likewise zero, all agents with infringing works would choose to upload on the Open site (and cannot upload to the Vetted site).

There are several things to note about this formulation. First, while all infringing uploaders use Open sites by assumption, some owners of non-infringing material may upload on Open sites (see Expression 3). But, this occurs when the value of that non-infringing material is sufficiently small \( (p < c / \pi) \). Thus, if both site types exist in equilibrium, then the Open sites will exhibit a combination of low-valued non-infringing material (dancing babies, silly cats, political rants, etc.) while the Vetted sites will host all higher-value legitimate material.

Second, the level of safe harbor enforcement, proxied by \( \pi \), determines whether Vetted sites could exist at all. Since it is costly to police infringing uploads, and some of these costs inevitably rebound on the uploaders, Open sites enjoy a cost advantage vis-à-vis Vetted sites. As pointed out earlier, viewers of online uploads presumably neither know, nor care, whether particular uploads are infringing or not, so viewers cannot be expected to police infringement. Even for uploaders with legitimate content, compliance with costly vetting procedures is unattractive unless some sufficiently robust offsetting benefit is available. Safe harbor rules, which can in principle disrupt the operations of sites hosting infringing content, may provide such an incentive, but only if the penalty for infringement is sufficiently large.
Finally, disruption of Open website operations can impact non-infringing uploaders with material on those sites. However, the amount of such material at risk in this way does not depend on the level of enforcement parameter \( \pi \). This is because the quantity of such non-infringing material is given by \( (c/\pi) \), so the expected quantity blocked is thus \( \pi (c/\pi) = c \), which depends only on the cost differential attributable to vetting uploaded material. Uploading non-infringing works to Open sites is merely the avoidance by uploaders of paying for the cost of vetting systems.

2. Uploading Infringing Works

We turn next to the degree of infringing material on Open sites, measured as a percentage of all material on such sites. The percentage of infringing material on Open sites, labeled \( F \), is

\[
F = 1/(1 + (c/\pi)) = \pi/(\pi + c).
\]

This formula illustrates that \( F \) and the level of infringing site disruption (\( \pi \)) are positively related. That is, the more active the enforcement mechanism, the more non-infringing content is uploaded to Vetted sites, thereby increasing the share of infringing material on Open sites. Further, when the uploading cost differential between the Vetted and Open sites, \( c \), is “small,” then even relatively modest values for \( \pi \) will lead to almost complete segregation of material, with non-infringing material being uploaded almost exclusively on Vetted sites, and Open sites hosting almost solely infringing files. Here, it is easy to see that a more aggressive enforcement regime creates better targets for site blocking and other enforcement actions, since, if enforcement is strong enough, Open sites contain mostly infringing content thereby avoiding the “wide net” problem.

B. Endogenizing Enforcement

We have, to this point, largely ignored the role and behavior of the Vetted and Open websites. This lack of attention is in keeping with our Assumption C, above. If, as we assume, these markets are competitive, then such sites will offer infinitely elastic uploading opportunities at marginal cost prices, and engage in no strategic behavior.

In our analysis, the consequences of a safe harbor policy are reflected in the presence of a differential legal risk for those who lack this legal indemnity. While both sorts of sites may face similar baseline legal challenges, the introduction of credible safe harbor rules is modeled as simultaneously (i) creating an additional
uploading cost for Vetted sites, and (ii) introducing a risk of legal action against a site lacking protection, and this risk rebounds to some degree on uploaders using that site, possibly including some uploaders of legal content.

It is not likely that the level of legal risk, represented here by $\pi$, is completely determined by the law. Rather, the law gives private actors the means and incentives to pursue remedies through complaints and litigation, and it is probable that the level of such activities reflect the level of infringements. In this simple telling, though, infringement only occurs on Open sites, and the level of this infringement is measured by $F$. Thus, as a first attempt to “endogenize” enforcement action (and, hence, $\pi$), we suppose that the probability an Open site with infringing content is disrupted is given by the relationship $\pi = \alpha F$ for some given positive constant $\alpha$. We can now analyze the equilibrium level of enforcement under the safe harbor mechanism.

Figure 1 above illustrates a plausible generic equilibrium. This figure is drawn under the assumption that the threat for infringers is sufficiently strong ($\alpha > 2c$, ensuring the lines labeled $\pi$ and $F$ intersect). The share of infringing material $F$ is measured on the vertical axis, and the enforcement level $\pi$ on the horizontal axis. In this case, there exists an equilibrium level of enforcement $\pi^*$ which is consistent with the equilibrium level of infringement on Open sites. $F$ equals 0.5 up until $\pi = c$, since we have assumed half of all content is infringing and all uploaders are pooled on the Open site. When $\pi > c$, then non-infringing content migrates to the Vetted sites, increasing the share of infringing content on Open sites, as illustrated by the change in the shape of $F = 1/(1 + c/\pi)$ at $c$ on the horizontal axis.

In the figure, the equilibrium is $\pi^*$, where the $\pi$ and $F$ lines intersect. Inspection of the diagram and underlying equations reveals that this equilibrium is “stable” in the usual sense. The reduced form expression for equilibrium enforcement is:

\[ \pi^* = \frac{\alpha F^*}{1 + \frac{c}{\pi^*}} \]
\[ \pi^* = \alpha - c. \] (4)

The expression states that the strength of property enforcement (\(\pi\)) is greater when the legal system makes it easy to enforce intellectual property rights (\(\alpha\) is larger), and when the uploading cost differential between the Vetted and Open platforms (\(c\)) is smaller.

While our model is not a dynamic one, the expression has a practical temporal meaning. In the early days of the Internet, vetting content was more costly than it is today. With the development of content identification technology, which is increasingly widespread and available from third parties, the relative costs between uploading on Vetted and Open sites is much lower and should continue to shrink. Consequently, the optimal sanction should be larger today than in the past, suggesting safe harbor is not temporally fixed but should adjust to changing market conditions.

C. Summary

Safe harbor rules, if they mean anything, create a differential legal risk to websites hosting illegal content. Obtaining safe harbor protection, though, is costly, as it implies the implementation of some type of content identification system, with the attendant costs of registration, screening, and so on. When the UUC platform industry is competitive then, in the baseline sense, Vetted sites (which qualify for safe harbor) need to offer some countervailing benefit for uploaders of non-infringing files to overcome the additional compliance costs. This differential is the fundamental function of safe harbor provisions, and it works to the extent that it is able to create sufficient alternative incentives. Weak rules will probably result in the same outcomes as no rules since, with competition, any cost disadvantage is a significant handicap. If the Internet is to evolve in a way that permits platforms to develop while also protecting intellectual property, as the “grand bargain” implies, then stronger sanctions for platforms that host and distribute infringing materials is required.\(^{42}\)

D. Extensions and Qualifications

There are several significant factors affecting online infringement that are not encompassed in the earlier analysis. In this section, we will discuss several of the

\(^{42}\) The analysis here presumes the goal is to balance infringement and the growth of UUC platforms. We do not provide a general equilibrium analysis of the economic welfare consequences of such policies, which may involve numerous tradeoffs.
most important of these factors. As we will see, the basic logic of our results remains, though sometimes with qualifications.

First, the analysis assumes infinitely inelastic supplies of both infringing and legitimate uploads. This simplification frees us from having to consider effects on the extensive margin, in which changes in policy or cost parameters lead to different numbers of uploads in equilibrium. This may strike the reader as quite odd, since keeping infringing material off the Internet is presumably a basic purpose of public policy towards copyright and safe harbor rules. Interestingly, this complication is less nuanced than might appear. To see this, suppose that the uploading cost for an Open platform is $c_1$ and that for a Vetted platform is $c_2$, where $c_2 > c_1 > 0$. This complication will provide for elastic supplies of both infringing and non-infringing uploads. In this case, owners of legitimate files will choose the Vetted site when their value is high enough, so that $\pi p > (c_2 - c_1)$; that is, the profit put “at risk” by uploading on the Open site exceeds the extra cost required to upload on the Vetted platform. Some “intermediate value” non-infringing material will be put on the Open platform, and the lowest valued material will not be uploaded at all. Again, by assumption, infringing matter can only be uploaded on the Open platform, and very low valued files will not be uploaded (the value to the uploader is too small to cover any cost).

The comparative statics of the sorting described above is fairly straightforward. An increase in $\pi$, which we take to represent a strengthening of liability on UUC platforms for infringement, will increase uploading to Vetted platforms, decrease uploading of non-infringing material at Open platforms, and suppress uploading of low valued legitimate material. Simultaneously, uploading of infringing matter, which occurs only on Open platforms, will decline. Thus, while Vetted platforms will receive more uploading, Open platforms, which will diminish in overall content, might exhibit either an increase or decrease in the proportion of infringing material, the outcome depending on the underlying distributions of values.

Our model also avoids incorporating a very visible aspect of infringement: when a movie or song is available on a UUC platform “for free,” it is much more difficult to get customers to pay for it through a legitimate channel (e.g., Netflix or Spotify), reducing the income of rights holders. Indeed, in many respects, this phenomenon is fundamental for the case for the protection of intellectual property. If the creators of works cannot realize income from their property, then they will
cease making it, impoverishing society.\textsuperscript{43} Limiting the amount of stolen material on the Internet is a crucial part of this process, and safe harbor rules affect the ability of rightsholders to protect their investments.

From the standpoint of our analysis, one can imagine that the amount of infringing material on the Internet negatively affects the potential value obtained from uploading non-infringing material, thus shifting the value distribution to the left. Ignoring the equilibrium determination of \( \pi \) in this case, which could be quite complicated, the first-order effect of a reduction in the value of legal property is to reduce uploading on Vetted platforms with an ambiguous effect on non-infringing uploads on Open platforms. This latter occurs because, while some property formerly uploaded on a Vetted platform would be moved to an Open platform if its value fell, so also can some low value material uploaded on Open platforms be dropped entirely: the particular outcome depends on the underlying distributions and how the reduction in value is specified. If, following our original assumptions, all property is uploaded in equilibrium, then we would observe fewer Vetted platforms, more Open platforms, and a lower proportion of infringing material on the Open platforms as the remaining low-value non-infringing material is uploaded to Open sites.

The lesson from this is fairly clear: When the presence of infringing works on the Internet reduces the incomes of legitimate works, this can be expected to change the platform industry market structure, with increased presence of non-infringing material on the Open platforms, and, therefore, greater risk that some of this material could be affected by legal proceedings against UUC platforms.

Finally, implementing an identification system may be cost prohibitive for some UUC platforms, thereby altering the market structure and prices.\textsuperscript{44} With uniform application, the price effects are likely to be attenuated by competition among similarly situated platforms. Of course, any impact of higher prices or content effects must be weighed against the social losses from the theft of property.


including the direct and indirect effects of infringing activity.\textsuperscript{45} Such tradeoffs are common. In many respects, the online intermediaries’ arguments against content identification are the same as, say, the coal industry’s arguments against environmental policies that raise coal prices and reduce industry employment.\textsuperscript{46} Solutions to undesirable behaviors may be costly, but the solutions often create benefits well in excess of the costs.

E. Legislative Solutions

Specific legislative solutions are beyond the scope of our analysis. We believe, however, that the analysis, while a simplification of the issue, points to the target areas where the safe harbor regime could be improved. First, the vetting of upload material prior to its availability for consumption on the UUC platform should be encouraged. To encourage the use of vetting systems, Congress could borrow from the requirement placed on the UUC platforms for repeat infringer policies. That is, the protection of the safe harbors could be limited to UUC platforms with formal vetting policies and systems. These systems are available and can be effective, so there is little excuse for a failure to implement a vetting system on UUC platforms commonly used for infringing acts (as may be determined by the receipt of takedown notices).

Second, the statutory language could provide greater specificity surrounding the financial benefits of hosting, indexing, or distributing infringing material. Content identification systems have arisen, in part, from the desire of UUC platforms to monetize the viewing of material they host as viewership (and thus advertising potential) is higher for professionally-generated and protected content.\textsuperscript{47} Evidence of direct financial benefit from the consumption of infringing


\textsuperscript{47} See, e.g., M. Mulligan, STATE OF THE YOUTUBE MUSIC ECONOMY, MIDiA (June 2016) (available at: https://www.midiaresearch.com/blog/the-state-of-the-youtube-music-economy) (81% of YouTube viewers watch music videos, at p. 13); T. Ingham, YouTube Earned $9bn in Revenue Last Year, Towering Over Spotify, MUSIC BUSINESS WORLDWIDE (January 5, 2016) (58% of YouTube viewing is music videos) (available at: http://www.musicbusinessworldwide.com/youtube-will-earn-9bn-in-
works on a UUC platform weakens the safe harbor defense, thereby driving the larger UUC platforms to implement vetting technologies to create a desirable user experience but retain limited liability. It seems, therefore, that the “financial” considerations of Section 512 are binding in some respects, but the continued epidemic of digital piracy suggests the statute should be strengthened in this regard.

These modifications to the safe harbor policies are not original to this PAPER, but already under consideration in the European Union. Though some details remained to be finalized, Article 13 of the Digital Single Market Directive Proposal recommends, for instance, that

Information society service providers that store and provide to the public access to large amounts of works or other subject-matter uploaded by their users shall, in cooperation with rightholders, take measures to ensure the functioning of agreements concluded with rightholders for the use of their works or other subject-matter or to prevent the availability on their services of works or other subject-matter identified by rightholders through the cooperation with the service providers. Those measures, such as the use of effective content recognition technologies, shall be appropriate and proportionate. The service providers shall provide rightholders with adequate information on the functioning and the deployment of the measures, as well as, when relevant, adequate reporting on the recognition and use of the works and other subject-matter.

In effect, the Directive Proposal aims to adjust the liability regime for online intermediaries so that they take some responsibility for the attenuation of infringement and to share revenues with rights holders. While not a requirement, the Directive Proposal points to the use of content identification systems as a

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responsible approach to detecting and addressing infringement, especially for intermediaries that provide “access to large amounts of works.”

Article 14 of the Directive Proposal limits the application of the safe harbor to passive intermediaries. With some exceptions, online intermediaries that

... store and provide access to the public to copyright protected works or other subject-matter uploaded by their users, thereby going beyond the mere provision of physical facilities and performing an act of communication to the public, they are obliged to conclude licensing agreements with rightholders.49

An “active” role includes, but is apparently not limited to, “optimising the presentation of the uploaded works or subject-matter or promoting them, irrespective of the nature of the means used therefor.”50 While it is difficult to predict the efficacy of these changes since they are not final or tested in court, these proposed changes to the safe harbor policy have sound economic footing and should encourage more responsible behavior by online intermediaries with respect to copyright infringement.

IV. Conclusion

The meteoric rise of the Internet has changed the way we communicate, conduct commerce, entertain ourselves and more. Public policy has nurtured the Internet in its infancy, but an avalanche of unsavory, dangerous and illegal online behavior has raised serious questions about how to treat a modern and mature Internet. A significant influence on the types of content appearing on the Internet are the safe harbor provisions of Section 230 of the CDA and Section 512 of the DMCA. Certainly, online intermediaries wish to preserve their near blanket immunity from legal liability for any content posted to their services, but the current safe harbor rules appear to have resulted in an imbalance favoring online intermediaries and snubbing rightholders and, with regard to the CDA, human decency.

In this PAPER, we offer an economic model of safe harbors in an effort to help guide the reform of safe harbors. We find that the limits on liability afforded by safe harbor protection affects the evolution of platforms reliant on content posted

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49 Id. at 38.
50 Id.
by users. As we see it, limited liability for these platforms promotes the success of platforms with high shares of illegal material—to the detriment of platforms that properly vet posted files for infringing and illegal activity. Put simply, vetting is costly, placing platforms with a conscience at an economic disadvantage in a competitive market place.

Increasing the risk of liability on platforms for infringing materials results in a “separating equilibrium,” where two types of platforms will arise—those offering only (or mostly) legitimate content, and those offering a market-determined combination of illegal, unsavory and low value content. Thus, the introduction of increased platform liability can be expected to ultimately change the structure of the platform industry by allowing socially responsible platforms that vet their content to thrive while at the same time exposing targets for enforcement action.

Safe harbors were implemented to help the Internet grow, but as cyberspace reaches the age of majority it is reasonable to expect more from online intermediaries facilitating the distribution of infringing and disturbing content. Strict liability for online intermediaries may not be the answer, but neither is absolute immunity. As for proper balance between the two, the continued epidemic of digital piracy suggests U.S. laws are too weak on infringement. Legal immunity should be predicated on responsible behavior. With the proper incentives in place, lawmakers can encourage the next Google and Facebook to help build an Internet that better reflects legal and ethical standards, and encourages new investment, creativity, and innovation.