An Introduction to the Law & Economics of Information

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An Introduction to the
Law & Economics of Information

Tim Wu†

Information is an extremely complex phenomenon not fully understood by any branch of learning, yet one of enormous importance to contemporary economics, science, and technology. (Gleick 2012, Pierce 1980). Beginning from the 1970s, economists and legal scholars, relying on a simplified “public good” model of information, have constructed an impressively extensive body of scholarship devoted to the relationship between law and information. The public good model tends to justify law, such as the intellectual property laws or various forms of securities regulation that seek to incentivize the production of information or its broader dissemination.

A review of the last several decades of scholarship based on the public choice model suggests the following two trends. First, scholars have extended the public good model of information to an ever-increasing number of fields where law and information intersect. An incomplete list of fields covered includes intellectual property, securities regulation, financial regulation, contract theory, financial regulation, consumer protection, communications, and the study of free speech. While scholars in all of these fields are interested in information, they tend to focus on different market failures and different properties of information. Generally speaking, scholars of intellectual property have focused on problems of underproduction – the concern that, absent government intervention, less than optimal amounts of information will be produced. In contrast, scholars in other fields, like securities regulation or consumer protection, analyze the dissemination of information, or “information asymmetries” -- failures to distribute information in an optimal fashion.

Second, over the last decade, scholars have sharply questioned the simplified model, and ask whether, in practice, information actually has the characteristics of a public good. The public good model of information relies on two purported qualities: (1) that information tends to be difficult or impossible to exclude others from, and (2) that its consumption does not eliminate its value for others. The first assumption, in particular, has undergone considerable attack; a closer look suggests that context, subject matter, and industry structure tends to yield great variation in how much intervention really is required to ensure adequate production or

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dissemination. This tends to support the existence of dynamic legal regimes attuned to differences in subject matter or perhaps industry structure.

The review closes by asking if the public good model, while well-established, and relatively easy to understand, ought really be the exclusive focus of the economic and legal understanding of information. The article closes by considering other, less investigated, but potentially important, properties of information that have not received as much scholarly attention.

Information’s Peculiar Characteristics

Information is a complex abstraction that has been the subject of intense study by scientists and philosophers for more than a century. It remains incompletely understood: some physicists, for example, believe that every particle and force in the universe might actually be best understood as a form of information. (Wheeler 1990). In the sciences, a minimal, though not uncontested definition of information defines it “as one or more statements or facts that are received by a human and that have some form of worth to the recipient.” (Losee 1998).

What are the economic properties of this abstraction? Economists and legal scholars have generally been uninterested in the scientist’s concept of information, and instead more captivated by the premise that information is a “public good.” Stated otherwise, the economic and legal scholarship has sought to analyze information as a member of a category of goods first described in modern times by John Stuart Mill (1848) as those that require public intervention to ensure an adequate supply of.

If Mill did not invent the model, he certainly popularized it. His most famous example of a public good was the lighthouse – something from which all benefited, but might be unwilling to pay for privately. Other classic examples of public goods include a strong national defense, clean air, and so on, and Mill may have seeded the current treatment of information by describing knowledge as follows. “The cultivation of speculative knowledge” wrote Mill, “though one of the most useful of all employments, is a service rendered to a community collectively, not individually, and one consequently for which it is, primâ facie, reasonable that the community collectively should pay.”

In 1954, economist Paul Samuelson stated Mill’s idea more precisely by describing what he called a “collective consumption good.” According to Samuelson, the category included those goods which “. . . all enjoy in common in the sense that each individual's consumption of such a good leads to no
subtractions from any other individual's consumption of that good . . . ."1 In 1962, Kenneth Arrow provided one of the first linkages between Samuelson's concept and intellectual property regimes, like patents, by which government intervenes in the market for information.2 And by the 1980s, it had become commonplace to link a public good model to government regimes that concerned themselves with information.

Meanwhile, from the 1970s onward, the study of "information asymmetries" popularized by George Akerlof and others, has influenced and served as an important complement to the study of information production.3 The study of asymmetries is essentially concerned with the distribution, as opposed to the creation of information. The basic observation that a suboptimal distribution of information may yield a variety of problems (like adverse selection, moral hazard or worse) has influenced most of the writing described here.

The Spread of the Public Good Model

Today, some version of the public good model of information now dominates analysis of the economics of information production. Among other fields, scholars have applied information-as-public-good arguments to fields as diverse as the regulation of securities, contract, consumer protection laws, communication laws, and constitutional law, among others. However, as we shall see, there are important variations in how the arguments appear in different fields.

The use of public good arguments to justify grants of intellectual property has perhaps the longest lineage – one probably older than the public good model itself. Consider Lord Macaulay's famous 1841 argument that copyright is a "tax on readers for the purpose of giving a bounty to writers," justified because it is "desirable that we should have a supply of good books: we cannot have such a supply unless men of letters are liberally remunerated."4 But the theory has spread far from its origins in intellectual property. Since the 1980s, a public good theory of information has been used to justify mandating the disclosure of information for consumer or investor protection. "[B]ecause information has many characteristics of a public good,"

2 ("In the absence of special legal protection, the owner cannot . . . simply sell information on the open market. Any one purchaser can destroy the monopoly, since he can reproduce the information at little or no cost.").
4 Lord Thomas Babington Macaulay, Speech Delivered in the House of Commons (Feb. 5, 1841),
wrote Jack Coffee in 1984, “securities research tends to be underprovided.” The related concept of “informational” or “transparency” regulation such as hazard warnings, medical disclosure, and certain forms of campaign finance regulation has been justified using similar concepts. Daniel Farber has relied on public good arguments to explain or justify the American First Amendment’s protection of speech. “[I]nformation is likely not only to be underproduced in the private market,” he writes, “but also to be insufficiently protected by the political system.”

In each area, the key theory is that there is a market failure: without state action, important information will either be underproduced, or too much will be kept secret from the public. On closer examination, there are actually two different concerns here: underproduction and suboptimal distribution. These, as we shall see, can be more generally tied to two properties of information: non-exclusion, and non-rivalry, respectively.

Underproduction

John Stuart Mill’s original theory focused on non-exclusion. As he wrote, “it is impossible that the ships at sea which are benefited by a lighthouse, should be made to pay a toll on the occasion of its use.” The idea is that if it is difficult or impossible to exclude non-payers from consuming the good in question, no one will have an incentive to provide the good, justifying public provisioning of the good. Jefferson, writing before Mill in 1813, opined similarly that an idea, once divulged, “forces itself into the possession of everyone, and the receiver cannot dispossess himself of it.” In contemporary times, it is commonplace to describe information as “impossible” or “very difficult” to exclude anyone from.

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8 Mill, supra note Error! Bookmark not defined., Book V, Chapter XI, Sec. 15. See also Samuelson, Pure Theory of Public Expenditure, supra note 1, at 387. This point was famously challenged by Coase, who established that private lighthouses were funded by port fees. Ronald Coase, The Lighthouse in Economics, 17 J.L. & Econ. 357 (1974) (“We may conclude that economists should not use the lighthouse as an example of a service which could only be provided by the government.”).
10 E.g., James Boyle, The Second Enclosure Movement and the Construction of the Public Domain, 66 Law & Contemp. Prosbs. 33, 42 (2003) (“[Ideas] are also assumed to be non-excludable (it is
It makes sense that a concern about the underproduction of information ought depend on a concern about non-excludability. The idea is that if the producer of information cannot exclude non-payers, he will lack the means to recoup his initial investment, hence eliminating any desire to create information in the first place. If an author invests heavily in writing a book, and then lacks any mechanism to exclude non-payers, he will be unable to reap the proceeds of his investment later, and therefore will have no direct financial incentive to write books in the first place (though he might have indirect or personal incentives). More realistically, we might say that if there is no mechanism for excluding non-payers, that publishers would be unlikely to invest in an author’s work, therefore making a career as an author difficult to support.

The key question, then is whether there is something about information that makes it impossible to exclude non-payers from consuming. A moment’s reflection makes it obvious that in most contexts this premise is cannot be right, at least in its strong form. Consider the text of a book locked in a vault for which the key is lost: we are all excluded from it. If you don’t have a ticket, you won’t see that movie. The information contained in an engraving written in a lost language, like hieroglyphs before the discovery of the Rosetta stone, is inaccessible to everyone.

Two basic ideas from the basic science of information make it clear why the non-excludability assumption is hard to support. First, information consists of patterns, which must subsist in some physical or electronic form -- ink on paper, stored magnetic charges, or whatever else. Second, for a human to process information, that information must reach the brain (unlike, say, national defense, which can be consumed unknowingly), and be in a form that the brain can process. These necessities combine to suggest one can exclude others from information.

Why, then, have so many thinkers insisted that information has the “property” of non-excludability? What writers like Jefferson or Mill seem to have meant by non-excludability seems to be something meant at a high level of abstraction, really a property of knowledge or wisdom more than

impossible, or at least hard, to stop one unit of the good from satisfying an infinite number of users at zero marginal cost.”); Kimberly D. Krawiec, Fairness Efficiency, and Insider Trading: Deconstructing the Coin of the Realm in the Information Age, 95 NW. U. L. REV. 443, 451 (2001) (“By labeling information a collective good in this Article, I do not mean to imply that it is literally impossible to exclude nonpurchasers, but rather the slightly weaker condition that such exclusion is extremely difficult.”); Peter S. Menell, An Analysis of the Scope of Copyright Protection for Application Programs, 41 Stan. L. Rev. 1045, 1046 (1989) (“As [the National Commission on New Technological Uses of Copyrighted Works] well recognized, the information comprising innovation in application programs is a prime example of a public good. Given the ease and low cost of copying application programs, it is often impossible to exclude nonpurchasers from an application program’s benefits once it is commercially available.”).
information. For example, one might be the beneficiary of the Christian injunction to “love thy neighbor as thyself” without ever hearing the phrase. Similarly, you might enjoy the comforts of air-conditioning without having read any of the original patents. But this is different that being a property of information.

Alternatively, sometimes what is meant by the “non-excludability” of information is really the idea that it is cheap to copy information. Since the invention of the printing press, and especially since digitalization, copying information is usually far cheaper than creating valuable information. This point can also be expressed by saying that information goods have a high initial and low marginal cost of production.

The fact that non-excludability is not some intrinsic quality of information, but a technological contingency is a challenge for the intellectual property laws. Stephen Breyer noticed as much in 1970, when he argued that copyright is hard to justify given the existence of alternative means of exclusion, such as the “lead time” enjoyed, in 1970, by the first publisher of a book.11 Breyer’s argument has been criticized for its technological naïveté (the piece presumed, for example, that software would be hard to copy), but the central insight seems correct: namely, when copying is expensive, the case for government intervention weakens. That’s why, for example, the later Picasso never suffered from a lack of financial incentives to paint, because only he could create a Picasso. The prospect of non-legal mechanisms of exclusion is what Chris Sprigman and Kal Rastiala rely on in their study of creative industries, like fashion, cooking, and stand-up comedy, which seem to prosper without intellectual property.12 In each, the industry devises its own means of exclusion, which seem good enough to incentivize production. Eben Moglen argues that since non-market mechanisms yield sufficient information production, the actual effect of the creation of exclusionary rights in information is merely a giant wealth transfer from the proletariat to the bourgeoisie.13

11 Stephen Breyer, The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs, 84 HARV. L. REV. 281, 299-302 (1970) (“A copying publisher, faced with the problems of ‘lead time’ and ‘retaliation’ is unlikely to see much profit in copying low-volume titles. It seems unlikely, for example, that a publisher thinking of copying the type of tradebook that now sells about 4000 copies, would count on selling the 2000 or more copies needed to earn a profit.”).
13 Eben Moglen, The dotCommunist Manifesto, at 3-4 (2003), http://emoglen.law.columbia.edu/my_pubs/dcm.pdf (“Creators of knowledge, technology, and culture discover that they no longer require the structure of production based on ownership and the structure of distribution based on coercion of payment. Association, and its anarchist model of propertyless production, makes possible the creation of free software, through which creators gain control of the technology of further production.”). See also Breyer, supra, note 11, at 289 (“We do not ordinarily create or modify property rights, nor even award compensation, solely on the basis of labor expended.”).
Nowadays most scholars hedge their bets by describing exclusion as partially non-excludable, “hard” to exclude people from, or by drawing a line between private and public information. Some scholars, like Christopher Yoo, Amy Kapczynski, and Talha Syed argue that non-excludability shouldn’t be considered a defining feature of information at all. Yoo, writing in 2007, suggested that the costs of exclusion depend on the technological context of consumption, rather than the any inherent characteristic of information. Hence, it may be very expensive to exclude the ships that benefit from a lighthouse, but that is irrelevant to whether people without tickets may be kept out of a movie theater on opening night. Consequently, Yoo argues that information should be understood an “impure” public good, yielding policy outcomes different than the pure public goods assumption. Kapczynski and Syed argue that excludability is “highly variable across information goods, and is affected not only by formal legal entitlements, but also by existing technologies for detecting or tracing such uses (and their costs); existing social norms regarding ‘acceptable’ or ‘reasonable’ enforcement efforts (in light of concerns about privacy, freedom of thought and speech, and so forth); and the existing institutions—or social roles, relations, and organizational forms—within which the predominant uses of the good will be made.”

The weakness of the non-excludability assumption cannot be said to have destroyed the case for intellectual property or other forms of government action. Defenders of the intellectual property regimes have attempted to justify intellectual property property by relying on several alternative theories.

First, one might rely not on the assumption of non-excludability, but, as stated above, the empirical observation that it is, in today’s technological context, usually cheaper to copy information than create it in the first place. Whether low marginal costs of production are intrinsic to information, or

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14 Yochai Benkler, in a typical example, writes, “Information is generally understood to be perfectly nonrival and partially nonexcludable.” Yochai Benkler, An Unhurried View of Private Ordering in Informational Transactions, 53 Vand. L. Rev. 2063, 2066 (2000).
15 Christopher S. Yoo, Copyright and Public Good Economics: A Misunderstood Relation, 155 U. Pa. L. Rev. 635, 659 (2007) (“Indeed, it has long been recognized that exclusion is typically possible, with the costs of exclusion depending on the state of technology.”). Yoo attributes this point to Francis M. Bator, The Anatomy of Market Failure, 72 Q.J. Econ. 351, 370 (1958) (describing how nonappropriability can cause market failure).
16 See Yoo, supra note 15. Yoo’s argument is more complex than captured by this sentence. More specifically, he believes that Samuelson’s theory of public goods does not depend on non-rivalry and non-excludability, but rather, a condition whereby consumers consume the same quantity of the good and signal their preferences by prices, the inverse of the situation with private goods. Yoo believes that this incentivizes users of a public good to understate their true willingness to pay, in the hopes that others will bear the costs of creating that good. Id. at 670.
simply a matter of technological context is an interesting one and not subject to easy answer. In the days when monks copied bibles by hand, copying costs were perhaps comparable to the costs of creating the work in the first place. However, ever since the invention of the printing press, copying information has tended to be cheaper than producing it, which is an explanation for the appearance of the earliest copyright laws in that era.

In any event, the low marginal cost of production for informational goods creates a free-riding argument. Represented in accounts by Tom Palmer, among others, the argument asserted that the production of information would naturally create, within groups, either problems of collective action or a “tragedy of the commons.” Given an incentive to copy information and thereby free-ride on the production efforts of others, none will be incentivized to produce information, therefore yielding less production than might be ideal. This argument depends not on the impossibility of excluding consumers, but the low costs of copying in certain contexts, as just discussed.19

Second, some scholars justify the existence of government enforcement of intellectual property rights by stressing the costs of the alternatives. The creators of information tend to regard it as theirs, and want to protect it. When private parties rely on private remedies, those remedies may themselves be quite socially expensive. Consider that real property can be defended by its owners using fences and armed guards, yet government grants exclusion rights in land, whether to encourage investment, or to facilitate the development of markets. In the Hobbesian sense, the legal system may be a less wasteful alternative to private exclusion schemes, for example, if it displaces expensive warfare between information producers and their copiers.20

This scholarship tends to allude to the costs of “races” of various kinds, including “arms races” between copiers and creators. “The existence of a cost-effective self-help remedy,” argues Douglas Lichtman, should not always preclude “government regulation as a means to accomplish similar ends.”21 In another example in the scholarship, Scott Hemphill and Jeannie Suk argue that in the fashion industry an inability to exclude copiers creates a reliance on “logoification.” That, they argue, “pull[s] fashion toward a

19 Palmer, supra note 18 at 285.
status-conferring function and away from the communication of diverse messages.”

Third, intellectual property has sometimes been separately justified by what might be described as a Demsetzian theory. The idea is that group use of a given resource, like information, will create externalities of various sorts that should be internalized by property rights. For example, Ed Kitch in a famous 1977 paper argued that patent ought to give out broad “prospects”—that is, a patent covering the initial invention and subsequent inventions as well. Otherwise, Kitch argued, the owner might lack incentives to make further investments in research beyond the initial invention in research for fear that the benefits will be appropriated by others.

Kitch’s idea has faced criticism too voluminous to summarize: Mark Lemley’s 2004 criticism is typical, and echoes earlier papers by Carol Rose, Wendy Gordon and others. Lemley, as in his other work, relies on the nature of information: it “cannot be depleted,” he wrote, and therefore is not subject to a tragedy of the commons or the negative externalities that justify real property rights. Rather, by its very nature, the tendency was for the creation of information to throw off positive externalities—such as the example of the multiple beneficiaries of the invention of the steam engine. Compensation for positive externalities, or spillovers, Lemley argued in this and other works, should almost never be the subject of government intervention. “If ‘free riding’ means merely obtaining a benefit from another’s investment, the law does not, cannot, and should not prohibit it.”

Fourth and finally, where the public good model doesn’t strongly justify intervention, it is certainly possible government may have entirely different goals in mind unrelated to the economics of information. For example, a strong copyright or patent regime may be understood as a subsidy for the entertainment or pharmaceutical industries. As such the law might really draw little justification from the economics of information, but rather

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23 Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 143 n. 52 (2004). Carol Rose wrote that the case for property rights is inherently weaker in what she labeled “intellectual space” because “there is no physical resource to be ruined by overuse. Books, tapes, and words may be copied, inventions may be imitated, pictures may be reproduced all without the slightest damage to the original.” Carol M. Rose, *Romans, Roads, and Romantic Creators: Traditions of Public Property in the Information Age*, 66 L. & CONTEMP. PROBS. 89, 90 (2003).


be better described as such be a form of industrial policy, or perhaps a component of a “strategic trade policy.” Such laws might also be understood as a form of political patronage.

If nothing more, a generation of scholarship on the existence of private exclusion mechanisms should force any contemporary policy-maker to consider the comparative efficiency of private and public reward schemes for the production of information products, along with due consideration of the choice among public alternatives. That point is central to Raustiala and Springman’s writings and also has led Steven Shavell, among others, to conclude that an optional reward would be more efficient than a pure patent system for incentivizing research.26

**Information Distribution Problems**

Problems of information distribution, or “under-dissemination” form a problem distinct from under-production. Here, the problem can be phrased as follows. Markets and other systems involving human decisions (like elections) require a certain amount of information to function well and may also require that the information be distributed symmetrically among buyers and sellers (or their equivalents). Where information is scarce, or if distributed asymmetrically, systemic failure can be expected. By metaphor, information may act like oil in an engine, and if insufficient, the engine may seize. While some quantity of information is disseminated naturally, so to speak, the idea that natural sources will be inadequate tends to support some forms of public or private intervention to ensure enough information is disseminated to keep things running smoothly.

As described above, the problem of information distribution was a focused of the information asymmetry literature whose origins were in the 1970s. Among that literature’s first prominent area of legal relevance was the analysis of capital markets: in 1984, law professors Ronald J. Gilson and Reinier H. Kraakman theorized that the distribution of information was a key determinant of capital market efficiency. Hence, institutions (like investment banks) capable of reducing the costs of obtaining information, and thereby making information more widespread, increased the efficiency of the capital markets.27 Writing in the same year, Jack Coffee argued that the need for investors to have adequate information to make investment decisions justified the

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26 Yochai Benkler, similarly, suggests that there may be alternative private models of producing valuable information that depend on what he terms “peer production” models. Yochai Benkler, *THE WEALTH OF NETWORKS* (2006).

existence of regulations requiring disclosure of financial information. The argument that a market needs information in order to function efficiently has also been used to justify the existence of quasi-private institutions like credit rating organizations.28

But capital markets are not the only systems that require adequate and well distributed information to function well. Markets for consumer goods and services do as well, yielding theoretical support for interventions like consumer warnings, the publication of nutritional information,29 or the consumer protection requirement that information on labels be generally accurate.30 In financial regulation, the market for money claims has been said to depend on the maintenance of symmetric ignorance.31 Non-market systems, like the political system or elections, also require information to function well, which may justify various measures, such as the prohibition of political censorship in the First Amendment.32

The extent to the need for better distribution of information justifies government interventions depends on whether the private mechanisms of distribution are adequate. This is a question which is very hard to answer in the abstract. Gilson and Kraakman theorized that the “distribution of a particular piece of information is a function of its cost,” by which they meant the cost of acquiring it or perhaps of producing it. They suggested that private mechanisms, like investment banks, might aid the distribution of information, but did not make clear when such mechanisms might be adequate. It is also true that markets themselves are, as Thomas J. Fitzpatrick & Chris Sagers put it, “machines for generating information” and many financial economists have long supposed that markets generate enough information to generate accurate prices without much intervention.33 Other the other hand, it is obvious that there is much important information that one cannot expect to be widely distributed without any public intervention. Some might be simply too expensive to be worth producing (like census


30 See Kathryn Judge, Information Gaps and Shadow Banking (2016).

31 See Farber, supra note 7.

information), causing the public good problem described above. For other forms of information, the parties who hold will have good reason to hide it. Companies might want to hide their true revenues and profits, or the fact that a product is defective or causes disease. In these sort of situations scholars and government have suggested public action is necessary.

While the literature centered on information asymmetries and the previous discussion of underproduction are authored by different groups of scholars, a moment's analysis reveals that they rely on the same conceptual framework, and ultimately the same observations about information itself. Asymmetries are typically assumed to result from some initial allocation of information that is expensive to overcome. Another way to express the same point is to suggest that high information costs cause problems. If the marginal cost of disseminating information is low, anyone who values the information at even a fraction of a penny should have it; otherwise, there is deadweight loss. The concern, therefore, is that the full value of information to the public, and in particular, to consumers of the information, will go unrealized.

But what might make problems of distribution of information different than any other good or commodity? The differences lie in the key concept of “non-rivalry,” which is the link between the information asymmetry literature and the public good scholarship. The concept is simply that consumption of information does not reduce its utility for others. Your reading of my book doesn’t “use it up,” the same way that eating my sandwich does. This concept is expressed by economists in various ways, including the idea that information is “infinite in supply,” or experiences “jointness of consumption.” In mathematical models, non-rivalry is captured by the assumption of zero marginal cost of production.

Perhaps reflecting its slightly mysterious quality, legal writers have often employed parables or analogies to capture the concept of non-rivalry. Mark Lemley writes, “if I give you a fish, I no longer have it, but if I teach you to fish, you or I can teach a hundred others the same skill without appreciably reducing its value.” The most famous parable is Thomas Jefferson’s analogy to fire and air. “He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me.” Therefore, ideas are

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35 Mark A. Lemley, The Economics of Improvement in Intellectual Property Law, 75 Tex. L. Rev. 989, 995 (1997). See also PAUL GOLDSTEIN, COPYRIGHT’S HIGHWAY: FROM GUTENBERG TO THE CELESTIAL JUKEBOX 12 (1994) (“A loaf of bread, once eaten, is gone. But ‘Oh, Pretty Woman,’ once sung and heard, is still available for someone else to sing and to hear. Countless fans can listen to the song, indeed copy it, without diminishing its availability to anyone else who wants to sing or listen to or copy it.”).
“like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation.” Jefferson took this to mean that private rights in ideas cannot be justified “[i]f nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea.”36

Copyright’s fair use doctrine, while sometimes said to overcome failures of bargaining, has sometimes been justified by what is, on closer inspection, the solution to a distributional problem. Provided the producer is unaffected, or not unduly affected, the non-rivalrous nature of information suggests the public should want others to use the information at a price approaching zero. The famous Sony decision, which held legal the home taping of TV shows for later viewing, is easily viewed as the solution to an underuse problem.37 If the home taping did not actually deplete or affect the value of the television shows, there was no good reason not to allow it. We might say the court set the price at zero.

The analogies to fish and fire notwithstanding, it is worth asking, as we did with non-excludability: does information actually have the characteristics of non-rivalry? In its purest form, this concept would presume that one’s usage of information would no effect on another’s, that “a unit of the good can be consumed by one individual without detracting, in the slightest, from the consumption opportunities still available to others from that same unit.”38 To use a common example, it seems implausible that one person’s use of a stop sign would change that experience for someone else.

Some scholars seem to firmly believe that information’s non-rivalry is an incontestable, as a matter of physics rather than law or economics. “The degree to which a good is or is not rivalrous is a fact of nature,” writes Yochai Benkler “a thing either does, or does not have this unusual attribute that, once produced, many can enjoy it without added cost.”39 But others argue that information, like private goods, might in fact sometimes be “overgrazed” or suffer from congestion, like a parcel of land or a highway.40 The trademark laws, which employ concepts like blurring, tarnishing, and dilution, seems to contemplate this possibility, and in a 2002 paper, Richard Posner and William Landes so asserted explicitly. 41 They argued that

36 Letter to Isaac McPherson, from Thomas Jefferson, supra note 9.
39 Benkler, Unhurried, supra note 14.
excessive use of an image of Humphrey Bogart, for example, over time might cause “confusion, the tarnishing of the image, or sheer boredom ... [e]ventually the image might become worthless.”\textsuperscript{42} Turning to the well-known character of Mickey Mouse, Posner and Landes argued that the character might similarly become over-grazed without proper management: “not only would the public rapidly tire of Mickey Mouse, but his image would be blurred, as some authors portrayed him as a Casanova, others as catmeat, others as an animal-rights advocate, still others as the henpecked husband of Minnie.”\textsuperscript{43}

Posner and Landes’s assertion has gained a few adherents,\textsuperscript{44} but has also been subject to sharp criticism.\textsuperscript{45} Such congestion arguments, argued Mark Lemley, “misunderstand[] the nature of information,” which “cannot be depleted.” Christopher Yoo argues that the Posner & Landes argument is hard to sustain beyond the particular examples of celebrity images or characters, which have an unusual economics all of their own. Yoo accepts the possibility of congestion, but notes that usage of information will not predictably decrease its value;\textsuperscript{46} moreover, if there are congestion externalities, says Yoo, they might be either technological or pecuniary; and if the latter, the policy implications become highly ambiguous.\textsuperscript{47}

Examples make clear that congestion problems or overgrazing concerns are certainly not present for all forms of information. (This is a point Landes and Posner concede by alluding to Shakespeare’s works which “seem undiminished by the proliferation of performances and derivative works, some of them kitsch.”)\textsuperscript{48} Strictly speaking, Landes and Posner were writing about copyrighted works, which are a subset of information, but consider a factual discovery like the circumference of the earth. While clearly a form of valuable information, how it might get used up or tarnished is unclear. Even if a central plot element in a bad romantic comedy, the number (40,075 km) would retain its value and remain useful to others. What does seem to be potentially subject to dilution or tarnishing is not the information itself, but something like the reputation attached to the information, which seems an analytically distinct category.

\textsuperscript{42}Id. at 486.
\textsuperscript{43}Id. at 488.
\textsuperscript{44}David Barnes seeks to extend the concept as follows: “analytically, it is useful to distinguish between the simple ‘over-reproduction’ type of overuse that causes the public to tire of the image and ‘transformative’ overuse that blurs the image.” David W. Barnes, Congestible Intellectual Property and Impure Public Goods, 9 NW. J. TECH. & INTELL. PROP. 533 at ¶ 20 (2011).
\textsuperscript{45}See, e.g., Yoo, supra note 15; Lemley, Ex Ante Versus Ex Pos, supra note 23.
\textsuperscript{46}Yoo, supra note 15, at 683-87.
\textsuperscript{47}Id. at 686.
\textsuperscript{48}Landes & Posner, supra note 12, at 488.
The idea that underusage is a problem also depends on information actually being non-rivalous, or infinite in supply, not just as an ideal object, but as a market reality – how often is the information itself is actually the relevant good? Thomas Nachbar argues that for many purposes it is other economic factors that policy should concern itself with. “Intellectual works” he states, “do not exist except as the product of human labor, which is itself the subject of considerable rivalry.”

For example, in the case International New Service v. Associated Press, as Nachbar explains, it may have been true that the information taken from one news service by another was a public good. However, the court was, according to Nachbar, concerned not with the unusual properties of information, but competition for profit as between the two news services. His point is that esoteric questions about the nature of information, such as those just considered at length here, can often be irrelevant for many markets.

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We can here summarize the current state of understanding. Information is widely agreed to have unusual properties as compared to physical resources, chief among which are some measure of non-rivalry, non-exclusivity, and a low marginal cost of production. These properties have been used both to justify specialized legal regimes designed either to overcome underproduction and asymmetry problems. The extent of all of these properties is contested, both as a matter of theory and market reality, or said to be context-dependent.

This tends to suggest that the case for laws governing information is difficult to state generally, and may vary widely by industry, context, or the means of production involved. While describing information as a public good provides a simple justification for government intervention, as Ronald Coase famously pointed out with respect to lighthouses, the reality is often far more complex (there were, in fact, private lighthouses). This lends support to the idea, for example, that the subject matter of copyright and patent might be better served by rules that are adjusted by an ongoing judicial process, rather than being subject to blanket rules. In areas outside of intellectual property, it similarly suggests that regulators ought to pay careful attention to determine whether, in fact, the information they wish to see disclosed requires intervention, and how effectively consumers will really make use of the information.

It is also curious that, given the myriad properties of information, non-

excludability and non-rivalry have received so much attention. One may be suspicious that the attention may be prompted by its neatness of fit into the pre-existing concept of a public good more than the underlying realities of what properties information holds. In any event, it is worth suggesting that lawyers’ or economists’ understanding of information’s properties might be broader, and begin to draw less on just anecdotal examples, but some study of the science of information. Indeed, it may turn out that information’s other properties, less studied, will be equally important for public policy.

Consider, for example, the question of what effect usage has on the market value of information. While the question has not been well studied, two views are implied by the literature: namely the “overgrazing” view that information necessarily degrades or is tarnished by usage, and its rejoinder that usage cannot have any effect on the value of information. Neither seems to be exactly correct, and the relationship between usage and value may in fact be more complicated than first appears.

It is interesting to notice that many suppliers in the information economy devote themselves to trying to convince the public to consume information, and will even sometimes pay them to do so. The idea of the “attention economy” refers to concentrated efforts by suppliers not to avoid the usage of their information, but to encourage it to the broadest extent possible – captured by the desire to see information “go viral” and reach millions of users. This is not a new phenomenon – record labels have long wanted their music to play on the radio, and have long been willing to pay radio stations to, in effect, give away their product for free. If information were predictably subject to overgrazing, this would be a terrible idea; similarly, if information’s value could not possibly be affected by usage, why try so hard to get people to consume it?

One obvious explanation is that this is all advertising (itself not well understood). Advertising, in John Kenneth Galbraith’s account, is a tool for creating demand, and by this theory the song is played to create demand for itself. But that doesn’t tell us enough: advertising makes sense when it is for another product, and indeed the usual definition of the word “advertising” is to “call attention to goods for sale.” It seems a different matter when information generates demand for itself, and therefore, by usage, increases its own value. Watching the exploits of Iron Man on the screen or page may generate an insatiable appetite for more Iron Man. By establishing itself in the minds of consumers in this way, information can become incredibly valuable, in part because it can then be used to draw consumers to still other objects by an attention merchant.

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51 JOHN KENNETH GALBRAITH, THE AFFLUENT SOCIETY (1958)
52 Cf. David S. Evans, Attention Rivalry Among Online Platforms, University of Chicago Institute for
A different theory suggests that we are approaching the problem incorrectly, for someone listening to a “free” song or watching a “free” video is actually paying for it, not in units of money, but in human attention, a highly scarce resource. Deciding to spend time with any information should be seen as an expenditure, dissolving the apparent paradox.

In the law, trademark is best acquainted with this dynamic. With its doctrines of blurring, tarnishment, and dilution, trademark seems to recognize that certain uses of information might reduce the value of information, or its reputation. On the other hand, firms pay millions to have their brands announced during sporting events, or placed in Times Square to be consumed by millions without payment, or even to have the brand mocked or portrayed in strange circumstances, so long as there is exposure (consider the prominent role played by FedEx in the film Cast Away). The result of such mass exposure is rarely degradation, but rather, the creation of brands, which are easily the most valuable form of intellectual property.

A final theory relies on the idea that a certain class of informational goods gets more valuable with usage. They are what Cass R. Sunstein and Edna Ullmann-Margalit call “solidarity goods”: goods that increase in value with joint consumption. As the authors write, “Solidarity goods have more value to the extent that other people are enjoying them.” While solidarity goods are not exclusively informational, many of Sunstein and Ullmann-Margalit’s examples are forms of information. “The value of a magazine or television program focusing on a current topic (genetic engineering of food, for example) may increase significantly if many other people watch or read them.” This suggests that, rather than trying to discourage usage of some information, the owner of the information has some incentive to increase consumption of the information in question and so as to maximize the value of the good.

The theory of solidarity goods also seems an incomplete explanation. It does not explain, for example, the intuition that a song may become more valuable by repeated play to even a single consumer, regardless of any group effects. But, in any event, understanding these mechanisms is one of many ways we might better understand the information economy and its regulation. It might entail trying to better understand the competition for cognitive space and attention that is so central to the information economy.

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