Fordham Intellectual Property, Media and Entertainment Law Journal

Volume 28 *XXVIII*
Number 4

Article 3

2018

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Adam D. Moore
University of Washington - Seattle Campus, moore2@u.washington.edu

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Cover Page Footnote

Adam D. Moore is a Professor in the Information School at the University of Washington and examines the ethical, legal, and policy issues surrounding intellectual property, privacy, freedom of speech, accountability, and information control. The basic idea for this paper was informally discussed at the Center for the Protection of Intellectual Property (CPIP) conference on the philosophical foundations of intellectual property, Jekyll Island, May 19–20, 2016. Thanks to Chris Newman, Eric Claeys, Adam Mossoff, Matthew Barblan, and the other conference participants for their comments about game theory, the prisoner's dilemma, and intellectual property. Special thanks goes to Jennifer Rosenblatt and Matthew Hershkowitz for comments, suggestions, and editing assistance.

Intellectual Property and the Prisoner's Dilemma: A Game Theory Justification of Copyrights, Patents, and Trade Secrets

Adam D. Moore*

In this article, I will offer an argument for the protection of intellectual property based on individual self-interest and prudence. In large part, this argument will parallel considerations that arise in a prisoner's dilemma game. In brief, allowing content to be unprotected in terms of free access leads to a sub-optimal outcome where creation and innovation are suppressed. Adopting the institutions of copyright, patent, and trade secret is one way to avoid these sub-optimal results.

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INTRODUCTION

A major concern and limitation on traditional justifications for intellectual property is that few scholars accept the starting assumptions needed to generate the desired moral claims. For example, utilitarian incentives-based arguments for intellectual property have been rejected for both external and internal reasons. These arguments center on promoting social utility by incentivizing authors and inventors to innovate in exchange for limited rights. Externally, as a moral theory, utilitarianism has come under attack for failing to account for special obligations, claims of distributive and retributive justice, and undermining individual integrity or life-long project pursuit.[1] Internally, even assuming that utilitarianism is the correct moral theory, it is not at all clear whether individual ownership of intellectual works can be justified, or more generally, whether the institutions of copyright, patent, and trade secret, are warranted.[2] More specifically, it would be difficult to justify twenty-year patent monopolies or lifetime-plus-seventy-year copyrights on utilitarian grounds.[3]

Starting with Lockean labor-mixing accounts, or other foundational assumptions, seems to fare no better. According to Locke, by mixing labor with an unowned object, individuals could come to own the item in question.[4] David Hume argued that the idea of mixing one's labor is incoherent—actions cannot be mixed with objects.[5] Robert Nozick asked, why isn't mixing what I own

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1 *See generally* SAMUEL SCHEFFLER, THE REJECTION OF CONSEQUENTIALISM (rev. ed. 1994); CONSEQUENTIALISM AND ITS CRITICS (Samuel Scheffler ed., 1988); Bernard Williams & J.J.C. Smart, UTILITARIANISM: FOR AND AGAINST (1973).

2 *See* Edwin C. Hettinger, *Justifying Intellectual Property*, 18 PHIL. & PUB. AFF. 31–52 (1989); ADAM D. MOORE, INTELLECTUAL PROPERTY AND INFORMATION CONTROL: PHILOSOPHIC FOUNDATIONS AND CONTEMPORARY ISSUES 37–71 (New York: Routledge Pub. 2004) (2001); Adam D. Moore, *Intellectual Property, Innovation, and Social Progress: The Case Against Incentive Based Arguments*, 26 HAMLINE L. REV. 602–30 (2003) [hereinafter Moore, *Incentive Based Arguments*]; HUGH BREAKEY, INTELLECTUAL LIBERTY: NATURAL RIGHTS AND INTELLECTUAL PROPERTY 38–58 (New York: Routledge Pub. 2012).

3 17 U.S.C. § 302 (1988), 35 U.S.C.§ 154(a)(2) (1994).

4 JOHN LOCKE, SECOND TREATISE OF GOVERNMENT, ch. 5, § 27 (C.B. MacPherson ed., Hackett Pub.1980) (1690).

5 DAVID HUME, A TREATISE OF HUMAN NATURE bk. 3, pt. 2, § 3 (L.A. Selby-Bigge ed., Oxford Univ. Press 1896) (1739); *see also,* Jeremy Waldron, *Two Worries about Mixing One's Labor*, 33 PHIL. Q. 37, 40, 41 (Oxford Univ. Press 1983).

(my labor) a way of losing my labor rather than obtaining a property right?[6] P.J. Proudhon questioned why, if labor is important, shouldn't the second laborer on an object obtain a property right in an object as reliably as the first laborer?[7] Jeremy Waldron and others have argued that mixing one's labor with an unowned object should yield more limited rights than rights of full ownership.[8] These challenges have not gone unnoticed among defenders of Lockean-based arguments for private property.[9] In each case, however, internal and external objections are offered, leaving the justification for intellectual property compelling only to those who find the initial assumptions plausible.

In this Article, and setting aside various foundational moral entanglements, I offer an argument for the protection of intellectual property based on individual self-interest and prudence. While consequences play a fundamental role, the argument and analysis discussed below are not utilitarian in nature. There is no maximization of net or average utility required. In large part, this argument parallels considerations that arise in a prisoner's dilemma game. In Part I, a sketch of the salient features of prisoner's dilemma games is provided. Examining the nature of intellectual property and how content creation, exclusion, and access can be modeled as a prisoner's dilemma is the focus of Part II. In Part III, empirical evidence is offered and analyzed. In brief, allowing content to be unprotected in terms of free access will lead to a sub-optimal outcome where creation and innovation are

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6 ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA 174–75 (Basic Books 1974).

7 P.J. Proudhon, WHAT IS PROPERTY? 61 (Howard Fertig 1966) (1867); *see also* John Plamenatz, MAN AND SOCIETY 247 (McGraw-Hill 1963).

8 Waldron, *supra* note 5, at 42; Geraint Parry, JOHN LOCKE 52 (1978).

9 *See generally* A. JOHN SIMMONS, THE LOCKEAN THEORY OF RIGHTS (Princeton Univ. Press 1994) (1992). *See also,* Adam Mossoff, *Saving Locke from Marx: The Labor Theory of Value in Intellectual Property Theory*, 29 SOC. PHIL. & POL'Y 283 (2012); Moore, INTELLECTUAL PROPERTY AND INFORMATION, *supra* note 2; Adam D. Moore, *A Lockean Theory of Intellectual Property Revisited*, 49 SAN DIEGO L. REV. 1069 (2012) [hereinafter Moore, *Lockean Theory Revisited*]; Adam D. Moore, *Intangible Property: Privacy, Power, and Information Control*, 35 AM. PHIL. Q. 365 (1998); Adam D. Moore, *A Lockean Theory of Intellectual Property*, 21 HAMLINE L. REV. 65 (1997) [hereinafter Moore, *Lockean Theory*]; Kenneth Einar Himma, *Justifying Intellectual Property Protection: Why the Interests of Content-Creators Usually Wins Over Everyone Else's*, *in* INFORMATION TECHNOLOGY AND SOCIAL JUSTICE 47 (Emma Rooksby & John Weckert eds., 2006).

suppressed. Finally, in Part IV, it is argued that adopting the institutions of copyright, patent, and trade secret is one way we can avoid the sub-optimal results of playing an intellectual property prisoner's dilemma.

I. THE PRISONER'S DILEMMA[10]

The classic version of a prisoner's dilemma game begins with two individuals and two choices.[11] Fred and Ginger are picked up by the police and charged with robbing a bank. Each are given the choice of informing (ratting) on the other or staying silent. If Fred rats on Ginger and she remains silent, he is set free and she will be sentenced to life in prison. If Ginger rats on Fred while he remains silent, then she is set free while he is sentenced to life in prison. If both rat on each other, then both are sentenced to twenty years in jail. Finally, if both stay silent, then each will be sentenced to one year in jail.

Figure 1:

		Ginger's choices: Rat	Ginger's choices: Stay Silent
Fred's choices	Rat	20 years 20 years	Life Freedom
	Stay Silent	Freedom Life	1 year 1 year

[10] *See* Robert Axelrod, *The Emergence of Cooperation Among Egoists*, 75 AM. POL. SCI. REV. 306 (1981) [hereinafter Axelrod, *Emergence of Cooperation*]; ROBERT AXELROD, THE EVOLUTION OF COOPERATION (Basic Books 1984) [hereinafter Axelrod, EVOLUTION]; BRIAN SKYRMS, THE DYNAMICS OF RATIONAL DELIBERATION (Harvard Univ. Press 1990).

[11] *See* Merrill M. Flood, *Some Experimental Games*, 5 MGMT. SCI. 5 (1958). The story is credited to Albert Tucker. *See* Sylvia Nasar, *Albert W. Tucker, 89, Pioneering Mathematician*, N.Y. TIMES, Jan. 27, 1995, at A20, https://www.nytimes.com/1995/01/27/obituaries/albert-w-tucker-89-pioneering-mathematician.html [https://perma.cc/JL2A-5NQ6].

Both Fred and Ginger prefer freedom to one year, one year to twenty years, and twenty years to life in prison. Given the structure, payoffs, and preferences, the option of "ratting" dominates over the option of "staying silent." That is, no matter what the other player does, it is always better to rat. Ginger would reason the following way: "Suppose Fred rats, then I will do better to rat as well and avoid the sentence of life in prison. Suppose Fred stays silent, then I will do better if I rat and attain freedom. Either way, ratting is better." Of course, Fred is engaging in the same sort of reasoning and thus both are driven to a sub-optimal outcome. Both will rat. The lesson of such a game is that prudentially rational, self-interested players will end up with sub-optimal outcomes.[12] Collectively, however, both would do better if each remained silent. If Fred and Ginger could just cooperate, then they could each avoid the harsh result of spending twenty years in prison. This option yields what economists call "Pareto optimality"[13]—what is individually rational may well be collectively irrational.

A. Iterated and Multi-Player Prisoner's Dilemmas

Prisoner's dilemma games can also be played between two players numerous times. Imagine that Fred and Ginger were going to play an iterated prisoner's dilemma game with no known end point.[14] They might play ten rounds or one hundred rounds of the game. In this sort of game, when both can reasonably guess that the game will continue for some time, strategies like tit-for-tat dominate.[15] A tit-for-tat strategy starts off with cooperation (non-

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[12] Thus, ratting is said to dominate staying silent and is a "Nash equilibrium." "A Nash equilibrium is any profile of strategies—one for each player—in which each player's strategy is a best reply to the strategies of the other players." Ken Binmore, *Why all the Fuss? The Many Aspects of the Prisoner's Dilemma*, *in* THE PRISONER'S DILEMMA: CLASSIC PHILOSOPHICAL ARGUMENTS 16, 20 (Martin Peterson ed., Cambridge Univ. Press 2015).

[13] Pareto conditions are named after Vilfredo Pareto (1848–1923), an Italian economist and sociologist. *See Vilfredo Pareto,* ENCYC. BRITANNICA, https://www.britannica.com /biography/Vilfredo-Pareto [https://perma.cc/A6VF-BNQ2] (last visited Nov. 2, 2018).

[14] *See* Axelrod, EVOLUTION, *supra* note 10, at 10.

[15] *See* Axelrod, *Emergence of Cooperation*, *supra* note 10, at 311. For indefinitely repeated prisoner's dilemma games tit-for-tat is a Nash equilibrium.

ratting) and then imitates the opponent's previous move in subsequent rounds.[16] The problem is that if either player guesses the game is nearing its end, defection or ratting becomes the dominant strategy once again.[17] Defection, or threat of defection, pressures players to not cooperate as the game progresses.[18]

Rather than a two-person game, consider a multi-player game with an unknown number of counterparts. In this version of the game, if only one person rats, then that person is set free while the others all get life in prison. If more than one player rats, then those that rat get twenty years while those that remain silent get life in prison. Finally, if everyone remains silent, then each player is sentenced to one year in prison. As with the single-player version of the prisoner's dilemma game, the option of ratting dominates over staying silent. Again, what is individually rational yields a collectively sub-optimal outcome.

The tragedy of the commons can also be modeled as a multi-player prisoner's dilemma game.[19] Garret Hardin writes,

> If a pasture becomes a commons open to all, the right of each to use it may not be matched by a corresponding responsibility to protect it. Asking

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16 *Id.*; *see also* Axelrod, EVOLUTION*, supra* note 10, at 13.

17 Axelrod, *Emergence of Cooperation, supra* note 10, at 307, 312.

18 Pettit and Sugden offer a critique of this argument. *See* Phillip Pettit & Robert Sugden, *The Backward Induction Paradox*, 86 J. PHIL. 169 (1989). While this backward induction argument has been challenged in two-person iterated prisoner's dilemmas with no known end point, it is not at all clear that such considerations hold in multi-player iterated prisoner's dilemmas.

19 *See* Garret Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1243–48 (1968); *see also*, R. M. Dawes, *Formal Models of Dilemmas in Social Decision Making*, *in* HUMAN JUDGEMENT AND DECISION PROCESSES 87, (M. F. Kaplan & S. Schwartz, eds., Academic Press, 1975); Xin Yao & Paul J. Darwen, *An Experimental Study of N-Person Iterated Prisoner's Dilemma Games*, 18 INFORMATICA 435 (1994) (James E. Alt & Douglass C. North eds., 1st ed. 1990); ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (Cambridge Univ. Press 1990). Others have modeled public goods problems, like the tragedy of the commons, as assurance, chicken, or voting games. *See* Luc Bovens, *The Tragedy of the Commons as a Voting Game*, *in* THE PRISONER'S DILEMMA: CLASSIC PHILOSOPHICAL ARGUMENTS 156 (Martin Peterson ed., Cambridge Univ. Press 2015); Geoffrey Brennan & Michael Brooks, *The Role of Numbers in Prisoner's Dilemmas and Public Good Situations*, *in* THE PRISONER'S DILEMMA: CLASSIC PHILOSOPHICAL ARGUMENTS 177 (Martin Peterson ed., Cambridge Univ. Press 2015).

> everyone to use it with discretion will hardly do, for the considerate herdsman who refrains from overloading the commons suffers more than a selfish one who says his needs are greater. If everyone would restrain himself, all would be well; but it takes only one less than everyone to ruin a system of voluntary restraint. In a crowded world of less than perfect human beings, mutual ruin is inevitable if there are no controls. This is the tragedy of the commons.[20]

In this sort of example, value will be destroyed if it is overused. Adding in one or two extra sheep will benefit me at only a slight cost to others who use the commons. The result of each herder thinking this way is overgrazing, and the destruction of the commons. Admittedly, some overgrazing is within the carrying capacity of the typical commons. Nevertheless, there will be some amount of overuse that cannot be sustained. Once this point is reached, overgrazing will ensure the destruction of this common resource. As with the two-person version of a prisoner's dilemma game, there appears to be a dominant action. Each player would do better by overusing the commons no matter what the other players do.[21] Individuals acting prudentially lead to a collective tragedy.

B. Solutions to the Prisoner's Dilemma

Solutions to prisoner's dilemma-style games are varied.[22] One possibility would be to change the payoffs in the game. For example, imagine that a government, or Hobbes' Leviathan,[23]

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[20] Garret Hardin, *Lifeboat Ethics: The Case Against Helping the Poor*, PSYCHOL. TODAY, Sept. 1974, at 800.

[21] For a rich discussion of these issues, see MICHAEL TAYLOR, THE POSSIBILITY OF COOPERATION (1987); Phillip Pettit, *Free Riding and Foul Dealing*, 83 J. PHIL. 361 (1986).

[22] For recent experiments exploring different ways to solve the prisoner's dilemma, see Charles Holt, Cathleen Johnson, & David Schmidtz, *Prisoner's Dilemma Experiments*, *in* THE PRISONER'S DILEMMA: CLASSIC PHILOSOPHICAL ARGUMENTS 243 (Martin Peterson, ed., Cambridge Univ. Press 2015).

[23] Thomas Hobbes' solution to a version of the prisoner's dilemma was to institute a powerful government, a Leviathan, to incentivize individuals to cooperate. THOMAS HOBBES, LEVIATHAN 76–103 (Rod Hay ed., McMaster Univ. 1999) (1651)

would penalize individuals who acted out of prudence or narrow self-interest. In the two-person version of this scenario, a payoff of freedom would come with some sanction like severe weekly beatings. In this case, prudence and self-interest would lead toward silence and a collectively optimal solution. In multi-player games, like Hardin's tragedy of the commons, the Leviathan could simply penalize those who overuse shared resources. Hardin's own solution to the tragedy of the commons was to assign property rights along with corresponding legal obligations and privileges.[24] By setting up institutions of private property, the negative consequences of overuse can be internalized by those who own the land.[25]

Another solution to the tragedy of the commons or the prisoner's dilemma game is to only play with individuals that you trust. By being a transparent and public cooperator, a player can choose accordingly, and thus avoid sub-optimal outcomes.[26] Imagine a close-knit community where ratting on each other, or being non-cooperative, would be known to everyone. Those who made decisions based on narrow self-interest would find themselves at a disadvantage or ostracized altogether.

The Silk-Road escrow and reputation system was a real-life example of how to solve a prisoner's dilemma.[27] The Silk-Road was an anonymous online drug buying and selling black market.[28]

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https://socialsciences.mcmaster.ca/econ/ugcm/3ll3/hobbes/Leviathan.pdf [https://perma.cc/CTG3-ATFA].

24 Hardin, *supra* note 19, at 1245.

25 *Id.* at 1247.

26 *See* DAVID GAUTHIER, MORALS BY AGREEMENT (1986); David Gautheir, *How I Learned to Stop Worrying and Love the Prisoner's Dilemma*, *in* THE PRISONER'S DILEMMA: CLASSIC PHILOSOPHICAL ARGUMENTS 35 (Martin Peterson ed., Cambridge Univ. Press 2015); *see also* Natalie Gold & Robert Sugden, *Theories of Team Agency*, *in* MICHAEL BACHARACH, BEYOND INDIVIDUAL CHOICE: TEAMS AND FRAMES IN GAME THEORY 280 (Natalie Gold & Robert Sugden eds., Princeton Univ. Press 2006).

27 The original Silk Road was seized by the FBI in 2013 only to rise again in different iterations. New decentralized markets and cryptocurrencies are being developed with presumably new technological ways to solve the prisoner's dilemma problem. For a history of the Silk Road and its founder, Ross Ulbricht, see Joshuah Bearman, *The Rise & Fall of Silk Road*, WIRED (May 2015), https://www.wired.com/2015/04/silk-road-1/ [https://perma.cc/638C-LCWL].

28 *See id.*

Using Bitcoin as the currency and the Tor onion browser[29] to access the site, buyers and sellers connect to complete transactions. If a mechanism to ensure cooperation did not exist, the problems are obvious. If a seller could collect money first and then send the drugs, there would be no reason to actually send the product. Sellers could just keep the money and the drugs. Conversely, if the drugs were sent first, buyers would have no reason to send payment. Moreover, both buyers and sellers could reenter the market using different account names, so that the history of their prior uncooperative acts would be unknown. The optimal outcome would be for a party to receive the item (money or drugs) without completing the transaction. The next best outcome would be for a complete transaction: the seller receives the money and the buyer receives the drugs. The sub-optimal outcome would be no exchanges for either party. Finally, for the seller, the worst outcome would be to have sent the drugs and not received payment. The worst outcome for the buyer would be to have sent the money and not received the drugs.

The Silk-Road, and many of its imitators, solved this problem by having the buyer place the purchase money in an escrow account, which could only be released to the seller once the drugs arrived as advertised.[30] In this case, the system administrator, the Dread Pirate Roberts, would collect a small fee from the money in the escrow account and send the Bitcoins on to the seller.[31] Additionally, reputation also played a role in this system. Sellers and buyers could leave feedback about the product or payment.[32]

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29 "Tor stands for 'the Onion Router' and was launched by the Navy in 2002." *See id.*

30 *See id*.

31 The Dread Pirate Roberts was the fictional name of the Silk Road's administrator Ross Ulbricht. The Silk Road's escrow account was a bitcoin holding account controlled by Ulbricht. *See id.*

32 Andy Greenberg, *Meet the Dread Pirate Roberts, the Man Behind Booming Black Market Drug Website Silk Road*, FORBES (Aug. 14, 2013, 11:31 AM), https://www.forbes.com/sites/andygreenberg/2013/08/14/meet-the-dread-pirate-roberts-the-man-behind-booming-black-market-drug-website-silk-road/#500b0bf88b73 [https://perma.cc/47FH-RFUK].

Both parties could attain a reputation of fair dealing with other buyers and sellers.[33]

One of the problems associated with the Silk Road and its progeny is that there is nothing that keeps the escrow administrators honest. The best administrators develop a reputation of fair dealing and always paying off sellers upon notification of product arrival and quality. But, as these sites grow, there might be millions of dollars' worth of Bitcoins held in escrow accounts, and there is nothing buyers or sellers can do if the administrators simply abscond with the entire escrow account. This is called an "exit scam."[34] Modeled as an iterated prisoner's dilemma, this would amount to one of the parties being able to unilaterally end the game after securing optimal results. In this version, the two players are the administrator and the buyer/seller, the latter being thought of as one combined player. The current solution for exit scamming by administrators is for buyers and sellers to only work in small exchanges or markets and to risk only a small percentage of their bankroll or product at one time.[35] Moreover, there is also the possibility of automating the administrator's function. If the game has no end and the administrator fees cannot be changed, then perhaps a collectively optimal equilibrium will emerge. In any case, as discussed below, the use of reputation and escrow accounts will not provide a solution for a prisoner's dilemma involving intellectual property content, creation, and copying.[36]

II. CONTENT CREATION AND COPYING MODELED AS A PRISONER'S DILEMMA

Imagine that we have two intellectual property creators, Crusoe and Friday, and two possible outcomes for each. In a single-play

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[33] Andy Greenberg, *The Dark Web Drug Lords Who Got Away*, WIRED (June 2, 2015, 10:42 AM), https://www.wired.com/2015/06/dark-web-drug-lords-got-away/ [https://perma.cc/V6H5-YUHW].

[34] Andy Greenberg, *The Silk Road's Dark-Web Dream is Dead*, WIRED (Jan. 14, 2016, 7:00 AM), https://www.wired.com/2016/01/the-silk-roads-dark-web-dream-is-dead/ [https://perma.cc/KZG7-QPFX].

[35] This is exactly the strategy noticed by Charles Holt, Cathleen Johnson, and David Schmidtz. *See* Holt et al., *supra* note 22, at 251–52.

[36] *See infra* Part II.

prisoner's dilemma game, each player can copy an intellectual creation of the other, or not. Assume as well that the intellectual works created by Crusoe and Friday are valuable, interesting, or desired. The best case for either player is that their own intellectual creation is not copied, and yet they get to copy the work of the other player. This is 'best' for the player who copies and 'worst' for the player who does not because (1) the player who copies enjoys or consumes more content compared to the other player; (2) the player who copies still has the option or possibility of obtaining a benefit by selling, trading, or bartering with the other player, while the non-copier does not enjoy these possibilities—which provides a way to recoup research and development costs; and (3) via selling, trading, or bartering, the copier may obtain a positional advantage and more capital for future exchanges compared to the non-copier. Simply put, the copier obtains more content and retains more opportunities to sell, barter, or exchange than the non-copier.[37]

If Friday and Crusoe both refrain from copying each other, then each will avoid the worst outcome in terms of recouping investment costs and being at a positional disadvantage. Both will also retain the option of buying or bartering for the non-copied content, which the other enjoys. This payoff is 'okay,' better than 'worst,' but not as good as 'best.' If both Friday and Crusoe copy each other, then both will get extra content to enjoy and will not be put at a positional disadvantage, but each will be denied the possibility of recouping research and development costs. Alas, the other player will not buy or barter for content he or she already possesses.

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[37] Law Professor Sean O'Connor reminds us that 'real life' cases may actually be worse. O'Connor writes: "Some innovators are economically benefitting from their own IP-protected services by monetizing these services through a model that undermines creators' IP. In other words, when Google, for example, uses its advanced algorithms to profit from advertising and data mining tied to links to pirate sites or copyright-infringing content on its subsidiary, YouTube, it is very much relying on its patents, trade secret, copyright, and contract protections on these algorithms so that other search and social media firms cannot simply duplicate this code." Sean M. O'Connor, *Creators, Innovators, and Appropriation Mechanisms*, 22 GEO. MASON L. REV. 973, 995 (2015).

Figure 2:

		Friday's choices: Copy	Friday's choices: Don't Copy
Crusoe's choices: Copy		Bad / Bad	Worst / Best
Crusoe's choices: Don't Copy		Best / Worst	Okay / Okay

Assuming that Crusoe and Friday both prefer 'best' to 'okay,' 'okay' to 'bad,' and 'bad' to 'worst,' this scenario produces the structure of a single-play prisoner's dilemma, where copying dominates. Given that it is plausible to assume that content creation depends on time, effort, industry, capacity creation, and other investments, it is not implausible to model Crusoe and Friday's preferences this way.

Crusoe would reason the following way: "Suppose Friday copies, then I will do better to copy as well. I will not be able to trade my intellectual work with Friday in the future because he already has a copy, and thus I will have fewer opportunities to recoup research and development costs. Moreover, I will have less content to enjoy, and if this content would provide greater health and well-being, I may suffer a positional disadvantage as Friday amasses more capital. Supposing that Friday does not copy, then I will do better by copying for reasons already mentioned. Either way, copying is better." Of course, Friday is engaging in the same sort of reasoning and thus both are driven to copy. Finally, knowing this ahead of time, those who would engage in content creation may well deploy their efforts in other ways to avoid these risks. If this analysis is plausible, it is not far-fetched to assert that, without protections against copying, there would be a natural

suppression of intellectual property creation. Neither Crusoe nor Friday would find it prudent to engage in such creative activities.[38]

Consider a slightly different case. Imagine that Crusoe is a content creator and Friday is a mere content consumer. This cannot be modeled as a prisoner's dilemma, because Crusoe has no choice to copy or not to copy; however, it does illustrate the futility of Crusoe's position if he chooses to create content. In the short run, Friday has everything to gain and nothing to lose by copying the intellectual works of Crusoe. Thus, Crusoe has nothing to gain by engaging in the necessary research and development needed to create intellectual works. All of this becomes more salient when we move to iterated prisoner's dilemma games with numerous players. Crusoe is not just playing with Friday, but rather he is playing with thousands, perhaps millions, of other content creators and consumers. Moreover, if we allow for the possibility of both copying and downstream economic exploitation of copied intellectual works, the suppression of content creation seems to be guaranteed. If so, a sub-optimal result follows.

Consider the following illustration. Suppose that after months of effort and numerous failed experiments, Bonnie creates a new recipe for spicy noodles. Clyde, on the other hand, has spent years creating a new widget-making machine. Both of these creations are, let us suppose, useful and greatly desired by others living and working nearby. Both Bonnie and Clyde can expect to recoup their investment costs, and perhaps earn a living, by selling or licensing noodles or widgets. Bonnie and Clyde enter a prisoner's dilemma game when both are given the opportunity to copy and exploit the intellectual efforts of the other. While walking by Clyde's house, Bonnie could peek in the window and take a quick picture of Clyde's widget-making machine designs, build the same widget-making machine, and quickly start producing widgets. At the same

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[38] Sean O'Connor notes that quality requires sustained immersion in a practice. Moreover, such immersion requires an 'appropriation mechanism' to protect income and to recoup costs. O'Conner writes, "There is, however, a direct and pragmatic argument for the value of a full-time creative class: maintaining and being at the top of one's craft requires daily practice . . . . The importance of daily engagement in one's craft is well represented by performing artists such as musicians, who refer to the phenomenon as 'chops.' To 'keep his chops up,' the musician must constantly practice." *Id.* at 990.

time, Clyde could peek in Bonnie's window, take a picture of her recipe, and then start selling the noodles.

Note that nothing important turns on the fact that Bonnie and Clyde are selling artifacts rather than the ideas that make up the recipe or machine design. For example, Clyde could sell Bonnie's recipe, the set of ideas, to local chefs for a fee. Alternatively, Bonnie could sell Clyde's widget-making machine designs to local merchants. In either case, because neither has incurred research or development costs, both would be able to market the set of ideas at a lower price point than the other.

The best case for Bonnie and the worst for Clyde would be if Bonnie copies and Clyde does not. Without the investment costs, Bonnie would likely be able to sell widgets at a lower price than Clyde, thus easily capturing a dominant market share. This is the worst case for Clyde because he would likely lose all of his start-up investment costs and ongoing market share. Moreover, by not copying and exploiting Bonnie's recipe, Clyde would be at a competitive and positional disadvantage. Bonnie would be able to gather more profits and deploy this capital to her advantage. In the case where neither player copies or exploits the intellectual creations of the other, both could expect to do 'okay'—not as good as 'best,' but better than 'worst.' If both do not copy, both could expect to recoup investment costs and perhaps make a profit. Moreover, neither would attain a competitive and positional advantage.

Finally, if both creators copy and exploit the efforts of the other, then neither could expect to recoup the investment costs of their own original invention. Whatever costs Bonnie has incurred in creating the recipe, Clyde has avoided. Thus, Clyde would be able to sell the noodles at a lower price point than Bonnie. This would also be true of Bonnie if she sells widgets. Additionally, for Bonnie, assuming that each product has approximately equal investment costs, in cases where both parties copy and exploit the intellectual efforts of the other, she would do better to sell widgets. Clyde, in similar conditions, would do better to sell noodles. By copying and exploiting the efforts of the other, both Bonnie and Clyde might recoup the investment costs for their own *lost* intellectual efforts.

What would stop Clyde or Bonnie from giving away their own intellectual efforts or the efforts of the other player? Clyde or Bonnie could post the noodle recipe or widget-making machine designs on the Internet or any other public sharing site. In this case, both players would lose investment and start-up costs, but neither would be at a positional disadvantage.

Furthermore, rather than assuming that Bonnie and Clyde have similar investment costs, imagine that the investment costs of creating the noodle recipe is a fraction of the cost of creating the widget-machine designs. In this case, other things being equal, Bonnie would have an advantage.[39] By selling widgets she would be able to recoup the investment costs of developing the noodle recipe before Clyde would be able to recoup the investment costs of developing the machine by selling noodles. Once Bonnie has recouped her costs and perhaps pocketed a nice profit, she could simply give away her noodle recipe for free. If she does this, then Clyde's ability to sell noodles for a profit would vanish. Knowing this, Clyde might consider posting online the designs of his widget machine in order to undermine Bonnie's ill-gotten widget market. After copying and exploiting the intellectual efforts of each other—Clyde taking and exploiting Bonnie's noodle recipe and Bonnie taking and exploiting Clyde's widget-making machine designs—they would both have to consider the further non-cooperative act of publicizing these intellectual works, and thus undermining the other's income capacity.

An iterated version of this dilemma might run as follows: Suppose Bonnie and Clyde each have numerous opportunities to copy the intellectual works of the other. Both have lots of novel machine designs or new recipes. Additionally, each knows that they will face the question of copying and exploiting the other's work or refraining from copying and exploiting the other's work. The sub-optimal outcome is assured if both Bonnie and Clyde decide to copy and exploit the intellectual creations of the other. Both would quickly move on to other more profitable pursuits and content creation would be minimized. This is analogous to the

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[39] In this scenario, it is assumed that both Bonnie and Clyde make approximately the same monthly income by selling noodles or widgets, and that the other benefits and expenditures are similar.

"always defect or rat" mindset in iterated prisoner's dilemmas. Suppose, on the other hand, that both parties choose to cooperate, opting not to copy or exploit the intellectual works of the other, and to continue following this principle for as long as the other player continues to cooperate. Both adopt a "tit-for-tat strategy."[40] If so, the sub-optimal result would be avoided and both Bonnie and Clyde would be able to market their own intellectual efforts, recoup investment costs, trade content with each other, and avoid ending up in a disadvantaged position.

As soon as we look to an iterated game with multiple players, which includes both content creators and mere content consumers, it is highly unlikely that a tit-for-tat strategy would be adopted.[41] First of all, content consumers would have no compelling reason to adopt a tit-for-tat strategy because they have nothing to copy. If enough users and creators copy, then content creation would be suppressed and there would be much less content for everyone. Everyone would suffer as a result. This sort of reasoning parallels the considerations that occur in a tragedy of the commons situation.[42] The self-interested, prudent individual would seek to overgraze his sheep, hoping that others will refrain. Others reason similarly and the commons is ruined.

All of this might be stopped by adopting a robust principle of transparency and accountability.[43] Imagine that the identities of those who overgrazed the commons were made public, and that these individuals were shamed or ostracized. Reputations might follow these non-cooperative individuals who chose to ruin the commons for everyone in order to self-promote. Nevertheless, there are two factors working against this analysis as it applies to intellectual property. First, the copying of intellectual works is easily done in secret. From reverse engineering artifacts to simply copying files, no one has to know that my new "Ping" brand golf

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40 *See* Axelrod, *Emergence of Cooperation*, *supra* note 10; Axelrod, EVOLUTION, *supra* note 10.

41 It seems both Aristotle and Hume would agree. *See generally* ARISTOTLE, ARISTOTLE'S POLITICS (Benjamin Jowett trans., Clarendon Press 1885) (c. 384–322 B.C.E.); HUME, *supra* note 5, at § 7; *see also* Bovens, *supra* note 19.

42 *See generally* Hardin, *supra* note 19.

43 *See generally* Gauthier, *supra* note 26.

driver is a knock-off copy or that the music streaming from my phone was obtained illegally via BitTorrent.[44]

Second, copiers are not "frowned upon" or generally ashamed of their actions. In fact, most believe that they are not harming intellectual property creators or themselves when they copy.[45] When accused of "theft," copiers typically resort to one or all of the following replies: (1) "But I didn't take anything — they still have their copy." (2) "I wouldn't have purchased the content anyway, so 'no harm, no foul.'" (3) "Ownership of intangible works is misguided—ideas, language, even individuals, are social products. We should not allow individuals to monopolize these social products." Elsewhere it has been argued that these replies are not compelling, but there is no need to rehash these arguments presently.[46] At this point, all that should be noted is that transparency and accountability as a means for avoiding the sub-optimal outcome of an iterated prisoner's dilemma won't work.

If the argument presented above is correct, the dominant action between two players in a single-play or iterated prisoner's dilemma game is to copy the content of the other. If copying and exploiting the market is possible, then this behavior will dominate. Moreover, in multi-player iterated prisoner's dilemma games, copying or copying coupled with market exploitation would be rationally prudent. Additionally, copying for use or market exploitation becomes ever more dominant when we consider content creators and users in multi-player situations.

III. COPYING, INNOVATION, AND THE SUB-OPTIMAL OUTCOME

While it has been argued that copying or exploiting the intellectual efforts of others will lead to a sub-optimal outcome in terms of less innovation, this view needs to be more substantially

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44 BitTorrent is software that allows peer-to-peer file sharing over the internet. *About BitTorrent,* BITTORRENT, https://www.bittorrent.com/company/about [https://perma.cc/NB3Z-Y4DJ] (last visited Oct. 25, 2018).

45 *See* Adam D. Moore, *Privacy, Intellectual Property, and Hacking: Evaluating Free Access Arguments*, *in* INTERNET SECURITY: HACKING, COUNTERHACKING, AND SOCIETY 235 (Ken Himma ed., Jones & Bartlett Pub. 2007), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1980857 [https://perma.cc/UT2C-XS7G].

46 *See* Moore, *Lockean Theory Revisited*, *supra* note 9.

defended. If innovators would be motivated to create independent of compensation and in spite of being able to recoup investment costs, then copying would not lead to a suppression of content creation and a sub-optimal outcome.

First, one could argue that there can be no tragedy of the commons when considering intellectual property. Given that intellectual property cannot be destroyed and can be concurrently used by many individuals, there can be no ruin of the commons. Upon closer examination, this assertion does not hold true. To begin, ask, "What is the tragedy in the typical case?" Generally, it is the destruction of some land or other object and the cause of the destruction is scarcity and common access. But the tragedy cannot actually be the destruction of land or some physical object because, as we all well know, matter is neither created nor destroyed.[47] The tragedy is the loss of value, potential value, or opportunities. Where there was once a green field capable of supporting life for years to come, there is now a plot of mud, a barren wasteland, or a polluted stream. If access to valuable resources is not restricted, the tragedy will keep occurring.[48]

The tragedy in this, and other such cases, is not only the loss of current value, but of future value. Unless access is restricted in such a way that promotes the preservation or augmentation of value, a tragedy will likely result.[49] Now, suppose that intellectual works were not protected—that if they "got out" anyone would be able to profit from them. In such cases, individuals and companies would seek to protect their intellectual efforts by keeping them a secret. As noted below, secrecy was the predominant form of protection used by guilds in the Middle Ages.[50] The result of this secrecy can be described as a tragedy or a loss of potential value. If authors and inventors can be assured that their intellectual efforts will be protected, then the information can be disseminated, and

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47 *See* Henry Guerlac, *Lavoisier Antione-Laurent*, *in* 8 COMPLETE DICTIONARY OF SCIENTIFIC BIOGRAPHY 66, 84 (8th ed. 2008).

48 A prime example is the Tongan coral reefs that have been being destroyed by unsavory fishing practices. David Schmidtz, *When is Original Acquisition Required?,* 73 THE MONIST 504, 513 (1990). It seems that the best way to catch the most fish along the reef is to pour bleach into the water, bringing the fish to the surface and choking the reef.

49 *See* Hardin*, supra* note 19, at 1243; Schmidtz, *supra* note 48, at 513.

50 *See* discussion *infra* Part III.

licenses can be granted, so that others may build upon the information and create new intellectual works. The tragedy of a "no-protection rule" is secrecy, restricted markets, and lost opportunities.[51] This view is echoed by Professors Roger Meiners and Robert Staaf:

> The same story has been told about patents. If inventions lost their exclusivity and became part of the commons, then in the short run there would be over-grazing. The inventor could not exclude others, and products that embody previously patentable ideas would now yield a lower rate of return. There would be lower returns to the activity of inventing, so that innovative minds would become less innovative. In the case of open ranges, common rights destroy what nature endows, and in the long run keeps the land barren because no one will invest to make the land fertile. Similarly, common rights would make the intellectual field of innovations less productive relative to a private property right system.[52]

It should be obvious that such considerations would inevitably lead content creators to deploy their efforts in less risky pursuits.[53] If would-be innovators know that they would likely end up playing

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[51] Not all secrecy is a bad thing. Surely, keeping sensitive personal information to oneself is justified. For more about secrecy and the control of sensitive personal information, *see generally* ADAM D. MOORE, PRIVACY RIGHTS: MORAL AND LEGAL FOUNDATIONS (Univ. Park, Pennsylvania: Penn. State Univ. Press, 2010).

[52] Roger Miners & Robert Staaf, *Patents, Copyrights, and Trademarks: Property or Monopoly*, 13 HARV. J.L. & PUB. POL'Y 911, 919 (1990).

[53] William Fisher notes: "[P]otential innovators will know that, once they reveal their breakthroughs to the world, other people will be able to take advantage of them for free. Consequently, the innovators will be unable to recoup the costs of their innovations (the costs of the education they underwent to prepare them to make the innovations, the outlay for research and development, their opportunity costs, etc.). Aware of this risk, potential innovators will devote their energies to other, more lucrative activities, and society at large will suffer." William Fisher, *Intellectual Property and Innovation: Theoretical, Empirical, and Historical Perspectives*, *in* 37 INDUSTRIAL PROPERTY, INNOVATION, AND THE KNOWLEDGE-BASED ECONOMY, BELEIDSSTUDIES TECHNOLOGIE ECONOMIE 50 (2001); *see also* David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RESEARCH POL'Y 285 (1986).

out prisoner's dilemma games with each other numerous times, and with countless other players, each would pick a different profession. The incentives to create intellectual property content would be severely undermined.

Nevertheless, some have called for the elimination of patent and copyright regimes in favor of other forms of protection, because, it is argued that these institutions are unnecessary for innovation and content creation.[54] For example, Professors Michele Boldrin and David Levine argued that a "first mover advantage," coupled with secrecy and add-on services, is sufficient as an incentive for creation and discovery.[55] Tom Palmer made a similar argument seventeen years earlier, arguing that intellectual works should be protected via technological fences and contracts, along with bundling in other products and services.[56] Richard Stallman, focusing on software production, famously argued that without copyright or patent protection, programmers would continue to produce, "because it is fun!"[57] In 1958 Fritz Machlup wrote:

> No economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society . . . . If one does not know whether a system 'as a whole' (in contrast to certain features of it) is good or bad, the safest 'policy

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[54] *See generally* ERIC SCHIFF, INDUSTRIALIZATION WITHOUT NATIONAL PATENTS: THE NETHERLANDS, 1869–1912; SWITZERLAND, 1850–1907 (Princeton Univ. Press 1971); Edwin C. Hettinger, *Justifying Intellectual Property*, 18 PHIL. AND PUB. AFF. 31 (1989); Tom G. Palmer, *Intellectual Property: A Non-Posnerian Law and Economics Approach*, 12 HAMLINE L. REV. 261, 303 (1989) [hereinafter Palmer, *Intellectual Property*]; Tom G. Palmer, *Are Patents and Copyrights Morally Justified?: The Philosophy of Property Rights and Ideal Objects*, 13 HARV. J.L. & PUB. POL'Y 817 (1990) [hereinafter Palmer, *Patents and Copyrights*]; MICHELE BOLDRIN & DAVID K. LEVINE, AGAINST INTELLECTUAL MONOPOLY (Cambridge Univ. Press, 2008); N. STEPHAN KINSELLA, AGAINST INTELLECTUAL PROPERTY 38 (Ludwig von Mises Inst., 2008).

[55] *See, e.g.*, BOLDRIN & LEVINE, *supra* note 54, at 142–47.

[56] Palmer, *Intellectual Property*, *supra* note 54, at 288–89; Technological fencing includes the use of encryption passwords and product registration while bundled services would include receiving free software updates or free access to technical support experts.

[57] Richard Stallman, *Why Software Should Be Free,* GNU OPERATING SYSTEM (1992), *reprinted in* INTELLECTUAL PROPERTY: MORAL, LEGAL, AND INTERNATIONAL DILEMMAS 272–85 (A. Moore ed., Rowman & Littlefield 1997).

> conclusion' is to 'muddle through'—either with it, if one has lived long with it, or without it, if one has lived without it. If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it.[58]

If Machlup is correct, and contra to Boldrin, Levine, Palmer, and Stallman, there may be good reasons to retain our intellectual property institutions. Moreover, while it is admittedly difficult to compare the innovative output of our current system of copyrights, patents, global treaties, and competitive markets to other arrangements or institutions we might use to promote content creation, consider the following argument.

Imagine that you are a content creator and have the option of residing in one of several different city-states. In the city of "No Protection" there are no laws to protect the intellectual efforts of those who create or discover new intellectual works. In this city, protection is left to individual efforts like encryption or secrecy. In No Protection anyone can copy and exploit the intellectual efforts of anyone else. A short distance away is the city of "Guilds." In Guilds, secretive groups control innovation and uses of inventions backed by the force of law. For example, the wool-making guild has an ironclad and legally enforceable monopoly over the production of wool, along with all wool-making technology. If a citizen or visitor invents a better way to produce wool, then the guild can seize the innovation and legally prohibit the innovator from selling her invention or using it to produce wool.[59] Finally, there is a third city, called "IP Protection." In this city, new and original intellectual works are protected through the use of various legal instruments like copyrights and patents.

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[58] SUBCOMM. ON PATENTS, TRADEMARKS, AND COPYRIGHT OF THE S. COMM. ON THE JUDICIARY, 85TH CONG., STUD. NO. 15 ON THE PATENT SYSTEM 79–80 (Comm. Print 1958) (prepared by Fritz Machlup) [hereinafter Machlup].

[59] *See, e.g.,* discussion *infra* Part III, p. 849–52.

If your intellectual efforts include substantial research and development costs, it seems that your best option is the city of IP Protection. Short of working for free, or because you are already financially advantaged, moving to No Protection or to Guilds would likely leave you with no way to recover your costs. Moreover, you may notice that numerous other innovators are also taking up residence in IP Protection, leading to increased innovation and healthy markets. Suppose that in response to free riders attempting to copy and cash in on the efforts of innovators, the city adopted anti-copying statutes where a violation is met with ostracism or denied access to the city.[60] Sound far-fetched? Although there is a different story, this appears to be what happened in the Venetian Republic of 1474.[61]

Proposed by committee, the general patent statute passed in the Venetian Senate in 1474 by a vote of 116 to 10.[62] The statute read as follows:

> We have among us men of great genius, apt to invent and discover ingenious devices; and in view of the grandeur and virtue of our City, more such men come to us every day from divers parts. Now, if provision were made for the works and devices discovered by such persons, so that others, who may see them could not build them and take the inventor's honor away, more men would then apply their genius, would discover, and would build devices of great utility and benefit to our commonwealth . . . Therefore: Be it enacted that, by the authority of this Council, every person who shall build any new and ingenious device in this City, not previously made in our Commonwealth, shall give notice of it to the office of our General

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60 *See* Holt et al*., supra* note 22, at 246. *See also* A. Gunnthorsdittir, D. Houser, & K. McCabe, *Disposition, History and Contributions in Public Goods Experiment*s, 62 J. ECON. BEHAVIOR & ORG. 304, 304, 310 (2007) (providing evidence of the synergistic effects of cooperators being grouped together).

61 *See generally* BRUCE BUGBEE, GENESIS OF AMERICAN PATENT AND COPYRIGHT LAW (Pub. Aff. Press 1967).

62 G. Mandich, *Venetian Inventors' Rights*, *reprinted in* B. BUGBEE, GENESIS OF AMERICAN PATENT AND COPYRIGHT LAW 22 (1967).

> Welfare Board when it has been reduced to perfection so that it can be used and operated. It being forbidden to every other person in any of our territories and towns to make any further device conforming with and similar to said one, without the consent and license of the author, for a term of 10 years. And if anybody builds it in violation hereof, the aforesaid author and inventor shall be entitled to have him summoned before any magistrate of this City, by which magistrate the said infringer shall be constrained to pay him hundred ducats; and the devise shall be destroyed at once.[63]

This statute appeared 150 years before England's Statute of Monopolies[64] and provided the foundation for the world's first, lasting institution of intellectual property protection.[65] Moreover, the system was remarkably mature and sophisticated. The rights of inventors were recognized, an incentive mechanism was included, compensation for infringement was established, and a term limit on inventor's rights was imposed.[66]

Perhaps as a method to attract skilled individuals and to undermine the power of the guilds, the Venetian Republic began with rather limited legislation.[67] Originally, those who invented better technology or made improvements on existing technology simply had their efforts seized by the guilds.[68] After bitter complaining from both citizens and non-citizens alike, the Venetian Republic enacted a law that allowed individuals who innovated to seek permission to compete from the appropriate

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63 *Id*.

64 English Statute of Monopolies of 1623, 21 Jam. 1, c. 3.

65 *See generally* Bugbee, *supra* note 61.

66 *Id.*

67 For a concise analysis of the Venetian Republic's laws protecting intellectual property, see Ted Sichelman & Sean O'Connor, *Patents as Promoters of Competition: The Guild Origins of Patent Law in the Venetian Republic*, 49 SAN DIEGO L. REV. 1267, 1267–81 (2012).

68 "In France, the persecution of innovators by guilds of craftsmen continued far into the 18th century . . . for example, in 1726, the weavers guild threatened design printers with severe punishment, including death." Machlup, *supra* note 58, at 2.

guild.[69] In this case, if granted permission, the inventor could operate within the city and compete with the guild.[70] It is hardly surprising that the guilds were obstructionist when these requests occurred, so after further complaining, the Venetian Republic allowed innovators to compete with the guilds without guild permission.[71] However, this new law was criticized by inventors because it allowed the guilds to still take and use the innovations of non-guild members.[72] Given the widespread guild influence within city markets, it was rather easy for the guilds to use the efforts of the outside creators and secure a dominant market share.[73] Thus, finally in 1474 the Venetian Republic included exclusionary rights where those who invented new and original intellectual works could prohibit all others from using or profiting from these works for a period of time.[74] Moreover, not only did the Venetian Republic and the patent statute of 1474 begin to break up the power and control of the guilds, but it also acted as a magnet for foreign artisans and as a model for other city-states.[75]

In an interesting article comparing different intellectual property systems across different countries rather than city-states, Petra Moser makes the following observation:

> In countries without patent laws, inventors depend entirely on secrecy, lead-time, and other alternatives to patents in protecting their intellectual property. As a result, investments in research and development may be most attractive in industries in which secrecy can effectively guarantee exclusive rights long enough to allow inventors to recoup their investments. In countries *with* patent laws, inventors can use legal protection to establish exclusivity in any industry, so factors other than the

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69 *See generally* Machlup, *supra* note 58, at 2; Bugbee, *supra* note 61, at 22; Sichelman & O'Connor, *supra* note 67, at 1272–73.

70 Sichelman & O'Connor, *supra* note 67, at 1272–73.

71 *Id*. at 1274.

72 *Id*.

73 *Id*. at 1269.

74 Machlup, *supra* note 58, at 2; Sichelman & O'Connor, *supra* note 67, at 1275.

75 Sichelman & O'Connor, *supra* note 67, at 1279.

> effectiveness of secrecy determine the direction of technical change.[76]

This helps to explain why patents are under-utilized in different technology sectors. For example, in the early 1980s research and development executives in the industries of electrical equipment, primary metals, rubber, and textiles, claimed that "patent protection was not essential for the development or introduction of any of their inventions."[77] Even so, most of the innovations were patented anyway due to the perceived benefits compared to the patent costs.[78] Moreover, and more importantly, the ability to protect innovations through the use of trade secrets seemed to be the guiding principle for those inventions not covered by patent protection.[79]

Citing literature focusing on innovation within the pharmaceutical industry, William Fisher notes, "60% of the pharmaceutical inventions made between 1981 and 1983 would not have been developed at all and 65% of those inventions would not have been introduced into commerce if patent protection had been unavailable."[80] Within the chemical industry, 30% of the innovations would not have occurred without patents.[81] In "petroleum, machinery, and fabricated metal products, patent protection was estimated to be essential for the development and introduction of about 10-20 percent of . . . innovation."[82] Again, if not for patents and secrecy, supported via a regime of trade secrets, society seemingly gets less innovation.

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[76] Petra Moser, *Patents and Innovation: Evidence from Economic History*, 27 J. OF ECONOMIC PERSPECTIVES 23, 30 (2013) (emphasis in original); *see also* David Kline, *Do Patents Truly Promote Innovation?* IP WATCHDOG (Apr. 15, 2014), http://www.ipwatchdog.com/2014/04/15/do-patents-truly-promote-innovation/id=48768/ [https://perma.cc/PB9Z-DMTU].

[77] Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 MGMT. SCI. 174 (1986).

[78] *See id*. at 176.

[79] For an argument that trade secret protections are property claims, see Eric Claeys, *Intellectual Usufructs: Trade Secrets, Hot News, and the Usufructuary Paradigm at Common Law*, *in* INTELL. PROP. AND THE COMMON LAW 404 (Shyam Balganesh ed., 2015).

[80] Fisher, *supra* note 53, at 10.

[81] *Id*.

[82] Mansfield, *supra* note 77, at 174.

If the number of issued patents is used as a proxy for innovation, the United States, along with several other countries, has a distinct advantage.[83] Others have noted that the United States spent over $400 billion in research and development in 2011, more than double that of its closest competitor China: "U.S. based inventors received nearly 2 ½ times the number of U.S. patents compared" to its nearest rival.[84] Robert J. Barro and Xavier Sala-I-Martin note that, over the long run, the world's growth rate is largely

> driven by discoveries in the technologically leading economies. Followers converge at least part way toward the leaders because copying is cheaper than innovation over some range. As the pool of uncopied ideas diminishes, the cost of imitation tends to increase . . . the consequence from the absence of intellectual property rights across economies . . . *[is] the leading places tend to have insufficient incentive to invent, and the follower places tend to have excessive incentive to copy*.[85]

These empirical findings support the earlier contention that in single-play or iterated, multi-player, prisoner's dilemma games, the dominant strategy would be to copy the intellectual efforts of others and avoid upfront investment costs.[86]

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[83] William Hubbard, *Competitive Patent Law*, 65 FLA. L. REV. 341 (2013).

[84] Christopher B. Seaman, *American Innovation and the Limits of Patent Law: A Response to William Hubbard*, 23 FLA. L. REV. FORUM 24 (2013) (internal citations omitted).

[85] Robert J. Barro & Xavier Sala-I-Martin, *Technological Diffusion, Convergence, and Growth*, 2 J. ECON. GROWTH 1, 23 (1997) (emphasis added); "Whether through wisdom, ideology, or good fortune, the framers of the U.S. patent system fashioned a structure that has had a powerful impact on the patterns of inventive activity and generally worked well. According to Abraham Lincoln—himself a patentee—the system 'added the fuel of interest to the fire of genius.' Its attention to the provision of broad access to, and strict enforcement of, property rights in new inventions, coupled with the requirement of public disclosure, was extremely effective at stimulating the growth of a market for technology and promoting technical change." Kenneth L. Sokoloff & B. Zorina Khan, *Intellectual Property Institutions in the United States: Early Development and Comparative Perspective*, 9, presented at World Bank Summer Research Workshop on Market Institutions (July 17–19, 2000), http://www.dklevine.com/archive/sokoloff-kahn.pdf [https://perma.cc/C5L4-XZ6H].

[86] *See supra* Part II.

While much of the economic literature in this area focuses on patents, similar points can be made with respect to copyright. With the ease of copying and distribution afforded by modern digital networks, content creators would seem to be at a serious disadvantage compared to copiers. Without copyright there would be nothing to stop copiers from simply copying movies, books, articles, and music and selling, trading, or allowing others to make free copies.[87] Prior to international copyright treaties, like the Berne Convention or Trade Related Aspects of Intellectual Property, this was exactly what happened.[88]

Consider the costs hidden in the creation of a song or CD. From music lessons to recording software, demo tapes, numerous hours practicing and honing musical skills, not to mention eating and paying the electricity bill, there are lots of costs hidden in a song, album, or CD. A "professional album," Mathew Barblan writes, includes "costs for the studio, recording engineer, producer, studio musicians, back-up singers, mixing, and mastering, can push the price tag into the hundreds of thousands of dollars."[89]

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[87] Michael Smith, Brett Danaher, and Rahaul Telang note that "in the 10 years following Napster's introduction in 1999, global recorded music sales decreased 50% . . . DVD/VHS sales . . . fell 27% in the four years after the widespread adoption of the BitTorrent protocol in 2004." Brett Danaher, Michael D. Smith, & Rahul Telang, *Copyright Enforcement in the Digital Age: Empirical Evidence and Policy Implications*, 60 COMM. OF THE ACM 68 (2017). Michael Smith and Rahul Telang also note "that traffic from the popular file-sharing protocol BitTorrent accounted for [thirty-one] percent of all North American Internet traffic during peak-traffic periods in 2008." MICHAEL SMITH & RAHUL TELANG, STREAMING, SHARING, AND STEALING: BIG DATA THE FUTURE OF ENTERTAINMENT 9 (2016) [hereinafter, STREAMING, SHARING, AND STEALING].

[88] Berne Convention for the Protection of Literary and Artistic Works, *opened for signature* Sept. 9, 1886, 828 U.N.T.S. 221, S. Treaty Doc. No. 99-27 (1986) (revised at Paris, July 24, 1971, amended in 1979) [hereinafter Berne]; Berne Convention Implementation Act of 1988, Pub. L. No. 100-568, 102 Stat. 2853 (1988) (entered into force for the United States Mar. 1, 1989) (codified at 17 U.S.C. § 101 (1988 & Supp. V 1993)); Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, Apr. 15, 1994, 1867 U.N.T.S. 14, 33 I.L.M. 1143 (1994); TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994; Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994) *in* THE RESULTS OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS: THE LEGAL TEXTS 1–19, at 365–403 (Gatt Secretariat ed., 1994) [hereinafter Marrakesh Agreement]. See sources *supra* note 79 and accompanying text.

[89] Matthew Barblan, *Copyright as a Platform for Artistic and Creative Freedom*, 23 GEO. MASON L. REV. 795 (2016).

Production and distribution costs are even more profound when considering movies or plays.[90] Sean O'Connor notes, "it should be clear that no one would invest without some appropriation mechanism that would provide them with a favorable return on their investment through the monetization of the commercialized goods or services. If they cannot see a way to get such a return, they will not make the investment."[91] Simply put, with millions in production and distribution costs at stake, movies or other sorts of content would not be made without some sort of process where creators could recoup these costs.[92] These claims are further supported by the recent work of Michael Smith and Rahul Telang, who argue that piracy harms both producers and consumers by undermining the income streams of producers, resulting in less content being created and consumed.[93]

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[90] For some of the benefits and limitations of "the world's greatest naturally occurring experiment in cultural production without copyright: the burgeoning audiovisual industry of Nigeria, aka "Nollywood," see Justin Hughes, *Motion Pictures, Markets, and Copylocks*, 23 GEO. MASON L. REV. 941 (2016).

[91] Sean M. O'Connor, *Creators, Innovators, and Appropriation Mechanisms*, 22 GEO. MASON L. REV. 973, 982 (2015).

[92] Adam Mossoff has argued that even in the area of scholarly production of research, an area where economic incentives don't seem to apply, that "copyright incentivizes the business models necessary for converting a new scientific discovery or technical invention into a standardized and high-quality article that communicates this information to other scholars and researchers." Adam Mossoff, *How Copyright Drives Innovation: A Case Study of Scholarly Publishing in the Digital World*, 3 MICH. ST. L. REV. 955 (2016).

[93] *See*, STREAMING, SHARING, AND STEALING, *supra* note 87. "Using data from all wide release movies in the US from 2006 to 2008 we predict that if piracy could be eliminated from the theatrical window then box-office revenues would increase by 16% or $1.3b per year." Liye Ma, Alan L. Montgomery, & Michael D. Smith, *The Dual Impact of Movie Piracy on Box-Office Revenue: Cannibalization and Promotion*, J. MKT. RES. 1, 2 (2016), https://www.andrew.cmu.edu/user/alm3/papers/movie%20piracy.pdf [https://perma.cc/L6ZA-586N]. Movie piracy is also implicated in the economic downturn confronting independent movie producers and art-house labels. Without the ability to tie movie revenues to t-shirts, action figures, and theme parks, and thus recoup losses from piracy, independent movie producers are struggling. "If piracy continues to be rampant like this, then in four to five years it will be the end of the independent film business as we know it . . . ." Nelson Granados, *How Piracy Is Still Hurting the Filmmakers and Artists You Admire*, FORBES (Dec. 3, 2015, 12:08 PM), https://www.forbes.com/sites/nelsongranados/2015/12/03/how-piracy-hurts-the-filmmakers-and-artists-you-admire/#26bc9f234554 [https://perma.cc/PC7F-R3BY] (internal citations omitted).

Finally, I am well aware that the evidence offered in this section is not conclusive. At best, all that has been demonstrated is that the institutions of patent, copyright, and trade secret protection likely provide incentives to innovate. Societies that adopt these practices tend to do better in terms of overall well-being compared to societies that do not. In any case, conclusive support for the claim that patent, copyright, and trade secret are *optimal* in terms of producing overall well-being is not necessary for the argument under consideration. If it is likely that copying leads to a sub-optimal result and that not copying yields a collectively superior result, then all that is needed is some form of sanction or process that pushes would-be copiers in the optimal direction.

IV. COPYRIGHTS, PATENTS, AND TRADE SECRETS AS PATHS TOWARD COLLECTIVE OPTIMALITY

"But why copyrights, patents, and trade secrets?" you might ask. If the position under consideration holds, some form of protection is needed—some way to make it in everyone's best interest to not copy. Institutions of copyright, patent, and trade secret are not necessary for this purpose, although they may be sufficient.[94] By changing the payoffs of the intellectual property prisoner's dilemma through the use of copyrights, patents, and trade secrets, a path toward collective optimality will have been opened.

Within the Anglo-American tradition, intellectual property is protected by the legal regimes of copyright, patent, and trade secret.[95] Copyright protection extends to original works of authorship fixed in any tangible medium of expression.[96] Works

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[94] Other protection "tweaks" could also be implemented. For example, legal obligations to remove pirate sites from search engine results have been shown to be an effective strategy. *See* Smith & Telang, *supra* note 87, at 96.

[95] Trademark and the law of ideas, two areas of law with significant overlap into the realm of intellectual property, will not be discussed.

[96] *See* 17 U.S.C. § 102 (1988). The three major restrictions on the bundle of rights that surround copyright are (1) fair use, under 17 U.S.C. § 107 and per District Judge Leval's opinion in *New Era Publications Intern. v. Henry Holt and Co.*, 695 F. Supp. 1493 (S.D.N.Y. 1988); (2) limited duration (17 U.S.C. § 302); and (3) the first sale rule under

that may be copyrighted include books, songs, photographs, movies, maps, architectural designs and computer software.[97] There are five exclusive rights that copyright owners enjoy and three major restrictions on these rights. The five rights are the right to reproduce the work, to adapt it or derive other works from it, to distribute copies of the work, to display the work publicly, and to perform it publicly.[98] Each of these rights may be parsed out and sold separately.[99] All five rights lapse after the lifetime of the author plus 70 years;[100] and in the case of works for hire, the term is set at 95 years from publication or 120 years from creation, whichever comes first.[101]

The domain or subject matter of patent protection is the invention and discovery of new and useful processes, machines, articles of manufacture, or compositions of matter.[102] Patents yield the strongest form of protection, in that a twenty-year exclusive monopoly is granted over any expression or implementation of the protected work.[103] The bundle of rights conferred on a patent owner includes the right to make, the right to use, the right to sell,

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17 U.S.C. § 109(a). The first sale rule prevents a copyright holder who has sold copies of the protected work from later interfering with the subsequent sale of those copies. It should also be noted that copyright protection does not exclude independent original creation—for example, if an author independently creates a work that is substantially similar to a copyrighted expression then, he can obtain copyright protection. *See* 17 U.S.C. § 106 (1976).

97 Copyright code was amended in 1988 to include computer software. *See* 17 U.S.C. § 102 (1988).

98 17 U.S.C. § 106.

99 *See id*.

100 *See* 17 U.S.C.§ 302.

101 *See id*. The Constitution requires limited terms for copyright and patent protections. The Constitution empowers Congress to "promote the Progress of Science and useful Arts, by securing *for limited Times* to Authors and Inventors the exclusive Right to their respective Writings and Discoveries" U.S. Const. art. I, § 8, cl. 8 (emphasis added). The other two restrictions are "fair use" and "first sale." 17 U.S.C. §§ 107–08.

102 *See* 35 U.S.C. § 154 (1984 & Supp. 1989). Patents may be granted when the subject matter satisfies the criteria of utility, novelty, and non-obviousness. *See* 35 U.S.C. §§ 101–07. Unlike copyright, patent law protects the totality of the idea, expression, and implementation. *See* 35 U.S.C. §§ 101–07.

103 The Patent Act, 35 U.S.C. § 101 (1988). The 1995 version of the Patent Act has added three years to the term of patent protection—from seventeen to twenty. *See* 35 U.S.C. § 154(a)(2).

and the right to authorize others to sell the patented item.[104] Moreover, the bundle of rights conferred by a patent excludes others from making, using, or selling the invention, regardless of independent creation.[105]

A trade secret may consist of any formula, pattern, device, or compilation of information that is used in one's business.[106] Trade secrecy laws rely entirely on private measures, rather than state action, to maintain exclusivity.[107] Furthermore, the subject matter of a trade secret is almost unlimited in terms of the content of the information that is subject to protection.[108] Within the secrecy requirement, owners of trade secrets enjoy management rights and are protected from misappropriation.[109]

Given the argument so far, there is nothing that necessitates copyrights that last the author's lifetime plus seventy years, or patents that last twenty years. All that is needed to avoid sub-optimal results is a sanction that changes the payoffs of the prisoner's dilemma, making cooperation or not copying, the prudent act. The modern institutions of patent, copyright, and trade secret perform this function. Moreover, these institutions are already in place.

Again, consider Crusoe and Friday playing a prisoner's dilemma game where they are each considering if copying and violating the other's copyright is the best option. Both may well take heed to consider that the willful infringement of a copyright can result in a $150,000 penalty and up to five years in jail. In this new game, with copyright sanctions in place, the best option is to not copy.

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104 *See* 35 U.S.C. § 154 (1984 & Supp. 1989).

105 *See id*.

106 *See generally* RESTATEMENT (THIRD) OF UNFAIR COMPETITION §§ 39–45 (Am. Law Inst. 1995) (containing the most current information about the law of trade secrets). The two major restrictions on the domain of trade secrets are the requirements of secrecy and competitive advantage. Although trade secret rights have no built-in sunset, they are extremely limited in one important respect; owners of trade secrets have exclusive rights to make use of the secret but only as long as the secret is maintained. If the secret is made public by the owner, then the trade secret protection lapses and anyone can make use of it. Moreover, the rights of the owner do not exclude independent invention or discovery.

107 *Id.* at comment *g.*

108 *Id.* at comment *d.*

109 *Id.* at comment *f.*

Figure 3:

		Friday's choices: Copy	Friday's choices: Don't Copy
Crusoe's choices	Copy	150k Fine 150k Fine	Worst? 150k Fine
	Don't Copy	150k Fine Worst?	Okay Okay

Similarly, for patent infringement, the plaintiffs can be awarded an injunction against further use and "damages adequate to compensate" for the unauthorized use.[110] Along with an injunction against the use of the misappropriated information, owners of trade secrets may be entitled to compensatory damages, lost royalties, and punitive damages.[111] With copyright, patent, and trade secret institutions in place, along with appropriate enforcement mechanisms, we have changed the payoffs of iterated, multi-player, intellectual property, prisoner's dilemma games. Not copying becomes the dominant strategy.

Note, there is nothing in the argument offered so far that would prohibit copyrights that last for fifteen years or patents that last five years.[112] We could eliminate exclusive patent monopolies and allow those who independently innovate to obtain protection along with current patent holders.[113] Fair use could be weakened or strengthened, as with forced patent licensing. So long as incentives to innovate are maintained, which include enforced sanctions

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[110] *See* 35 U.S.C. §§ 281–289 (1984 & Supp. 1989).

[111] *See* RESTATEMENT (THIRD) OF UNFAIR COMPETITION §§ 44–45 (Am. Law Inst. 1995).

[112] For arguments regarding the optimal length of patent protection, see WILLIAM D. NORDHAUS, INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE (MIT Press 1969). For arguments regarding the optimal length of copyright protection, *see* Stan J. Liebowitz & Stephen Margolis, *Seventeen Famous Economists Weigh in on Copyright: The Role of Theory, Empirics, And Network Effects*, 18 HARV. J.L. & TECH. 435 (2005).

[113] For an argument to abandon exclusive patent monopolies, see Moore, *Lockean Theory*, *supra* note 9, at 74.

against copying, we will have provided ourselves reasons to avoid what narrow self-interest and prudence would otherwise dictate.

Rather than focusing on content creation, imitation, and copying within a country, it is possible to look more broadly and consider if a prisoner's dilemma arises between states or citizens of different countries.[114] Peter Andreas writes:

> In its adolescent years, the [United States] was a hotbed of intellectual piracy and technology smuggling, particularly in the textile industry, acquiring both machines and skilled machinists in violation of British export and emigration laws. Only after it had become a mature industrial power did the country vigorously campaign for intellectual-property protection.[115]

Andreas notes further that Alexander Hamilton, in his 1791 "Report on Manufactures" to the House of Representatives, argued for the wholesale theft of technology from Europe.[116] Moreover, the first U.S. Patent Act of 1790 allowed for the theft of foreign intellectual property and subsequent protection within the United States.[117]

An interesting case study of an intellectual property prisoner's dilemma between countries is found in Eric Schiff's book, *Industrialization Without National Patents*.[118] Schiff, and those who cite him, fail to see that the success of the Netherlands and Switzerland in maintaining or advancing industrialization in the late 1800s/early 1900s was parasitic on the intellectual property institutions of other countries. For example, an innovator in the Netherlands circa 1885 could not patent his intellectual work domestically, but because of membership in the International

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114 *See generally* Bugbee, *supra* note 61.

115 Peter Andreas, *Piracy and Fraud Propelled the U.S. Industrial Revolution,* BLOOMBERG (Feb. 1, 2013, 11:24 AM), https://www.bloomberg.com/view/articles/2013-02-01/piracy-and-fraud-propelled-the-u-s-industrial-revolution [https://perma.cc/F9D9-Q9DC].

116 Alexander Hamilton, REPORT ON MANUFACTURES (presented to the House of Representatives, Dec. 5, 1791), http://constitution.org/ah/rpt_manufactures.pdf [https://perma.cc/7CPF-3SK4].

117 *See* Patent Act of 1790, Ch. 7, 1 Stat. 109–112 (1790).

118 SCHIFF, *supra* note 54, at 513. *See also* Boldrin & Levine, *supra* note 54, at 7.

Union, he could patent his work in France, Germany, and the United States, thus securing income from his efforts.[119] Schiff notes, "one of the basic principles of the International Union was . . . that with respect to protection of industrial property every member country should treat the citizens or residents of any other country just as it treats its own nationals, even if the latter enjoy less protection or none at all in the foreign country."[120] Moreover, given that there was no patent system in the Netherlands and Switzerland, innovations from outside these countries were able to be imported and operationalized without sanctions.[121] Patent institutions generally require disclosure,[122] which made it exceedingly easy to copy and exploit the efforts of others in countries without patent institutions. In the optimal case, citizens and corporations in foreign countries with patent institutions must comply with your patent rights, while domestically—where your business resides—you can safely ignore their patent claims.

In response to this sort of activity, at the 1887 meetings of the International Union, the United States proposed that "any invention that is not patentable in the country of origin, may be excluded from protection in any other member country that finds it expedient to exclude it."[123] More telling language was used by W. Stuber, a German national, who referenced the Swiss people as "robber barons" and "parasites."[124] Foreshowing the TRIPS agreement discussed below, in response to the Swiss theft of German intellectual efforts, in 1907 Germany threatened tariffs on various Swiss products.[125] By 1910, both the Netherlands and Switzerland had adopted patent institutions.[126]

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119 *See generally* Boldrin & Levine, *supra* note 54.

120 Schiff, *supra* note 54, at 89.

121 *Id*. at 69–101.

122 *See generally* Corinne Langinier & GianCarlo Moschini, *The Economics of Patents: An Overview* (Ctr. for Agric. and Rural Dev., Working Paper No. 02-WP 293, 2002), https://ageconsearch.umn.edu/bitstream/18374/1/wp020293.pdf [https://perma.cc/LT2C-YHSM].

123 SCHIFF, *supra* note 54, at 93 (citing F. Meili, Die Prinzipien des Schweizerichen Patentgesetzes 11 (1890)).

124 *Id.* at 94 (citing W. Stuber, Die Patentierbarkeit Chemischer Erfindungen (1907)).

125 Machlup *supra* note 58, at 5.

126 *Id.*

Similar problems with copyright also occurred in the United States. Traveling in the United States in 1842 Charles Dickens wrote:

> Is it not a horrible thing that scoundrel booksellers should grow rich here from publishing books, the authors of which do not reap one farthing from their issue by scores of thousands; . . . Is it tolerable that besides being robbed and rifled an author should be forced to appear in any form, in any vulgar dress, in any atrocious company; that he should have no choice of his audience, no control over his own distorted text, and that he should be compelled to jostle out of the course the best men in this country who only ask to live by writing? I vow before high heaven that my blood so boils at these enormities, that when I speak about them I seem to grow twenty feet high, and to swell out in proportion. 'Robbers that ye are.'[127]

Dickens was railing against the practice of bribing English publishers, obtaining advance copies of books, and then selling these copies throughout the United States without compensating the authors.[128] With no international copyright protections, there was little Dickens or other writers could do about these practices. Moreover, given that U.S. authors were not as yet producing at the same rate as their English counterparts,[129] U.S. publishers had little to lose and lots to gain by participating in this practice.

After Dickens was joined by Mark Twain and others, the U.S. reversed course in 1891 by enacting the Chace Act.[130] "The absence of international copyright laws allowed Canadian publishers to prey on Mark Twain's early books. He was hurt badly in 1876, when the Toronto publisher Charles Belford issued

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[127] CHARLES DICKENS, THE SELECTED LETTERS OF CHARLES DICKENS, 230 (Jenny Hartley ed., 2012).

[128] *Id*.

[129] *See* PETER BALDWIN, THE COPYRIGHT WARS: THREE CENTURIES OF TRANSATLANTIC BATTLE 113 (2014).

[130] International Copyright Act of 1891, 26 Stat. 1106; *see* Thorvald Solberg, *The International Copyright Union*, 91 ADVOCATE OF PEACE THROUGH JUSTICE 98 (1929).

Tom Sawyer before the American edition even appeared."[131] Twain also noted a second kind of harm visited upon authors unprotected by international copyrights. Domestic publishing houses would earn higher profits by publishing unauthorized copies of *foreign authors* because there were no royalty costs.[132] This practice had the effect of suppressing innovative activity within the U.S. Nevertheless, as innovation increased in the United States, Canada, Australia, and other markets, and as reverse theft, industrial espionage, and unauthorized copying occurred, these countries found it in their interest to join together and enact international intellectual property legislation.[133] Given that there was no authority by which one country could force another to adopt international copyright and patent protection, content creating countries simply had to wait until emerging counties developed their own markets of innovation.[134]

This was not the case for what is now known as the TRIPS agreement of 1994.[135] The TRIPS "regime provides mechanisms for both the United States and the European Union to enforce provisions that increase protection in newly industrialized and developing nations."[136] Simply put, if a developing nation wanted access to U.S. or E.U. markets, then they have to agree to international protections for intellectual property.[137] While

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131 Philip V. Allingham, *Nineteenth-Century British and American Copyright Law*, THE VICTORIAN WEB (Jan. 5, 2001), http://www.victorianweb.org/authors/dickens/pva/pva74.html [https://perma.cc/FEJ5-AFM2] (quoting R. RASMUSEN & R. KENT, MARK TWAIN A TO Z: THE ESSENTIAL REFERENCE TO HIS LIFE AND WRITINGS 54 (1995))

132 Philip V. Allingham, *Nineteenth-Century British and American Copyright Law*, THE VICTORIAN WEB (Jan. 5, 2001), http://www.victorianweb.org/authors/dickens/pva/pva74.html [https://perma.cc/CJ32-LTZ4].

133 *See* John Tehranian, *The Emperor Has No Copyright: Registration, Cultural Hierarchy, and the Myth of American Copyright Militancy*, 24 BERKELEY TECH. L.J. 1399, 1406 (2009); Hal Varian, Copying and Copyright, 19 J. OF ECON. PERSPECTIVES 121, 121–38 (2005); David Nimmer, *Nation, Duration, Violation, Harmonization: An International Copyright Proposal for the United States*, 55 LAW & CONTEMPORARY PROBLEMS 211 (1992).

134 *See generally* Tehranian, *supra* note 133.

135 *See* Marrakesh Agreement, *supra* note 88.

136 Hugh C. Hansen, *International Copyright: An Unorthodox Analysis*, 23 FORDHAM INTELL. PROP. MEDIA & ENT. L. J. 447 (2013); *see also,* Marci Hamilton, *The TRIPS Agreement: Imperialistic, Outdated, and Overprotective*, 29 VAND. J. TRANSNAT'L L. 613 (1996).

137 Hamilton, *supra* note 136, at 617.

developing nations might have comparatively little innovative activity to protect in signing the TRIPS agreement, they have a lot to lose by being restricted from U.S. and E.U. markets. Obviously, these sanctions change the payoffs of the prisoner's dilemma game and allow a way out without waiting for countries to develop their own innovative industries.[138]

CONCLUSION

In this Article, and setting aside various foundational moral entanglements, an argument has been offered for the protection of intellectual property based on individual self-interest and prudence. If copying becomes too widespread, or if enforcement mechanisms fail, then we will inevitably spiral toward the collectively sub-optimal result of suppressing innovation and content creation. Through the use of sanctions against copying the intellectual efforts of others, we give ourselves compelling reasons to pursue a collectively superior outcome.

We could dismantle copyright, patent, and trade secrete institutions and build some different set of legal or societal instruments to deter copying and incentivize innovation. Arguably, such efforts would be politically and economically impractical. It is as if we have sectioned off Hardin's commons with assigned property rights and protective legal instruments, find that this system works, and are now considering whether replacing these institutions with some other arrangement would allow us to avoid the tragedy of the commons in some better way. There may be a better way, but the costs of such a shift would be massive and taking such a gamble would be rather imprudent.[139]

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[138] Admittedly, many find the TRIPS "agreement" rather hollow, claiming that it is based on bullying by the United States and EU. China was not considered for WTO or TRIPS membership until several years after the initial agreement. *See* Natalie P. Stoianoff, *The Influence of the WTO over China's Intellectual Property Regime*, 34 SIDNEY L. REV. 65–89 (2012); Robert M. Sherwood, *Why a Uniform Intellectual Property System Makes Sense for the World*, *in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 68 (Mitchel B. Wallerstein et al. eds., 1993).

[139] *See generally* Machlup *supra* note 58; Moore, *Incentive Based Arguments*, *supra* note 2.

Alternatively, we could modify our current institutions, tweaking things here and there to optimize access and incentives to create.[140] So long as we give ourselves compelling reasons to refrain from narrowly prudent and self-interested copying or imitation, we can avoid the sub-optimal results and aim at collectively rational payoffs. We already have institutions in place that allow us to avoid a tragedy of the commons related to intellectual property.

What is objectionable with the copying and pirating of computer software, music, machine designs, and other forms of intellectual property is that, in most cases, we are acting on an impulse that likely thwarts our own wider interests. "I want freedom over time in jail. I want more content, leisure time, health, software, and entertainment. No one is harmed by my taking." I dare say that only those who are not employed as content creators, or those inventors funded in some other way, typically make such claims. Even more cynically, many who hold such views attempt to undermine the protections for other content creators and innovators, while at the same time using government to secure their own intellectual property rights. Everyone has prudential and self-interest based reasons to avoid content piracy or illegitimate copying. "Copying the creations of others because I can" may feel good in the moment, but once understood as a prisoner's dilemma, where such behavior yields all of us sub-optimal results, we can more easily support—imperfect as they are—the institutions of copyright, patent, and trade secret.

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[140] *See infra* notes 106–07 and accompanying text. For additional examples, see Adam Jaffe and Josh Lerner, *Innovation and Its Discontents*, *in* INNOVATION POLICY AND THE ECONOMY 27–65 (William Kerr, Josh Lerner, & Scot Stern eds., 2015).