THE MACROECONOMICS OF INTELLECTUAL PROPERTY

ERIC E. JOHNSON*

ABSTRACT

Intellectual property is understood to have an economic rationale: supplying incentives for innovation and for the creation and dissemination of knowledge and information. In the modern era, questions of how best to accomplish this have been explored with reference to economic efficiency and other concepts from microeconomics. But why not macroeconomics?

In the microeconomic view, the intangibles of innovation, knowledge, and information are ordinary economic goods, albeit ones whose easy reproducibility leads to special problems. In the macroeconomic view, however, innovation, knowledge, and information are extraordinary goods with special virtues. Indeed, modern macroeconomics puts these intangibles at the center of the field because they are understood to be the key to achieving sustained economic growth in an advanced economy. And growth is macroeconomics' principal contemporary concern.

This Article makes a general case for putting macroeconomics front and center in discussions about intellectual property law, and it suggests a number of insights that come from doing so. The macroeconomic view can offer policy prescriptions that are distinct from and contrary to those springing from a microeconomic view. In particular, and perhaps counterintuitively, a macroeconomic focus cautions against expanding existing intellectual property rights or introducing new ones.

* Earl Sneed Centennial Professor of Law, University of Oklahoma College of Law. I have benefited from the opportunity to present this paper at the Works-in-Progress Intellectual Property Colloquium at Boston University School of Law, the Texas A&M Intellectual Property Scholars Roundtable, the Santa Clara & Berkeley Law Bay Area Works in Progress Event, and the Intellectual Property Scholars Conference at Stanford Law School. For helpful feedback, comments, and suggestions, I thank Betsy Rosenblatt, Peter Yu, Glynn S. Lunney, Jr., Colleen Chien, Anupam Chander, Joseph Scott Miller, Christopher S. Yoo, Bronwyn H. Hall, Mark A. Lemley, Oren Bracha, Joshua Sarnoff, Rebecca Tushnet, Emily Michiko Morris, Greg Reilly, Saurabh Vishnubhakat, Liam S. O'Melinn, BJ Ard, Patrick R. Goold, Michael Waters, and Kit Johnson. Please contact the author at www.ericejohnson.com.

TABLE OF CONTENTS

INTRODUCTION

Intellectual property has long been understood to revolve around an economic rationale—the need to incentivize innovation and the production and dissemination of knowledge and information.[1] Correspondingly, both intellectual property's critics and its defenders have used the tools of microeconomic analysis—supply curves, demand curves, price signals, and deadweight loss—in arguments over the law's expansion, retrenchment, and reform. The primacy of the microeconomic goal of efficiency for intellectual property has been regarded as a settled matter.[2] This Article, however, makes the argument that our economic approach to intellectual property should not, at its heart, be primarily concerned with a microeconomic perspective. Instead, intellectual property law and policy should have as its chief concern a *macroeconomic* perspective.

Microeconomics and macroeconomics are the two long-standing divisions within the field of economics.[3] Microeconomics concerns the interactions between individual economic units—consumers, retailers, workers, manufacturers, investors, banks, and so on.[4] In other words, microeconomics focuses on the production, trading, and consumption of particular goods and services—"widgets," as economics aficionados are fond of saying.[5] Macroeconomics, by contrast, concerns the economic

1. *See, e.g.*, Fox Film Corp. v. Doyal, 286 U.S. 123, 127–28 (1932) ("A copyright, like a patent, is 'at once the equivalent given by the public for benefits bestowed by the genius and meditations and skill of individuals and the incentive to further efforts for the same important objects.'" (quoting Kendall v. Winsor, 62 U.S. 322, 328 (1858)). Many commentators draw a distinction between incentivizing new innovation *creation* and new innovation *commercialization*. *See, e.g.*, Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 738–39 (2012) (discussing various commercialization incentive theories). In this article, I mean to lump the two together as "innovation." In terms of practicalities, inventing and commercializing can be quite distinct. But from a more fundamental economic perspective, they are two parts of the same thing—the introduction of new economic value to society not in the form of new physical matter, but in the form of new information about how to employ old physical matter in new ways so as to create value.

2. *See, e.g.*, WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 4 (2003) ("Today it is acknowledged that analysis and evaluation of intellectual property law are appropriately conducted within an economic framework that seeks to align that law with the dictates of economic efficiency.").

3. ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS 3 (7th ed. 2009).

4. *See, e.g.*, N. GREGORY MANKIW, PRINCIPLES OF MICROECONOMICS 29 (6th ed. 2012) [hereinafter MANKIW, MICRO] ("Microeconomics is the study of how households and firms make decisions and how they interact in specific markets."). PINDYCK & RUBINFELD, *supra* note 3, at 3 ("Microeconomics deals with the behavior of individual economics units. These units include consumers, workers, investors, owners of land, business firms—in fact, any individual or entity that plays a role in the functioning of our economy.").

5. *See, e.g.*, Susan Block-Lieb & Edward J. Janger, *The Myth of the Rational Borrower: Rationality, Behavioralism, and the Misguided "Reform" of Bankruptcy Law*, 84 TEX. L. REV. 1481, 1528 (2006) ("Classical microeconomic theories of consumer behavior present simplified models that involve decisions among a handful of widgets over a limited number of time periods."); Richard A.

functioning of a society—including economic growth and stagnation.[6] In other words, macroeconomics concerns "the economy as a whole."[7] The field of macroeconomics confronts questions such as, "Why are some countries rich and others poor?" and "Why do countries grow?"[8]

As things stand today, when the field of intellectual property law uses concepts or insights from economics, those concepts and insights are almost always microeconomic. And what is true for intellectual property law is true as well for law generally. When judges, lawyers, and legal scholars engage with economics, it is almost always with microeconomics. Indeed, the movement or school of thought that is called "law and economics" is accurately categorized as "law and microeconomics."[9] But a change is coming—from two directions.

In the broad conversation about the relationship between economics and law, there is increasing attention to "law and macroeconomics."[10] Anna Gelpern and Adam J. Levitin describe a "current 'macro moment'" for "a broad-based engagement between law and macroeconomics."[11] Yet the new law-and-macroeconomics scholarship has yet to focus attention on intellectual property law—despite the ripeness of the challenge. As Yair Listokin recently wrote, intellectual property is an area of law that "is (or

---

Posner, *Natural Monopoly and Its Regulation*, 21 STAN. L. REV. 548, 551–52 (1969) (using "widgets" as generic, unidentified units of production and consumption in an example about economic inefficiencies associated with monopoly pricing). The term "widget" is also used in ROBERT COOTER WITH AARON EDLIN, THE FALCON'S GYRE: LEGAL FOUNDATIONS OF ECONOMIC INNOVATION AND GROWTH (version 1.4 2014), https://www.law.berkeley.edu/library/resources/cooter.pdf [https://perma.cc/G43D-V6YH]. *See* Robert Cooter & Aaron Edlin, *Ventures*, in COOTER WITH EDLIN, *id.*, at 2.11 [hereinafter Cooter & Edlin, *Ventures*] (speaking of innovation as "development of a better widget").

6. *See, e.g.*, PINDYCK & RUBINFELD, *supra* note 3, at 3 ("[M]acroeconomics deals with aggregate economics quantities, such as the level and growth rate of national output, interest rates, unemployment, and inflation."); MANKIW, MICRO, *supra* note 4, at 29 ("Macroeconomics is the study of economywide phenomena.").

7. DAVID ROMER, ADVANCED MACROECONOMICS 1 (4th ed. 2012).

8. *Id.*

9. *See, e.g.*, Anna Gelpern & Adam J. Levitin, *Considering Law and Macroeconomics*, 83 L. & CONTEMP. PROBS., no. 1, 2020, at i, ii (identifying the "Law and Economics movement" as "LawMicro" and noting that it "has ignored macroeconomics altogether until very recently"); RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 3 (9th ed. 2014) (beginning discussion of fundamental concepts of law and economics by distinguishing it from "macroeconomic phenomena remote from the day-to-day concerns of the legal system" before going on to introduce microeconomic fundamentals); Yair Listokin, *Law and Macroeconomics: The Law and Economics of Recessions*, 34 YALE J. ON REGUL. 791, 793 (2017) (observing that "the microeconomic perspective . . . currently dominates law and economics").

10. For instance, a recurring conference at Georgetown Law School was launched in 2019. *See Conference on Law & Macroeconomics*, GEO. L., https://www.law.georgetown.edu/iiel/signature-events-overview/law-macroeconomics-conference/ [https://perma.cc/W37R-TGGV] (last visited Feb. 16, 2023).

11. Gelpern & Levitin, *supra* note 9, at xviii; *see also id.* at x ("We see the 'macro turn' in law scholarship as long-overdue and valuable.").

should be) impossible to analyze . . . without considering macroeconomics."[12]

Within the intellectual property literature, there has been increasing interest in moving beyond narrow microeconomic models of static efficiency. Yet attention to macroeconomic teachings, as such, has been limited.[13] The prominent exception is an emerging line of scholarship that upholds economic growth as more important than anything else—including the microeconomic concept of efficiency that has long been the central concern of law and economics.[14] This effort has been led by Robert Cooter and advanced by Benjamin Chen, Aaron Edlin, Uri Hacohen, and Hans-Bernd Schäfer.[15]

Cooter is a renowned law-and-economics scholar whose work has been regarded as pioneering and highly influential.[16] Indeed, he is recognized as a "founding father" of the law-and-economics movement.[17] That Cooter would spearhead an essentially anti-microeconomic approach is striking.[18]

---

12. Yair Listokin, *Law and Macro: What Took So Long?*, 83 L. & CONTEMP. PROBS., no. 1, 2020, at 141, 141–42.

13. Some past forays include Frank Partnoy, *Finance and Patent Length* (Univ. San Diego L. & Econ. Rsch. Paper, Paper No. 19, 2001), http://ssrn.com/abstract=285144 [https://perma.cc/W9YD-CSGY] (integrating interest rates into models for optimal patent terms); Eric E. Johnson, *Calibrating Patent Lifetimes*, 22 SANTA CLARA COMPUT. & HIGH TECH. L.J. 269, 287–88, 295–96, 307–09 (2006) [hereinafter Johnson, *Calibrating*] (making the case for dynamically varying patent terms based on macroeconomic variables).

14. *See, e.g.*, Benjamin Chen & Robert Cooter, *The New Economic Freedom*, 23 SUP. CT. ECON. REV. 59, 68 (2015) ("[R]apid exponential economic growth quickly overtakes the direct effects of static efficiency and redistribution on wealth and welfare. If sustained growth is achievable, static efficiency and income redistribution effects are important for their contribution to growth, and unimportant in themselves.").

15. *See* COOTER WITH EDLIN, *supra* note 5; Robert D. Cooter & Uri Y. Hacohen, *Progress in the Useful Arts: Foundations of Patent Law in Growth Economics*, 22 YALE J.L. & TECH. 191 (2020); Chen & Cooter, *supra* note 14; Robert D. Cooter, *Freedom, Creativity, and Intellectual Property*, 8 N.Y.U. J.L. & LIBERTY 1 (2013) [hereinafter Cooter, *Freedom*]; ROBERT D. COOTER & HANS-BERND SCHÄFER, SOLOMON'S KNOT: HOW LAW CAN END THE POVERTY OF NATIONS (2012).

16. *See, e.g.*, Alan Schwartz, *Proposals for Products Liability Reform: A Theoretical Synthesis*, 97 YALE L.J. 353, 419 (1988) (describing the influence of Cooter in the theoretical literature); Steven Alan Childress, *The Empty Concept of Self-Censorship*, 70 TUL. L. REV. 1969, 1973 n.9 (1996) (describing Cooter's work on punishment and prices as "highly influential"); Roger B. Myerson, *Economic Analysis of Constitutions*, 67 U. CHI. L. REV. 925, 939 (2000) (characterizing Cooter as a "pioneer[]" in economic analysis of constitutional law); Lynn A. Stout, *Judges as Altruistic Hierarchs: 2001 George C. Wythe Lecture*, 43 WM. & MARY L. REV. 1605, 1607 (2002) (describing Cooter's work about incentives for judges as "pioneering"); Benjamin C. Zipursky, *The Internal Point of View in Law and Ethics: Introduction*, 75 FORDHAM L. REV. 1143, 1147–48 (2006) (symposium introduction) (describing Cooter's efforts to understand legal norms in economic terms as "pioneering").

17. Bruno Meyerhof Salama, *Macroeconomic Analysis of Law Versus Law and Macroeconomics*, 83 L. & CONTEMP. PROBS., no. 1, 2020, at 181, 186. Notably, Cooter is the past president and founding director of the American Law and Economics Association. *Robert Cooter*, BERKELEY L., https://www.law.berkeley.edu/our-faculty/faculty-profiles/robert-cooter/#tab_profile [https://perma.cc/R62W-98AZ] (last visited Feb. 16, 2023).

18. COOTER WITH EDLIN, *supra* note 5, at ix (comparing his revelation with regard to the importance of economic growth over efficiency as being like a Catholic priest who suddenly decides that Buddha is correct and the pope is mistaken).

Cooter and other scholars pursuing this approach do not adopt the word "macroeconomic" in their explanations, nor do they draw deeply on contemporary macroeconomic teachings for their arguments.[19] But they do put their focus on the macroeconomic object of economic growth.

With their growth-centered perspective, these scholars have put forward a case for greatly strengthening available intellectual property protections. In so doing, they have set out a major challenge to conventional intellectual property theory. What is more, these scholars have made the eye-catching claim that ethics- and justice-based arguments about inequality and poverty may be properly subordinated as policy considerations in the pursuit of rapid economic growth.[20] This stance is a noteworthy break from traditional law and economics. That movement sidelined normative values of justice and fairness, but it did so largely because it regarded them as foreign to the economic paradigm, leaving nothing much to say about them.[21] By contrast, the new growth-oriented approach of Cooter, Chen, Edlin, Hacohen, and Schäfer directly engages fairness-type values, arguing for their inferior status on economic grounds. Given sufficiently rapid growth, in their view, inequality and distributive justice are rendered unimportant.

Cooter and colleagues' work on innovation and economic growth has gained attention from leading scholars.[22] Indeed, Cooter's reasoning has been called "hard to argue with."[23] In this Article, however, I offer a number

19. *See infra* notes 80–85 and accompanying text.

20. *See infra* notes 150–154 and accompanying text.

21. Russell B. Korobkin & Thomas S. Ulen, *Efficiency and Equity: What Can Be Gained by Combining Coase and Rawls?*, 73 WASH. L. REV. 329, 329–30 (1998) (noting law-and-economics scholars' responses include "that equity is not a coherent concept . . . that law and economics' concentration on efficiency is dictated by underlying microeconomic theory and not by an evaluation that efficiency is necessarily a superior value to equity; and that, in reality, little difference exists between efficiency and traditional, justice-based analyses . . . ." (footnotes omitted)).

22. *See, e.g.*, W. Michael Schuster & Gregory Day, *Colluding Against a Patent*, 2021 WIS. L. REV. 537, 556 (2021); Listokin, *supra* note 12, at 144; Patrick R. Goold, *Patent Accidents: Questioning Strict Liability in Patent Law*, 95 IND. L.J. 1075, 1110–11 (2020); Gelpern & Levitin, *supra* note 9, at i, xii, xv; Salama, *supra* note 17, at 186–87; Elizabeth Pollman, *Startup Governance*, 168 U. PA. L. REV. 155, 168–69 (2019); Colleen V. Chien, *Opening the Patent System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 838 (2016); William F. Shughart II & Diana W. Thomas, *Intellectual Property Rights, Public Choice, Networks, and the New Age of Informal IP Regimes*, 23 SUP. CT. ECON. REV. 169, 172 (2015); Camilla A. Hrdy, *Commercialization Awards*, 2015 WIS. L. REV. 13, 50 (2015); Mark A. Lemley, Response, *Taking the Regulatory Nature of IP Seriously*, 92 TEX. L. REV. *SEE ALSO* 107, 114 n.33 (2014).

23. Charles M. Yablon, *Innovation, the State and Private Enterprise: A Corporate Lawyer's Perspective*, 40 DEL. J. CORP. L. 1017, 1044 (2016) (reviewing MARIANA MAZZUCATO, THE ENTREPRENEURIAL STATE: DEBUNKING PUBLIC VS. PRIVATE SECTOR MYTHS (2014)) ("Given [various] considerations, it is hard to argue with Cooter's conclusion that to the extent law can be used to foster innovation and economic growth, that should be a lawmaker's first priority." (citing Robert Cooter & Aaron Edlin, *Overtaking*, in COOTER WITH EDLIN, *supra* note 5, at 1.16–17 [hereinafter, Cooter & Edlin, *Overtaking*])).

of arguments against their approach and their resulting policy prescriptions. To do so, I employ macroeconomics—both in name and in substance.

The primary project of this Article is to fill voids in both the intellectual property literature and the law-and-economics literature by providing a broad vision of what can be called the macroeconomics of intellectual property. I explain how the macroeconomic lens is able to capture unique, important considerations for the design of intellectual property law. I describe the high stakes for intellectual property law that are revealed at the macroeconomic level. And I show how the macroeconomic perspective can be difference-making for questions of intellectual property policy.

With reflection, it seems surprising that judges, lawyers, and legal scholars have taken for granted the aim of microeconomic efficiency for intellectual property, as a macroeconomic mission is arguably written into the U.S. Constitution. Article I authorizes Congress to create a system of exclusive rights for inventors and authors, and it does so by specifying a society-wide, growth-oriented goal: "To promote the Progress of Science and useful Arts."[24] That raises a question: How could it be possible to uphold the constitutional charge of progress-seeking with a focus on the microeconomic mission of efficiency-seeking? The answer is that intellectual property jurisprudence has long treated progress-promoting innovation as just another good that society needs to produce—like tractors, wheat, or paper clips. In other words, in the microeconomic view, innovation is a "widget"—albeit with a difference.

The difference is that from a microeconomic perspective, innovation is a widget with a problem—the "public goods problem."[25] By saying innovation is a public good, scholars mean that its use and enjoyment naturally inures to the public at large.[26] Considered in isolation, that would seem to be a good thing. The problem, however, arises with who will pay

24. U.S. CONST. art. I, § 8, cl. 8. Note that the phrase "Science and useful Arts" can be translated into modern language as *knowledge and technology*. *See* Jeanne C. Fromer, *The Intellectual Property Clause's External Limitations,* 61 DUKE L.J. 1329, 1373–74 (2012). As many have observed, Clause 8 is the only enumerated power in Section 8 that carries its own statement of purpose. *See, e.g.*, LAWRENCE LESSIG, FREE CULTURE: HOW BIG MEDIA USES TECHNOLOGY AND THE LAW TO LOCK DOWN CULTURE AND CONTROL CREATIVITY 215 (2004) ("[T]his clause is unique within the power-granting clause of Article I, section 8 of our Constitution. Every other clause granting power to Congress simply says Congress has the power to do something . . . . But here, the 'something' is something quite specific—to 'promote . . . Progress' . . . .").

25. *See* Madhavi Sunder, *IP*^{3}, 59 STAN. L. REV. 257, 261–62 (2006) ("[L]egal scholars continue to understand intellectual property as solely a tool to solve an economic 'public goods' problem: nonrivalrous and nonexcludable goods such as music and scientific knowledge will be too easy to copy and share—thus wiping out any incentive to create them in the first place . . . .").

26. *See, e.g.*, William W. Fisher III, *When Should We Permit Differential Pricing of Information?*, 55 UCLA L. REV. 1, 21 (2007) ("[L]ike navigational aids, roads, and environmental quality, [public goods] have two linked characteristics: (1) Enjoyment of them by one person does not materially curtail the ability of other people to enjoy them; and (2) once they have been made available to one person, it is difficult to prevent them from being made available, for free, to other people.").

for it. If I produce a barrel of oil or a bushel of oranges (private goods), I can expect compensation for my labor and my costs because I can require payment in exchange for handing over possession. Yet if I create an innovation or new knowledge (public goods), others can possess those things as soon as they *learn* about them. Lacking means of securing payment, I will lack the incentive to produce the innovation in the first place—or so says the theory.[27] This leads to the classic rationale for intellectual property law: The law imposes a means to exclude where the physical world does not. The power to exclude enables payment, which provides incentives. With supply and demand connected to one another through the market, there will be, according to theory, efficient production and distribution of innovation and knowledge. And when intellectual property rights eventually expire,[28] the public at large will be free to make use of innovations as they see fit—leading to a more perfect realization of microeconomics' ultimate objective of efficiency.

Various permutations of these ideas, along with debates about how these effects work in the real world, have engaged intellectual property scholars for a long time. To generalize, scholars pursue an answer to this question: Given that innovation is something we want, like widgets or wheat, how do we work around the public goods problem to ensure innovation's efficient production and distribution?

This is where macroeconomics offers a starkly different perspective. For the macroeconomist, innovation is indeed special, but not because of its problems as a public good. From the macroeconomic perspective, innovation is special because of its almost magical virtue of allowing unbounded economic growth.

As the field of macroeconomics appreciates, a society's standard of living can grow without innovation, but only so much. At the low end of the development spectrum—such as a society based on subsistence agriculture—a society can raise standards of living by making capital investments. Buying tractors, building bridges, and constructing water treatment plants are examples of capital investments that fuel economic growth. But as Nobel-winning economist Robert Solow explained, this can

27. This theory is susceptible to critique. *See, e.g.*, Eric E. Johnson, *Intellectual Property and the Incentive Fallacy*, 39 FLA. ST. U. L. REV. 623 (2012) [hereinafter Johnson, *Incentive Fallacy*] (arguing that the incentive theory, as a general matter, is incorrect).

28. 35 U.S.C. § 154(a)(2) (providing for the expiration of utility patents, generally 20 years after the date of application); 17 U.S.C. § 302 (providing for the expiration of copyrights, generally 70 years after the death of the author or 95 years from first publication for corporate and anonymous works); Camilla A. Hrdy & Mark A. Lemley, *Abandoning Trade Secrets*, 73 STAN. L. REV. 1, 43–44 (2021) (discussing expiration of trade secrets because of the passage of time).

only go so far.[29] When a society becomes sufficiently rich in physical capital, there is no more economic growth to be had by means of further capital investment. Investment continues to be needed to repair and replace aging physical capital, but this repair-and-replace investment has no net payoff for economic growth. For an advanced economy like the United States, further increasing standards of living requires being clever about how to get more value out of less stuff. In other words, the continued growth of a mature economy requires innovation and new knowledge.

To be clear, the macroeconomic view does not make the public goods problem go away. But it changes its nature. From a microeconomic perspective, the public goods problem is put to rest by optimizing the production of innovation, thereby obtaining an efficient result using intellectual property rights. From a macroeconomic perspective, however, the public goods problem is something that must be dealt with in order to obtain progress and growth.

As I argue in this Article, innovation, knowledge, and other intellectual intangibles are importantly different from other public goods. Regular public goods like clean air and fireworks displays are perishable and require continuing expenditure to maintain. Intellectual intangibles, however, are *imperishable*, because something written or invented needs never to be written or invented again. And this imperishability is what fuels *progress*. This view spotlights the problematic nature of intellectual property rights: even as intellectual property rights may initially—and efficiently—incentivize innovation and knowledge creation, those intellectual property rights may then interfere with others' using and building on that innovation and knowledge in ways that represent growth and progress.

Given the macroeconomic mandate for innovation and knowledge, and given that intellectual property law is governments' primary strategy for encouraging innovation and knowledge production,[30] it becomes clear that there can be no adequate account of intellectual property economics without macroeconomics.

This Article is organized as follows: Part I discusses the difference between the microeconomic and macroeconomic perspectives, and Part I goes on to explain how microeconomics has been applied to law in general and to intellectual property law in particular. Part II explores prior intellectual property scholarship that has engaged with macroeconomic concepts or at least stretched beyond narrower microeconomic framings. Within Part II, I explain and critically evaluate the arguments about

29. *See* R. M. SOLOW, GROWTH THEORY: AN EXPOSITION 17 (1970); Chen & Cooter, *supra* note 14, at 68 (discussing Solow's Nobel Prize). For an explanation of Solow's growth theory, see *infra* notes 98–110 and accompanying text.

30. Fisher, *supra* note 26, at 21.

intellectual property and economic growth that have been advanced by Cooter, Chen, Edlin, Hacohen, and Schäfer. Part III makes the case for prioritizing the macroeconomic view over the microeconomic view when it comes to analyzing intellectual property law and policy, and it explores some of what comes of this re-prioritization. For instance, I explain how innovation and knowledge are distinct, in a macroeconomic sense, from other public goods. And I show how a macroeconomic perspective can lead to new and different policy prescriptions.

I. FROM MICRO TO MACRO, FROM EFFICIENCY TO GROWTH

This part provides background useful for exploring the application of macroeconomics to intellectual property (IP). Section A aims to avoid some potential confusion by explaining that the economic grounding for IP is both older and less contested than the "law and economics" movement, even though the later came to inform the former. Section B provides a sketch of legal theory's focus on microeconomics and efficiency. Section C discusses the current microeconomic orientation of IP theory. Section D introduces macroeconomics and growth, paying particular attention to the role played by innovation and knowledge creation.

A. Evolution of Economic Thought in Law and IP

Basic notions of how economics is or should be applied to law are inevitably bound up with what is known as "law and economics." Yet it is important to note that IP law's economic orientation has an existence that is independent of—and much older and much less controversial than—the law-and-economics movement.

In terms of vintage, the law-and-economics movement is a relative newcomer, having its origins in the latter half of the twentieth century.[31] By contrast, the economic-incentive justification for intellectual property law goes back centuries—arguably as far as the Middle Ages.[32] In terms of controversy, the law-and-economics movement has it in abundance. Depending on who is explaining it, the law-and-economics approach is as

31. Thomas S. Ulen, *A Crowded House: Socioeconomics (and Other) Additions to the Law School and Law and Economics Curricula*, 41 SAN DIEGO L. REV. 35, 36 (2004) (describing "the early days of law and economics" as "roughly the late 1970s and early 1980s"); Randal C. Picker, *Law and Economics: Intellectual Arbitrage*, 27 LOY. L.A. L. REV. 127, 128 (1993) (pointing to 1960 in identifying the law-and-economics field's "beginnings"); Morton J. Horwitz, *Law and Economics: Science or Politics?*, 8 HOFSTRA L. REV. 905, 906 (1980) (same).

32. *See* LANDES & POSNER, *supra* note 2, at 1 ("Awareness that intellectual property raises distinctive economic issues long predates the modern law and economics movement."); *id*. (dating the economic incentive rationale for IP law to the Middle Ages).

fundamental and as undeniable as gravity,[33] as harmful and as infective as disease,[34] or so "smudged beyond recognition" that "little remains" to take issue with.[35] By contrast, the economic-incentive theory for intellectual property is, in its core essence, well defined and widely venerated. Indeed, it has been the main theoretical foundation and policy touchstone for United States intellectual property law for at least the nation's entire history.[36]

Even though the economic justification for intellectual property has a longer pedigree than the more generalized law-and-economics approach, that more general approach has become the background for contemporary economic thinking about intellectual property. And, as law-and-*macro*economics scholars have observed about the microeconomically focused law and economics: "The movement's reach and influence have made it the presumptive reference point for any project that implicates law and economics in the United States . . . ."[37] For that reason and for other reasons that will come up later, it makes sense to sketch out the classic law-and-economics account. I do that next.

33. HENRY N. BUTLER, CHRISTOPHER R. DRAHOZAL & JOANNA SHEPHERD, ECONOMIC ANALYSIS FOR LAWYERS 3 (3d ed. 2014) ("Just as a physicist must take into account the effects of gravity, so too must a lawyer understand the effects of economic forces. In a very real sense economic forces are the gravity of the social world . . . .").

34. Leonard R. Jaffee, *The Troubles with Law and Economics*, 20 HOFSTRA L. REV. 777, 779 (1992) ("So, I have two big gripes against Law and Economics. One is that it's sick and spreads sickness. The other's that it doesn't work in ways it claims, or do what it pretends.").

35. Anita Bernstein, *Whatever Happened to Law and Economics?*, 64 MD. L. REV. 303, 311–15, 324 (2005) (discussing the similarities and claimed distinctions among the terms "efficiency," "wealth maximization," and "welfare" as the desideratum in the law-and-economics approach).

36. *See, e.g.*, Golan v. Holder, 565 U.S. 302, 345 (2012) (Breyer, J., dissenting) ("The possibility of eliciting new production is, and always has been, an essential precondition for American copyright protection."); Mazer v. Stein, 347 U.S. 201, 219 (1954) ("The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare."); Fox Film Corp. v. Doyal, 286 U.S. 123, 127 (1932) ("The sole interest of the United States and the primary object in conferring the monopoly lie in the general benefits derived by the public from the labors of authors."); United States v. Paramount Pictures, Inc., 334 U.S. 131, 158 (1948) ("It is said that reward to the author or artist serves to induce release to the public of the products of his creative genius."); *see also* Johnson, *Incentive Fallacy*, *supra* note 27, at 635–40 (discussing the origins and influence of the incentive theory); *cf.* Diane Leenheer Zimmerman, *Information as Speech, Information as Goods: Some Thoughts on Marketplaces and the Bill of Rights*, 33 WM. & MARY L. REV. 665, 703–06 (1992) (noting the dominance of the incentive theory for copyright law in the United States from the beginning, but arguing that this rationale has always been infused with Lockean ideas about authors' entitlement to the fruits of their labor).

37. Gelpern & Levitin, *supra* note 9, at ii.

B. The Microeconomic Focus on Efficiency

As a general matter, and especially within the law-and-economics movement, the application of economics to law has focused on wealth maximization.[38] There is a question of whether this is a positive endeavor or a normative one, or perhaps one disguised as the other or something of a mix of the two.[39] But in general, in the economic perspective, the maximization of societal wealth is understood to be the thing toward which law should be directed. This goal, however, is often merely implicit. While it is accurate to say that wealth maximization is at the heart of the law-and-economics perspective, the phrase "wealth maximization" is often left unsaid. More common phrases for the same idea are "welfare" and, perhaps most ubiquitous, "economic efficiency."[40]

Economic efficiency is understood to mean the ordering of economic resources and relationships in a way that is congruent with maximizing wealth or total social welfare—in other words, leaving people, in the aggregate, "better off."[41] This does not mean leaving every individual better off, but rather everyone lumped all together in an aggregated whole.[42] Yet this kind of clarifying premise is often unstated and unexamined. In a more prosaic and practical sense, having economic efficiency as a goal means aiming for improved allocations of scarce resources[43]—that is, getting

38. *See, e.g.*, Abraham Bell & Gideon Parchomovsky, *Givings*, 111 YALE L.J. 547, 580 (2001) ("Economic efficiency is achieved by taking into account both costs and benefits."); *id.* at 580 n.159 ("Law and economics literature generally employs a Kaldor-Hicks wealth-maximization criterion for efficiency."); Herbert Hovenkamp, *The Limits of Preference-Based Legal Policy*, 89 NW. U. L. REV. 4, 57 (1994) (referring to "the commonly used law and economics criterion of wealth maximization, or cost-benefit analysis"). For some nuance, see Bernstein, *supra* note 35, at 311–15 (discussing the similarities and claimed distinctions among the terms "efficiency," "wealth maximization," and "welfare" as the desideratum in the law-and-economics approach).

39. *See* Herbert Hovenkamp, *Positivism in Law & Economics*, 78 CALIF. L. REV. 815, 815–18 (1990) (reviewing controversies around normativism and positivism in law and economics).

40. For a critical discussion of the terms "welfare," "economic efficiency" and "wealth maximization," see Bernstein, *supra* note 35, at 311–15.

41. *See, e.g.*, Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1093–94 (1972) ("Economic efficiency asks that we choose the set of entitlements which would lead to that allocation of resources which could not be improved in the sense that a further change would not so improve the condition of those who gained by it that they could compensate those who lost from it and still be better off than before. This is often called Pareto optimality.").

42. *See id.*; Steve P. Calandrillo, *Responsible Regulation: A Sensible Cost-Benefit, Risk Versus Risk Approach to Federal Health and Safety Regulation*, 81 B.U. L. REV. 957, 980 (2001) ("[S]eeking economic efficiency generally does *not* mean that everyone will, or even should, be better off after [a given course of action] . . . . Rather, the idea is to expand society's overall 'pie' so that more people are made better off and fewer people are made worse off.").

43. COOTER WITH EDLIN, *supra* note 5, at ix ("Law and efficiency economics explains how law improves resource allocations."); *see also* MANKIW, MICRO, *supra* note 4, at 27 ("An outcome is said to be *efficient* if the economy is getting all it can from the scarce resources it has available.").

goods and services into the hands of those who can make the best use of them and allocating labor and production in the most efficient way possible.

As perhaps the simplest possible example, imagine a farmer's only conveyance is a boat and a fisherman's sole means of transport is a tractor. That would be an inefficient allocation of resources.[44] Moving in the direction of greater economic efficiency means getting the tractor to the farmer and the boat to the fisherman.

The basic, traditional general law-and-economics prescription for economic efficiency is strong property law, dependable enforcement of contracts, and an unregulated free market.[45] With these things, the theory goes, people will enter into trades with one another, each mutually beneficial bargain making society better off.[46] If the farmer has clear title to the boat, the fisherman has clear title to the tractor, and if courts will enforce contracts and property rights, then the farmer and the fisherman will work out a transaction that leaves the farmer with the tractor and the fisherman with the boat. The theory provides that the pursuit of self-interest combined with a legal system that enforces deals allows the "invisible hand"[47] to produce the optimal quantity and mixture of goods and services and to distribute them to the optimal assortment of persons and firms.

The full efficiency argument, boiled down to three questions and three answers would be this: Who should get a particular piece of property? Whoever can make the most productive use of it. Who can make the most productive use of it? Whoever is willing and able to pay the highest price. What if the person who can make the most productive use of the property doesn't have the cash on hand to buy it? Free markets for financial capital will enable that buyer to get financing to make the purchase. So, summed up in as few words as possible, the economic-efficiency principle can be stated this way: selfish trades, beneficent system.

---

44. This example—like all in economics—is making a number of implied assumptions. If the farmer found great joy in owning the boat and had an indoor greenhouse operation for which a tractor was no use, and if the fisherman worked a wadable river bend at the end of a muddy path reachable only by tractor, then the status quo might well be optimally efficient. The hazards of economists' assumptions are pointed up by the oft-repeated joke about three ship-wrecked academics and their varying approaches to getting sustenance from a can of food they've found. The economist rejects the analysis from the physicist and the chemist, saying instead: "Assume a can opener." *See, e.g.*, Ronald Chen & Jon Hanson, *Categorically Biased: The Influence of Knowledge Structures on Law and Legal Theory*, 77 S. CAL. L. REV. 1103, 1124–25 (2004).

45. *See, e.g.*, BUTLER, DRAHOZAL & SHEPHERD, *supra* note 33, at 18 (stating that if all resources are owned, ownership allows exclusion of others, and it is costless to exchange rights, then this rights regime, "when combined with a free market economy, will generate the efficient allocation of resources").

46. *Id.*

47. For a discussion of the "invisible hand" metaphor, including with regard to free markets producing economic efficiency, see Adrian Vermeule, *The Invisible Hand in Legal and Political Theory*, 96 VA. L. REV. 1417, 1418–19 (2010).

That is a rough sketch of what can be called "classical" law and economics,[48] which is based on what is generally referred to as "neoclassical" economics, that being the basic, mainstream economics of our current era, grounded in the idea that supply and demand determines—and ought to determine—prices and outputs. A neoclassical approach, strictly construed, means assuming that economic actors are rational and do not make mistakes in the pursuit of maximizing their own utility while making decisions about buying, selling, working, resting, consuming, investing, and so on.[49]

All of the above law-and-economics doctrine comes from microeconomics. The focus is on individual transactions and discrete markets. The approach does not look at the economy as a whole or society as a whole. The implication is that there is no need—the big picture will take care of itself, with welfare gains accumulating across the economy, raising standards of living.

Criticism of the law-and-economics approach comes in at least two flavors. The first category of criticism opposes the idea that wealth maximization or economic efficiency ought to be the goal. Critics argue that other things are as important or more important—such as fairness and justice.[50] This category of criticism is external to the economic paradigm. The second broad category of criticism focuses not on the goal of efficiency but on the means of getting there. In this vein, critics argue that, in at least some important circumstances, the free market fails substantially to achieve efficient outcomes. These critiques do not exit the economic paradigm entirely; instead, they take issue with neoclassical assumptions about

48. *See, e.g.*, Robert C. Ellickson, *Bringing Culture and Human Frailty to Rational Actors: A Critique of Classical Law and Economics*, 65 CHI-KENT L. REV. 23, 23–24 (1989) (using the term "classical law and economics" to refer to a view in which analysis assumes that actors are rational personal-utility maximizers—a view championed by Richard Posner and said to have achieved "full bloom" as of the mid-1970s).

49. *See* E. Roy Weintraub, *The Concise Encyclopedia of Economics: Neoclassical Economics*, LIBR. ECON. & LIBERTY, http://www.econlib.org/library/Enc1/NeoclassicalEconomics.html [https://perma.cc/9YJA-F4GG] (last visited Feb. 16, 2023) (stating that theories are "neoclassical theories" when they are "based on, or guided by" three assumptions) ("1. People have rational preferences among outcomes. 2. Individuals maximize utility and firms maximize profits. 3. People act independently on the basis of full and relevant information."); Ellickson, *supra* note 48, at 23 (describing, in connection with a discussion of "classical law and economics," the economic foundations) ("The model assumes that a person can perfectly process available information about alternative courses of action, and can rank possible outcomes in order of expected utility. The model also assumes that an actor will choose the course of action that will maximize his personal expected utility, which may, of course, reflect a concern for the welfare of others.").

50. *See, e.g.*, Korobkin & Ulen, *supra* note 21, at 329 ("[O]ne of the most constant criticisms of the economic analysis of law has been that it fails to address distributive justice concerns.").

markets and their ability to reach improved allocations of resources.[51] Much of this kind of criticism is brought forth under the banner of what is known as "behavioral economics," which investigates the ways in which humans are not perfect rational actors.[52]

C. The Dominance of Microeconomics in IP

Economic analysis applied with regard to intellectual property has had a microeconomic focus as well. This section provides a brief primer on the economics of intellectual property as traditionally understood. This section goes on to discuss how the literature has sought to critique or extend the traditional understanding.

1. A Quick Primer on IP Economics

As far as economic analysis is concerned, there are two key features of intellectual property that make it worth distinguishing from other property: first, intellectual property is nonrivalrous; second, it is nonexcludable.[53] A good is rivalrous (or "rival") if, on the finest-grained level, it can only be enjoyed by only one person at time.[54] A good is excludable if others can be kept from enjoying it.[55] Regular, tangible property, such as a chattel or a plot of land, is rivalrous and excludable. A liter of potable water is an example. It is rivalrous because once I drink it, you cannot. And it is excludable because I can keep it to myself by pouring it into my canteen and tucking that into my backpack.[56]

Intellectual property, by contrast, is neither rivalrous nor excludable.[57] Intellectual property is nonrivalrous because there is no limit on the number

51. *See, e.g.*, Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1474–75, 1523–24 (1998) (arguing that neoclassically oriented law-and-economic prescriptions are undermined by failure to take into account limitations with regard to cognition, rationality, and willpower).

52. *See id.*

53. *See, e.g.*, Eric E. Johnson, *The Economics and Sociality of Sharing Intellectual Property Rights*, 94 B.U. L. REV. 1935, 1940–42 (2014) [hereinafter Johnson, *Intellectual Property Rights*] (discussing nonrivalrousness and nonexcludability in the context of intellectual property); David W. Barnes, *Congestible Intellectual Property and Impure Public Goods*, 9 NW. J. TECH. & INTELL. PROP. 533, 533 (2011) (discussing intellectual property as being both nonrivalrous and nonexcludable).

54. *See* Brett M. Frischmann, *Infrastructure Commons*, 2005 MICH. ST. L. REV. 121, 126 (2005) (explaining rivalrousness and nonrivalrousness).

55. *See* Tracey E. George & Chris Guthrie, *Induced Litigation*, 98 NW. U. L. REV. 545, 552–53 (2004) (explaining the concept of excludability).

56. *See* ROMER, *supra* note 7, at 117 ("A good is excludable if it is possible to prevent others from using it. Thus conventional private goods are excludable: the owner of a piece of clothing can prevent others from using it.").

57. Perhaps the most famous explication of these concepts is by Thomas Jefferson. Regarding nonexcludability, see Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), *in* 13 THE

of people that can use it at the same time. Everyone on Earth can simultaneously use any given technological invention—such as alternating current electricity or the wheel. Similarly, everyone on Earth could simultaneously perform the same copyrighted song. Intellectual property is nonexcludable because, short of violence or legal entitlements, there is nothing the originator of the intellectual work can do to stop others from using it or reproducing it. Once people have seen a wheel, there is nothing the inventor can do to stop them from making and using wheels themselves. Once a song has worked its way into the memories of other people, it is not within the songwriter's personal power to stop them from singing it.

This is where intellectual property rights come in. Where something is, by its nature, nonexcludable, intellectual property law imposes excludability through legal means.[58] This is the whole point of intellectual property rights—to exclude people from the use and enjoyment of various nonrivalrous intangibles. In other words, intellectual property law is a legal means of stopping people from wheeling around, singing songs, or doing other things that, by their very nature, do not interfere with anyone else's ability to do the same.

If stopping people from doing useful or enjoyable things were the sole economic effect of intellectual property law, then it would be a terrible thing from an economic perspective. After all, the more people who use an invention or play a song, the more potential economic worth is converted into real economic gain.

The rationale for intellectual property rights presents itself when you take an imaginary step backward in time. If inventors and authors anticipate that people will be allowed to freely copy and use their work, how will that affect their motivations to do that work? The traditional theory supporting intellectual property holds that if inventors and authors are not able to appropriate the returns from their intellectual works, then they will lack the adequate incentives to innovate and create—including the work involved in commercializing, publishing, marketing, and whatever else is required to

---

WRITINGS OF THOMAS JEFFERSON 326, 333 (Thomas Jefferson Memorial Ass'n ed., 1853) (1905) ("If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as long as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of every one, and the receiver cannot dispossess himself of it."). Regarding nonrivalrousness, see *id.* at 333–34 ("Its peculiar character, too, is that no one possesses the less, because every other possesses the whole of it. He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me."). *See also* Graham v. John Deere Co., 383 U.S. 1, 8–9 (1966) (quoting the same language from Jefferson and discussing this in the context of patent law).

58. This glosses over some nuance, of course. *See, e.g.*, ROMER, *supra* note 7, at 117 ("In some cases, excludability is more dependent on the nature of the knowledge and less dependent on the legal system. The recipe for Coca-Cola is sufficiently complex that it can be kept secret without copyright or patent protection.").

move the invention or creative expression out to the public where it can be consumed.[59] What is more, according to theory, combining the amount that consumers are willing to pay with the amount that authors and inventors are willing to accept for their labors—connected through price-based exchanges in a free market—allows the optimal amount of investment by authors and inventors into their creative and inventive activity.[60]

2. IP's Microeconomics-Centered Perspective

The above story about intellectual property rights is a microeconomic story. It is a rationale that, at least in its modern form, is built around allocative efficiency. William Landes and Richard Posner, in their book-length treatment of the law and economics of intellectual property, presented the microeconomic worldview of intellectual property theory to be a settled matter, saying, "Today it is acknowledged that analysis and evaluation of intellectual property law are appropriately conducted within an economics framework that seeks to align that law with the dictates of economic efficiency."[61]

Indeed, contemporary intellectual property scholarship lives and breathes microeconomics. The most popular theoretical approach to intellectual property theory is a utilitarian one in which the goal is maximizing net social welfare and the means is finding the optimal balance between the encouragement of intellectual production through exclusive rights and the enjoyment of intellectual works through freedom of use.[62] This is an efficiency approach. Proponents of patents and copyrights, for instance, identify the public goods problem as a market failure for innovation and knowledge production—a failure that revolves around the concepts of nonexcludability and nonrivalrousness, characteristics which

59. *See, e.g.*, Edmund W. Kitch, *Elementary and Persistent Errors in the Economic Analysis of Intellectual Property*, 53 VAND. L. REV. 1727, 1727 (2000) ("Absent intellectual property rights, copiers are free to take for themselves a significant part of the economic benefit generated by these types of investment and to undermine the incentive to make these investments in the first place.").

60. *See, e.g.*, *id.* at 1727–28 ("[T]he investment activities induced by intellectual property rights—developing a positive reputation with consumers, creating expressive works that consumers want to read, view, or hear, and developing improved technology—are efficient investments up to the point that consumers are willing to pay for their fruits."); *see also* Johnson, *Incentive Fallacy*, *supra* note 27, at 630–31 (working through the argument for this proposition).

61. *See, e.g.*, LANDES & POSNER, *supra* note 2, at 4 (citation omitted).

62. William Fisher, *Theories of Intellectual Property*, *in* NEW ESSAYS IN THE LEGAL AND POLITICAL THEORY OF PROPERTY 168, 169 (Stephen R. Munzer ed., 2001) ("Most of the recent theoretical writing consists of struggles among and within four approaches. The first and most popular of the four employs the familiar utilitarian guideline that lawmakers' beacon when shaping property rights should be the maximization of net social welfare.").

distinguish innovation and knowledge from physical goods.[63] Concentrating on the failure of supply and demand to guide price and output equates with a microeconomic mode of analysis.

Taking into account the wrinkles of nonexludability and nonrivalrousness, innovation is otherwise generally considered as a good to be produced and consumed, with positives and negatives to be considered from the ordinary microeconomic perspective.[64] For instance, William Nordhaus did his pioneering work in seeking to figure out the optimal duration of patents using microeconomic analytical tools—considering research and development (R&D) costs, the social value of inventions, demand elasticity, and the social welfare losses of too-long terms.[65]

Once the problem of the production of innovation is solved through the inducement of exclusive rights that allow supracompetitive profits, the question of how innovation should be allocated in the economy is considered to be answered by invoking markets. The claim is that markets created by copyright and patent entitlements will produce allocative efficiency for innovation and knowledge—meaning the market will route these things to those who value them the most.[66] A state of allocative efficiency represents the ideal ordering of economic production and consumption such that goods and labor are being put to their best, highest uses in terms of producing the most satisfaction possible.[67] And the opposite

63. *See* David W. Barnes, *A New Economics of Trademarks*, 5 NW. J. TECH. & INTELL. PROP. 22, 23 (2006) ("Public goods theory explains why unregulated markets fail to encourage sufficient creativity and disclosure of original works and novel, non-obvious innovations.").

64. *See, e.g.*, EINER ELHAUGE, UNITED STATES ANTITRUST LAW AND ECONOMICS 114 (3d ed. 2018) ("Decisions about whether to create intellectual property rights require a tradeoff between the right's positive effect on increasing incentives to innovate and its negative effect on decreasing competition in the efficient dissemination of new ideas.").

65. *See* WILLIAM D. NORDHAUS, INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE (1969); F. M. Scherer, *Nordhaus' Theory of Optimal Patent Life: A Geometric Reinterpretation*, 62 AM. ECON. REV. 422 (1972); Pankaj Tandon, *Optimal Patents with Compulsory Licensing*, 90 J. POL. ECON. 470 (1982); Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106 (1990); Paul Klemperer, *How Broad Should the Scope of Patent Protection Be?*, 21 RAND J. ECON. 113 (1990); Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1823 (1984).

66. *See, e.g.*, Lloyd L. Weinreb, *Copyright for Functional Expression*, 111 HARV. L. REV. 1149, 1237 (1998) ("The argument that copyright provides a necessary incentive to authors and publishers is a partial and crude application of the general argument that directing the rewards of productive activity to those who engage in it promotes the efficient allocation of resources . . . . [G]enerally, it is argued, from the perspective of allocative efficiency it is preferable that all the exchangeable value of an authorial work be the property of him who produces it, rather than a free good that anyone can appropriate at will. The market will then ensure that all the resources needed to produce such works . . . are used to the best effect . . . . [Notwithstanding copyright's fostering of rents and higher prices,] the owners of the copyrights will sell them to the highest bidder, whose bid will reflect the satisfaction thereby obtained.").

67. Richard Adelstein, *Equity and Efficiency in Markets for Ideas*, 17 CONN. J. INT'L L. 249, 249 (2002) ("As an economist's term of art, *allocative efficiency* means much the same thing: extracting the

of allocative efficiency—called "deadweight loss"[68]—is the thing to be avoided.

The microeconomic perspective dominates all sides of the discussion. Defenders of particular aspects of the intellectual property regime habitually use microeconomic analysis to make their case.[69] Criticisms of intellectual property law commonly involve arguments framed in the language of microeconomics, focused on microeconomic desiderata.[70] And proffered solutions or reforms are touted in terms of microeconomically flavored advantages.[71] Potentially detrimental aspects of law are criticized in microeconomic terms as well.[72]

---

greatest economic value possible from a fixed quantity of goods or resources. Efficiency in this sense is achieved when every good is in the possession of the person who derives the greatest economic value from it, so that the sum of these maximized values is itself as large as possible.").

68. The term "deadweight loss" is equivalent to "allocative inefficiency." That is to say, deadweight loss is a lack of allocative efficiency. *See, e.g.*, Louis Kaplow, *Direct Versus Communications-Based Prohibitions on Price Fixing*, 3 J. LEGAL ANALYSIS 449, 459 (2011) (using "allocative inefficiency" and "deadweight loss" equivalently). For a distinction in how the terms may be employed, while representing the same underlying concept, see William Hubbard, *The Debilitating Effect of Exclusive Rights: Patents and Productive Inefficiency*, 66 FLA. L. REV. 2045, 2053–54 (2014) (describing a situation where a monopolist constrains output to raise prices above what some consumers can afford, thus causing a welfare loss owing to the forgoing of some socially beneficial transactions) ("Economists refer to this loss as 'deadweight loss' and this situation as 'allocative inefficiency.'").

69. *See, e.g.*, Wendy J. Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the* Betamax *Case and Its Predecessors*, 82 COLUM. L. REV. 1600, 1608 (1982) (observing, in the context of describing the economically efficient nature of copyright fair use, the capacity of transaction costs to block socially beneficial uses of works where transaction costs are greater than the benefits to the transacting parties).

70. *See, e.g.*, Christopher Buccafusco & Christopher Jon Sprigman, *The Creativity Effect*, 78 U. CHI. L. REV. 31, 44 (2011) (describing an anomaly in creator's self-evaluation of the monetary value of their own works and positing that this has "significant implications for IP law and policy" because of its posing "substantial difficulties for the efficient allocation of resources"); Johnson, *Intellectual Property Rights*, *supra* note 53, at 1946 (criticizing contemporary copyright law for "overkill loss," a form of allocative inefficiency resulting from the automatic application of copyright to works created by persons unmotivated by copyright as an incentive); *see also* Christopher Sprigman, *Reform(aliz)ing Copyright*, 57 STAN. L. REV. 485, 503–14 (2004) [hereinafter Sprigman, *Reform(aliz)ing Copyright*] (presenting historical empirical evidence of fecund production and publication of creative works not incentivized by copyright).

71. *See, e.g.*, Kai Yi Xie, Comment, *Improving the Patent System by Encouraging Intentional Infringement: The Beneficial Use Standard of Patents*, 165 U. PA. L. REV. 1019, 1022–23 (2017) (proposing the encouragement of efficient patent infringement "where the benefits of infringement outweigh the costs of enforcement" in a manner "very much akin to encouraging efficient breaches of contracts" where "net gain in social utility from nonperformance is greater than if the contract was performed").

72. *See, e.g.*, Glynn S. Lunney, Jr., *The Death of Copyright: Digital Technology, Private Copying, and the Digital Millennium Copyright Act*, 87 VA. L. REV. 813, 821 (2001) (in critiquing the Digital Millennium Copyright Act, arguing that private copying likely "will not lead to a sub-optimal supply of creative works, but will only enable consumers to recapture a portion of the 'excess' incentive otherwise available for the most popular works"); Sprigman, *Reform(aliz)ing Copyright*, *supra* note 70, at 523–24 (discussing, as costs of copyright, deadweight loss from unrealized transactions caused by monopoly-profit-maximizing prices); Rebecca Tushnet, *Unfair Competition and Uncommon Sense*, 95 IOWA L. REV. BULL. 17, 21 (2009) (noting the lack of evidence or theoretical support for the idea that copyright term extension would encourage creative production) ("Nonetheless, Congress and the Supreme Court accepted the irrational incentive claims.").

Even when fundamental aspects of intellectual property are brought into question, microeconomic analysis continues to provide the criteria for evaluation. For instance, in scholarship questioning the usefulness of price signals and money-denominated market transactions—and upholding social sharing as an alternative—argument revolves around microeconomic concepts and principles of costs and efficiency.[73]

Another example is the notable line of scholarship that brings into question the most fundamental aspect of intellectual property law—exclusive rights—contemplating instead a government-run system of prizes or rewards. IP rights squelch competition so that innovators can use monopoly pricing to compensate their innovative activity. By contrast, prizes and rewards regimes give innovators equivalent monetary compensation, but the money is awarded by the government instead of extracted from consumers through monopoly pricing.[74]

Yet the prizes conversation has also taken place within the setting of microeconomics.[75] Proponents of prizes have framed their argument around the microeconomic concept of deadweight loss—that some consumers are unable to purchase goods at prices exceeding the cost of production because firms choose to price at monopoly levels to maximize profits.[76] Prizes are

73. *See, e.g.*, Yochai Benkler, *Coase's Penguin, or, Linux and* The Nature of the Firm, 112 YALE L.J. 369, 375–77 (2002) (explaining decentralized collaborative open-source software development as having particular efficiency advantages in terms of the avoidance of certain transaction costs incurred in firm-based or market-based models of software production collaboration); Jyh-An Lee, *New Perspectives on Public Goods Production: Policy Implications of Open Source Software*, 9 VAND. J. ENT. & TECH. L. 45, 69 (2006) (observing that open-source software, unlike proprietary software, can be priced at marginal cost, and noting that open-source software avoids the charging of economic rents by proprietary vendors based on consumer switching costs); Johnson, *Intellectual Property Rights*, *supra* note 53, at 1950–73 (suggesting that socially mediated sharing, rather than formal price-based market exchanges, is a more economically efficient means of allocating copyright licenses).

74. *See* Michael Abramowicz, *Prize and Reward Alternatives to Intellectual Property*, *in* 1 RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW 350, 351 (Ben Depoorter & Peter S. Menell eds., 2019) ("A prize or reward system is one in which the government gives an award to a person or entity that has produced an invention or work deemed socially valuable, based on an assessment of the contribution of that invention or work."). The terms "prizes" and "rewards" can be defined to be distinct mechanisms—for instance a "prize" going to the first entity or few entities with best or first solution to a problem, whereas the word "reward" can be used in connection with a broader scheme to award funds to many contributors based on their relative contributions. *See id.*

75. *See, e.g.*, Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115 (2003) (providing an in-depth analysis in microeconomic terms of prize systems for innovations).

76. *See id.* at 128 ("[T]he central problem that all proposals for patent prizes seek to attack [is] the inefficiency associated with the grant of a limited monopoly."); Steve P. Calandrillo, *An Economic Analysis of Property Rights in Information: Justifications and Problems of Exclusive Rights, Incentives to Generate Information, and the Alternative of a Government-Run Reward System*, 9 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 301, 327–28 (1998) (discussing arguments about deadweight loss from pricing pharmaceuticals and software above the marginal cost of production) ("[C]urrent intellectual property rights are subject to the serious criticism that they inevitably lead to less than socially optimal use of the information and products they protect."); Robert C. Guell & Marvin Fischbaum, *Toward Allocative Efficiency in the Prescription Drug Industry*, 73 MILBANK Q. 213 (1995).

also offered as an antidote where intellectual property entitlements cause wasteful, duplicative research.[77] The arguments against prizes are also microeconomic in nature. Prize critics argue that patents are better than prizes because the "market for inventions allocates inventions much more efficiently than would government diffusion of innovations."[78] And opponents of prizes argue that patents may be better positioned to avoid waste caused by duplicative research.[79]

D. The Macroeconomic Focus on Growth

In this section, I introduce the macroeconomic perspective. First, I explain what economic growth is and why it is understood to be desirable. Then, I explain the special importance of innovation for economic growth, an insight associated with the Solow model.

1. Growth as the Desideratum in Macroeconomics

While microeconomics is concerned with the incentives and decisions of individual players in the economy and how they interact in particular markets, macroeconomics embraces views that are society-wide and history-long, exploring how patterns of wealth and value vary among nations and change over generations. The core concern of macroeconomics is economic growth.[80] In addition, the field also includes topics such as inflation, unemployment, and fiscal policy.[81] Indeed, such non-growth

77. *See* Abramowicz, *supra* note 75, at 188–90 (reviewing ways in which a prize system could provide economically more efficient results than a patent system, noting in particular a prize system's potential to "allow for shared rewards in contexts in which shared rewards are more efficient than the alternative"); Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 361 (2013) (agreeing with Abramowicz) ("[P]atents can be outperformed on this ground by well-designed prizes, such as by setting the reward such that the efficient number of teams works on the problem and conditioning the prize on disclosure and cooperation.").

78. Daniel F. Spulber, *Public Prizes Versus Market Prices: Should Contests Replace Patents?*, 97 J. PAT. & TRADEMARK OFF. SOC'Y 690, 690 (2015).

79. *See, e.g.*, Robert P. Greenspoon & Catherine M. Cottle, *Don't Assume a Can Opener: Confronting Patent Economic Theories with Licensing and Enforcement Reality*, 12 COLUM. SCI. & TECH. L. REV. 194, 209 (2011) (reviewing arguments that patents offer advantages over prizes in avoiding duplicative, socially wasteful research).

80. *See, e.g.*, DARON ACEMOGLU, INTRODUCTION TO MODERN ECONOMIC GROWTH xv (2009) ("While there is disagreement among macroeconomists about how to approach short-run macroeconomic phenomena and what the boundaries of macroeconomics should be, there is broad agreement about the workhorse models of dynamic macroeconomic analysis . . . . all models of economic growth . . . ."); *cf.* TYLER COWEN & ALEX TABARROK, MODERN PRINCIPLES: MACROECONOMICS 109 (2d ed. 2013) ("The primary topics of macroeconomics are economic growth and business fluctuations.").

81. *See* ROBERT L. HEILBRONER & LESTER C. THUROW, ECONOMICS EXPLAINED 71, 123–28 (updated ed. 1987).

subjects tend to be a focus of beginning coursework in macroeconomics.[82] But advanced treatments of macroeconomics put growth at the center of the field because it is an area of broad consensus and because of the acknowledgement that growth is, over the long-term, far more important to the human condition than other objects of macroeconomic study.[83] The importance of economic growth is at least in part due to the fact that if there is sufficient growth, then other macroeconomic problems such as unemployment and inflation lose their sting.[84] The macroeconomists' emphasis on growth is summed up in an often-repeated quote by Robert Lucas: "Once one starts to think about [economic growth], it is hard to think about anything else."[85]

In terms of a formal definition, growth means an increase in economic output per person.[86] A more useful understanding, however, is that economic growth is an increase in average wealth and income. And for economists, wealth is good, and wealthier is better. The desirability of societal wealth is so fundamental to economists' view of the world that they seldom explain why societal wealth is a good thing. But if pressed, an economist would probably say something like "Wealthier economies lead to richer and more fulfilled human lives."[87] Empirically, economic growth is associated with other indicia of well-being, including life expectancy, infant mortality, and literacy.[88]

---

82. *See, e.g.*, JASON WELKER, AP MACROECONOMICS CRASH COURSE iii–v, 4 (2017) (giving relatively greater attention to non-growth subjects, including inflation, unemployment, and the money supply; and indicating that the subject of economic growth and productivity accounts for 5 to 10% of questions on the Advanced Placement exam for undergraduate college credit).

83. *See, e.g.*, ACEMOGLU, *supra* note 80, at xv (observing broad agreement about growth models being the workhorses of macroeconomics).

84. *See, e.g.*, *id.* (devoting the first four chapters of an advanced macroeconomics textbook to growth); *see also* ROMER, *supra* note 7, at 8 ("[T]he welfare consequences of long-run growth swamp any possible effects of the short-term fluctuations that macroeconomics traditionally focuses on.").

85. Robert E. Lucas, Jr., *On the Mechanics of Economic Development*, 22 J. MONETARY ECON. 3, 5 (1988); *see also* GREGORY MANKIW, PRINCIPLES OF MACROECONOMICS 236 (6th ed. 2012) [hereinafter MANKIW, MACRO] (quoting the same); Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.1 (quoting the same).

86. *See, e.g.*, OLIVIER DE LA GRANDVILLE, ECONOMIC GROWTH: A UNIFIED APPROACH 155 (2d ed. 2016) ("economic growth, defined as a steady increase in real income per person"); OBIOMA M. IHEDURU, THE POLITICS OF ECONOMIC RESTRUCTURING AND DEMOCRACY IN AFRICA 15–16 (1999) (citing various sources defining economic growth as an increase in real economic output per capita or across a nation's population); *id.* at 16 ("[E]conomic growth deals with sustained economic increments in the total income or in the per capita income.").

87. COWEN & TABARROK, *supra* note 80, at 7.

88. *See* ROMER, *supra* note 7, at 8 ("The implications of the vast differences of standard of living over time and across countries for human welfare are enormous. The differences are associated with large differences in nutrition, literacy, infant mortality, life expectancy, and other direct measures of well-being.").

Economic growth is commonly measured by changes in gross domestic product (GDP) over time.[89] GDP is widely understood to be a limited and incomplete quantification of economic productivity.[90] The real object of interest for economists is increased wealth of a population—in other words, a population's standard of living. But GDP is used as a proxy because it is seen as an estimate of the overall standard of living.[91] Thus, an increase in GDP implies a raised standard of living.

There is a thought experiment that provides a clever way of sharpening the point about the importance of economic growth. Ask yourself this question: Would you want the wealth of John D. Rockefeller—who is habitually cited as the richest American of all time[92]—if it meant that you would have to forgo all the technological innovations that have come along since Rockefeller's heyday in the late 1800s and early 1900s?[93] If you chose Rockefeller's wealth, you would be able to afford the finest real estate in the world.[94] And you could have an army of servants. But you would not be able to have computers, internet, or air conditioning, and you would not be able to travel in modern airplanes and cars. You would also have to forgo modern entertainment—including recorded music, movies, television, and video games. Perhaps most concerning, you would also have to forgo modern medical care, including antibiotics. Consider that in Rockefeller's time, President Calvin Coolidge's son died of a staph infection that started from his getting a blister while playing tennis on the White House lawn.[95] If this thought experiment leads you to conclude you would rather not

89. *See* COWEN & TABARROK, *supra* note 80, at 109.

90. *See id.* at 105–09 (noting that GDP does not capture black or "underground" markets, nonpriced production (such as childrearing and other household labor), leisure time, harm to the environment, and income inequality); *see also* ROBERT J. GORDON, THE RISE AND FALL OF AMERICAN GROWTH: THE U.S. STANDARD OF LIVING SINCE THE CIVIL WAR 9 (2016) (stating that GDP understates improvements in standard of living because GDP, by design, excludes nonmarket activities and because of inflation adjustments).

91. *See* COWEN & TABARROK, *supra* note 80, at 109 ("GDP per capita is a rough estimate of the standard of living in a nation. . . . Growth in real GDP per capita tells us roughly how the average person's standard of living is changing over time.").

92. *See, e.g.*, Christine Gibson, *The American Heritage: A Ranking of the Forty Wealthiest Americans of All Time (Surprise: Only Three of Them Are Alive Today)*, AM. HERITAGE (Oct. 1998), http://www.americanheritage.com/content/american-heritage [https://perma.cc/K4YY-9QZV].

93. It is not clear whom to credit with this clever way of thinking about economic growth. At least two economists offer it up, neither citing the other. *See* Donald J. Boudreaux, *The Average American Today Is Richer than John D. Rockefeller*, FOUND. FOR ECON. EDUC. STORIES (Feb. 23, 2016), https://fee.org/articles/average-americans-today-are-richer-than-john-rockefeller-ever-was/ [https://perma.cc/QGA6-MAWZ]; MANKIW, MACRO, *supra* note 85, at 240.

94. *See* MANKIW, MACRO, *supra* note 85, at 240.

95. *See* Boudreaux, *supra* note 93; *see also* Jared Rhoads, *The Medical Context of Calvin Jr.'s Untimely Death*, CALVIN COOLIDGE PRESIDENTIAL FOUND.: COOLIDGE BLOG (July 7, 2014), https://coolidgefoundation.org/blog/the-medical-context-of-calvin-jr-s-untimely-death/ [https://perma.cc/N63N-Q775] (discussing the infection and death).

switch economic situations with Rockefeller, then you are—in a playful yet meaningful sense[96]—richer than the richest American who has ever lived.[97]

2. The Solow Model and the Importance of Innovation

The traditional starting point for thinking about economic growth in a rigorous way is the Solow model, which is the namesake of Nobel laureate economist Robert Solow.[98] The Solow model understands growth as a function of three things: (1) physical capital, (2) labor, and (3) "knowledge" or the "effectiveness of labor."[99] The Solow model recognizes, straightforwardly, that a society can grow by investing in and accumulating capital. Crucially, however, increasing investments in capital will not keep economic growth on an upward trajectory forever. The reasons for this limit are that, first, there are diminishing returns to capital investment, and, second, capital depreciates over time.[100]

A simple example of a hypothetical farm is helpful in illustrating the limits of capital investment under the Solow model.[101] The farm in this example is fitted out with a progressively greater quantity of equipment. To begin with, imagine first that the farm has no capital equipment at all. From that starting point, adding a plow will dramatically increase the productivity of the farm. And if all farms do the same, this increased productivity constitutes substantial economic growth. Adding a tractor will result in another huge gain in productivity and a corresponding big jump in economic growth. But with each additional unit of capital, the corresponding gain in productivity is less and less.[102] A second tractor for each farm provides a smaller productivity gain than the first tractor, and so on. At least in part,

96. It is "playful" because the argument, taken literally, requires switching definitions of "rich" in the midst of the argument: obviously, if you are richer than Rockefeller, then so are your contemporaries who have more money than you, making the richest of them the true richest, and making you (unless you are that one person) not richer. The point about the power of economic growth to raise standards of living widely across society, however, is well-taken.

97. *See* MANKIW, MACRO, *supra* note 85, at 240 ("Because of tremendous technological advances, the average American today is arguably 'richer' than the richest American a century ago . . . ."); Boudreaux, *supra* note 93 ("[A]t least given my preferences, I am today materially richer than was John D. Rockefeller in 1916. And if, as I think is true, my preferences here are not unusual, then nearly every middle-class American today is richer than was America's richest man a mere 100 years ago.").

98. *See* ROMER, *supra* note 7, at 8 ("The Solow model is the starting point for almost all analyses of growth. Even models that depart fundamentally from Solow's are often best understood through comparison with the Solow model.").

99. *See id.* at 10.

100. *See, e.g.*, COWEN & TABARROK, *supra* note 80, at 146–48.

101. *See, e.g.*, *id.*, at 143 (explaining growth through capital accumulation with the example of a farm that acquired tractors).

102. *See* SOLOW, *supra* note 29, at 17 ("[M]ore efficient plant and equipment will be drawn into production first, less efficient capacity will be drawn into production later.").

this effect is a function of the general law of diminishing returns.[103] By the time a farm adds a fourth tractor—this one with satellite navigation and a turbocharger for the engine—the marginal productivity gain will be very modest. Meanwhile, capital does not last forever. It depreciates and has to be replaced.[104] Even the best tractor may have to be replaced after many years have gone by. Thus, in Solow's model, a society starting at a low level can grow quickly through capital accumulation, but the rate of growth through capital accumulation gets slower and slower through the law of diminishing returns.[105] Eventually, economic growth will slow down and stop at the point where investment in capital equals the depreciation of capital.[106] Further capital investment at that point only serves to keep society as productive as it has been. In other words, the economy reaches a point where additional capital investment does not allow the economy to grow. For instance, in a country like the United States, infrastructure investment today is generally not concerned with introducing electricity, clean water, or roadways to towns that have been doing without. Instead, conversations about the need for American infrastructure spending are mostly about replacing worn-out infrastructure.[107]

The Solow model, in predicting a plateauing for economic growth, seems to have a disconsolate conclusion. But happily, mature economies in the real world continue to grow—including, for instance, the economy of the United States. Thus, a vital lesson one gets from examining Solow's model is that growth in the real world cannot be explained solely by capital accumulation.[108]

The key to moving beyond capital accumulation to further realms of growth is the third variable: "effectiveness of labor," alternatively called "knowledge." The idea is that sustained economic growth requires new ideas and insights that will allow greater economic production to result from

103. *See id.* ("The curve is likely to be concave: equal successive increments of employment will generate successively smaller increments to output. If capital were truly homogeneous, the curvature would have to be attributed to diminishing returns.").

104. *See* COWEN & TABARROK, *supra* note 80, at 145.

105. *See* MANKIW, MACRO, *supra* note 85, at 245–46; COWEN & TABARROK, *supra* note 80, at 143.

106. *See* COWEN & TABARROK, *supra* note 80, at 146–47.

107. *See, e.g.*, Sarah Schindler, *Architectural Exclusion: Discrimination and Segregation Through Physical Design of the Built Environment*, 124 YALE L.J. 1934, 2018 (2015) (discussing the need to repair and rebuild aging infrastructure in the United States).

108. *See* ROMER, *supra* note 7, at 8; COWEN & TABARROK, *supra* note 80, at 148; SOLOW, *supra* note 29, at 37 ("In this steady state, the stock of capital is growing faster than employment in natural units; the excess rate of growth is equal to the rate of labour-augmenting technological progress. Since the capital/output ratio is constant, output per man is also growing at the rate of technological progress. The main defect in the picture of the steady state has been repaired.").

the same inputs of capital and labor.[109] This explains why "effectiveness of labor" equates to "knowledge." As Solow argued, "[c]ontinuous innovation" can stave off the effects of diminishing returns from capital investment.[110] In equations and graphs, the "effectiveness of labor" or "knowledge" variable is commonly denoted "*A*." Economists variously translate *A* as "ideas that increase productivity,"[111] "technology,"[112] "technological knowledge,"[113] and "technological progress."[114] Solow himself favored "technological progress" as a phrase.[115]

Here, it becomes clear why macroeconomic analysis has so much relevance to intellectual property law. Innovation allows an economy to continue to grow notwithstanding the bounds imposed by capital depreciation and capital investment's diminishing returns. Thus, technological innovation is not merely important to modern economic growth, it is necessary. It is not too picturesque to say that innovation presents itself as a magic bullet that allows continuing economic growth beyond the finite gains in growth that come from accumulating physical capital and putting everyone to work. And society's most intentional legal mechanism for incentivizing technological progress is intellectual property law.[116]

Considering all this, it is clear that macroeconomics has transcendent importance for intellectual property law. It is clear also that the reverse is true: intellectual property law has great significance for macroeconomics.

II. EXPANDED ECONOMIC FRAMINGS IN IP

This part explores ways in which the intellectual property literature has gone beyond the most traditional, narrow microeconomic perspectives—moving, to some extent, in the direction of a macroeconomic perspective, even if not yet embracing macroeconomics as such. Section A generally surveys engagement with these threads in intellectual property scholarship. Section B takes a particular look at work by Robert Cooter, Benjamin Chen,

109. COWEN & TABARROK, *supra* note 80, at 148 ("Better ideas let us produce more output from the same inputs of physical and human capital.").

110. *See* SOLOW, *supra* note 29, at 33, 37 ("Continuous innovation could stave off the effects of diminishing returns, which otherwise bring any such process [of rising productivity] to a halt."). Note that Solow also identified increasing economies of scale as a possible reason, outside of technological progress, that growth could continue, but he reckoned technological progress to be the more important effect in real economies. *Id.* at 34.

111. COWEN & TABARROK, *supra* note 80, at 149.

112. ACEMOGLU, *supra* note 80, at 28.

113. COWEN & TABARROK, *supra* note 80, at 149.

114. ROBERT M. SOLOW, GROWTH THEORY: AN EXPOSITION 30–33 (2d ed. 2000).

115. *Id.*

116. *See, e.g.*, Johnson, *Calibrating*, *supra* note 13, at 270.

Aaron Edlin, Uri Hacohen, and Hans-Bernd Schäfer, whose scholarship is part of a bold attempt to use macroeconomic-type concepts to challenge conventional IP theory. Section C offers a criticism of their argument, mapping out important shortfalls. That critical view will help point the way toward a more defensible view of macroeconomics and IP, which I subsequently develop in Part III.

A. Innovation Dynamics, Longer Timeframes, Macroeconomic Subjects

The difference between microeconomic and macroeconomic perspectives can be thought of as opposite settings on a zoom lens. Microeconomics is zoomed-in, engaging in a close-up view of economic transactions. Macroeconomics is zoomed-out, using the widest angle on the economy. In addition, microeconomics tends to be concerned with shorter timescales, while macroeconomics tends to set the shutter to a longer exposure. There is no crisp line delineating micro from macro. So, while the IP literature has not zoomed out far enough to adopt what is fairly categorized as a macroeconomic perspective as such, there has been important work with regard to economic thought on IP that derives insights by expanding out from the narrowest of focuses and the shortest of timescales.

One indication of a broadening perspective is an increasing concern with economic dynamics—meaning the way in which economic positions, incentives, and relationships change over some period of time. A number of different IP scholars have focused attention on dynamic effects with regard to intellectual property. For instance, Amy Kapczynski has distinguished between static and dynamic inefficiencies in patents in the context of medical research.[117] Mark A. Lemley has suggested that dynamic effects matter to damages calculations in patent cases.[118] And Brett M. Frischmann and Lemley have observed that a large portion of the utilization of IP by IP consumers constitutes "productive" as opposed to "passive" uses—meaning that these are uses that go toward creating a next-generation innovation.[119]

---

117. Amy Kapczynski, *Commentary: Innovation Policy for a New Era*, 37 J. L., MED. & ETHICS 264, 264 (2009) ("For the sake of simplicity, here you can think of static inefficiencies as those that affect patients, and dynamic inefficiencies as those that affect researchers . . . . Patents . . . raise the costs of inputs to R&D (if those inputs are themselves patented), thus creating potential inefficiencies in research." (footnote omitted)).

118. Lemley, *supra* note 22, at 113–14 ("[D]efendants in patent suits are rarely passive consumers. Empirical evidence suggests that they are themselves innovators in the vast majority of cases. So we need to worry not only about making sure the patentee gets paid the socially optimal amount of damages, but also that infringers are not paying a superoptimal penalty that could discourage their own innovation." (footnotes omitted)).

119. Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 273 (2007) ("[M]any, if not most, of the uses made by 'buyers' of IP are productive rather than passive uses . . . .").

As Frischmann and Lemley note, this complicates the picture of the extent to which IP transactions, though beneficial to the transacting parties, are beneficial to society as a whole.[120] And in discussing price discrimination behavior by IP holders, Michael J. Meurer has noted copyright's dynamic-efficiency/allocative-efficiency tradeoff and has offered the prescription that the scope and duration of the copyright entitlement can be adjusted in seeking an optimal balance between incentivizing creation of works and fostering beneficial use of those works in terms of access and cumulative creation/innovation.[121] William Fisher, in agreeing with Meurer, has observed that the positive dynamic effects can swamp the negative allocative effects of IP price discrimination.[122]

Aside from a noticeable embrace of the dynamic perspective, there has also been some attention in IP scholarship to longer timeframes. Yet ironically, some of the most future-concerned scholarship about intellectual property takes a view that might be categorized as startlingly dismissive of the future. Richard Gilbert and Carl Shapiro, for instance, have argued that when it comes to innovation incentives from patents, longer duration offsets narrowed scope, and increases in scope are more harmful to social welfare than an offsetting increase in duration.[123] On this basis, they conclude that the optimal duration of a patent could be infinite, as that could allow the narrowest possible scope of patent rights.[124] While Gilbert and Shapiro's analysis includes the longest of timeframes, however, it is not a good example of a macroeconomic perspective, as it ultimately seems to give long-term considerations short shrift. That is, their view arguably indicates a readiness to sacrifice the long-term future for the present. Of course, as a real-world matter, simple net present value calculations suffice to show that the present incentive effect of adding future years to an already long patent term are tiny. And, for separate reasons, as I showed in a prior paper, elementary considerations of theoretical behavioral ecology allow one to conclude that an infinite duration of patent rights provides zero added

120. *Id.* ("While we can comfortably ignore pecuniary externalities when the buyer is a passive consumer, we cannot do the same with productive uses.").

121. Michael J. Meurer, *Copyright Law and Price Discrimination*, 23 CARDOZO L. REV. 55, 98 (2001) ("Economists have long understood that an optimal copyright policy balances the dynamic efficiency concerns relating to the incentive to supply works with the allocative efficiency concerns relating to access." (footnote omitted)).

122. Fisher, *supra* note 26, at 25 ("If the lure of such enhanced profits attracts a sufficiently large number of potential innovators, the social surplus associated with their innovations may be larger than the welfare losses caused by permitting sellers to engage in this behavior.").

123. *See* Gilbert & Shapiro, *supra* note 65; *see also* Partnoy, *supra* note 13, at 20, 25 (suggesting that infinite patent duration may be optimal if interest rates are high).

124. *See* Gilbert & Shapiro, *supra* note 65, at 106.

incentive over rights lasting approximately 100 to 200 years at the outside.[125]

A traditional subject of macroeconomic attention is central-bank interest rates. And there has been some thought given to interest rates and intellectual property. Frank Partnoy has worked on the integration of interest rates into models for optimal duration of patent rights.[126] He has suggested that as interest rates decrease so does the optimal duration of patent rights—and vice-versa for interest rates that drift higher.[127] I have previously proposed varying patent terms dynamically in response to changing macroeconomic variables—because, for instance, in a stagnating economy, the same amount of R&D investment earns lower returns, while in an expanding economy, the reverse is true.[128] And as I pointed out, interest rates are one such concern, but so are inflation, depressed spending, excessive borrowing, and other macroeconomic undesirables that central banks seek to affect with interest rate changes.[129] And thinking more generally about the macroeconomic context for patents, I have suggested an "ongoing calibration of the patent system so that rewards from R&D would be insulated from cyclical downturns and reined-in during a period of heated economic expansion."[130]

To sum up, many IP scholars have found dynamic effects crucially important. And some scholars writing on IP have engaged with various things of macroeconomic interest—including interest rates. These explorations add important and useful nuance to narrow microeconomic approaches. There is, however, a lack of a full-fledged embrace of a macroeconomic perspective or an emphasis on economic growth to such an extent that it pushes concerns about allocative inefficiency to the periphery.[131] Indeed, in keeping with the overriding dominance of the microeconomic perspective, IP scholarship frequently endorses the view that intellectual property entitlements ought to be provided to the extent of

125. Johnson, *Calibrating*, *supra* note 13, at 298–99 n.100, 310–14.

126. *See* Partnoy, *supra* note 13.

127. *Id.* at 18. Partnoy reasons that as interest rates go up, longer terms of patent rights are required to keep incentives the same. His models indicated that a 1% change in interest rates roughly corresponds to a change of one year in optimal patent duration. *Id.* at 5.

128. Johnson, *Calibrating*, *supra* note 13, at 287–88, 295–96, 307–09.

129. *Id.* at 295 n.89.

130. *Id.* at 295.

131. This appears not only to be true of IP scholarship, but of legal scholarship more generally. For instance, the lacuna of macroeconomic thinking in the law-and-economic movement was noticed by a student note that looked at the corporate law question of director liability. Jeremiah C. Humes observed that "economic considerations of growth and stability have been a significant part of lawmaking since the turn of the century. Yet, while those economic considerations existed, they have been almost completely excluded from what is termed 'law and economics.'" Jeremiah C. Humes, Note, *Macroeconomic Analysis of the Law: The Missing Piece of the Law and Economics Puzzle*, 42 WASHBURN L.J. 957, 958 (2004) (footnotes omitted).

what is necessary to induce the innovation, and no more.[132] Standing apart from the crowd, however, is the work of a group of legal scholars who see economic growth theory as a way to revolutionize and simplify analysis of intellectual property law. I turn to their work next.

B. Overtaking/Fertility/Separation Theory

Multiple legal scholars have engaged in a very substantial, focused effort to explore the intersection of intellectual property and macroeconomics through an interlocking set of ideas labeled "overtaking," "fertility," and "separation." These ideas, taken together (which I'll refer to as "Overtaking/Fertility/Separation Theory") have been advocated in part or in whole by Benjamin Chen, Robert Cooter, Aaron Edlin, Uri Hacohen, and Hans-Bernd Schäfer (whom I'll call the "Overtaking Theorists").[133] The leading voice with regard to this school of thought is Robert Cooter, who is one of the founders of the law-and-economics movement.[134] In this Section B, I explain the concepts of overtaking, fertility, and separation, and I explain the argument that these concepts provide specific prescriptions for IP law, including how to set IP rights' duration, scope, and available remedies. The basic idea, elucidated below, is to give strong rights against consuming/producing uses of innovation and weak or no rights against uses of innovation that beget further innovation.[135] Subsequently, in Section C, I offer a critique.

In addition to standing apart for its depth, scope, and boldness in specific regard to intellectual property law and policy, the body of work of the Overtaking Theorists makes a genuine contribution in articulating macroeconomic ideas as a challenge to the traditional law-and-economics

---

132. *See, e.g.*, Aaron K. Perzanowski, *Rethinking Anticircumvention's Interoperability Policy*, 42 U.C. DAVIS L. REV. 1549, 1559–60 (2009) ("An optimal IP system offers incentives sufficient to induce innovative activity, but no more."); William W. Fisher III, *Property and Contract on the Internet*, 73 CHI.-KENT L. REV. 1203, 1249 (1998) ("[O]ur aspiration, when designing or reforming the intellectual property system, is to increase the set of entitlements enjoyed by creators only up to the point past which the social losses caused by empowering creators to limit access to their works would exceed the social gains caused by increasing their collective output of works.").

133. Key works are Cooter & Hacohen, *supra* note 15; Chen & Cooter, *supra* note 14; COOTER & SCHÄFER, *supra* note 15; COOTER WITH EDLIN, *supra* note 5; Cooter, *Freedom*, *supra* note 15.

134. *See supra* notes 16–17 and accompanying text.

135. The basic idea is to give strong rights against consuming/producing uses of innovation and weak or no rights against uses of innovation that beget further innovation. Robert Cooter, *Separation and Fertility in Intellectual Property Law*, *in* COOTER WITH EDLIN, *supra* note 5, at 6.7–6.8 [hereinafter Cooter, *Intellectual Property*] ("To maximize progress in the useful arts, intellectual property law should apply the separation and fertility principles . . . . [G]iving innovators strong rights—broad, long, and with a generous remedy for infringement—against others consuming the innovation or producing with it . . . . [But] weak rights or no rights against others using the innovation to make subsequent innovations.").

approach that focuses on allocative efficiency as the overall goal.[136] Despite the success and influence Cooter has enjoyed as a pioneer and leader of the microeconomically focused classic law-and-economics movement, he paints his recent work on economic growth to be more important than, and in at least substantial part repudiatory of, his past views upholding the importance of seeking efficiency. He now sees economic growth as far more important than efficiency and compares his revelation in this regard as being like a Catholic priest who suddenly decides that the pope is mistaken and Buddha is correct.[137] Cooter means this not just with regard to intellectual property but for economic analysis of law across the board.[138]

Curiously, the Overtaking Theorists are not keen on using the word "macroeconomic" to describe their approach—Cooter and Edlin, for example, do not use the word at all.[139] But, as Bruno Meyerhof Salama has pointed out, "There is no question that Cooter and Edlin's law and growth economics is, in fact, law and macroeconomics."[140]

1. The Growth-Welfare Link

The argument for Overtaking/Fertility/Separation Theory begins by embracing wealth maximization as a good thing—a stance which, as discussed above,[141] is an underpinning of traditional law-and-economics analysis, even if often unstated. With the aim of wealth maximization in mind, Cooter and Edlin uphold economic growth as being of transcendent importance, because, they reason, all sources of societal wealth are insignificant next to sustained growth.[142] To support their view, Cooter and

136. *See, e.g.*, Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.17 ("The overtaking principle supplies the normative justification for prioritizing growth economics over static economics. It challenges conventional law and economics that treats static efficiency as a fundamental goal of law and policy.").

137. *See* COOTER WITH EDLIN, *supra* note 5, at ix; Cooter, *Freedom*, *supra* note 15, at 13.

138. *See* Cooter, *Freedom*, *supra* note 15, at 13 ("Now I am trying to rethink the principles of law and economics in light of the problem of growth."); Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.17 (similar).

139. The words "macroeconomic" or "macroeconomics" are not used in COOTER WITH EDLIN, *supra* note 5. This is notwithstanding the fact that their work is focused on economic growth, which is at the core of macroeconomics. *See supra* note 80 and accompanying text. The words are not used in Cooter & Hacohen, *supra* note 15, or Chen & Cooter, *supra* note 14, either. Notably, Cooter and Edlin do use the word "microeconomics" in discussing particular concepts. Robert Cooter & Aaron Edlin, *Separation*, in COOTER WITH EDLIN, *supra* note 5, at 4.4 [hereinafter, Cooter & Edlin, *Separation*]; Robert Cooter & Aaron Edlin, *Fertility*, in COOTER WITH EDLIN, *supra* note 5, at 5.1 [hereinafter, Cooter & Edlin, *Fertility*].

140. Salama, *supra* note 17, at 186.

141. *See* Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.11–1.12; Cooter & Hacohen, *supra* note 15, at 196.

142. Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.1 ("Compared to sustained growth, other sources of national wealth are insignificant.").

the Overtaking Theorists rely on the idea of compounding growth rates and exponential increases.[143]

Although the concept of exponential rates of increase will be familiar to many readers, the concept is so crucial to Overtaking/Fertility/Separation Theory that it is worth borrowing an example from their writings.[144] Suppose Society X and Society Y both start out with an economy the same size, but Society X has a lower growth rate than Society Y. Let's say that in both economies the average per-person income is $10,000, but in Society X the growth rate is a consistent 5%, while in Society Y the growth rate is a consistent 10%. What will per-person average income be after 25 years and 50 years? Society X, after 25 years, will have per-person income of $33,900; after 50 years, it will be $114,700. Society Y, after 25 years, will have per-person income of $108,300; after 50 years, it will be $137.8 million.

Three lessons are on offer. The first lesson is that steady growth is powerful. Looking just at Society X (ignoring Society Y for a moment), when you compare 25 years later to 50 years later, you can see that after twice as much time has gone by, the average per-person income is not merely twice as high. Instead, because of compounding effects, it is more than three times as large.[145]

The second lesson is that more growth is even more powerful, and the effects of this difference over time—again assuming a steady growth rate—become gargantuan. This is illustrated by comparing Society X to Society Y. Society Y, with its twice-as-high growth rate (10% instead of 5%), will not merely end up with per-person income that is merely twice as large as Society X. Instead, Society Y's level of income will be three times larger than Society X after 25 years and 1,200 times larger after 50 years.

The third lesson is that slowing or delaying economic growth can be seen as tragic. This is illustrated by considering Society X and Society Y not to be two separate countries, but two alternative futures for the same country. Doing this suggests that anything that delays the onset of economic growth or decreases the rate of economic growth is devastating from a what-might-have-been perspective. It is a familiar admonition from personal finance gurus that you should not delay saving for retirement and that you should not put your savings into low-growth investments. The same thing, one

143. Cooter & Hacohen, *supra* note 15, at 207–09 (speaking of growth as compounding in nature and using compound growth as the basis for their overtaking principle); Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.1–1.3; Chen & Cooter, *supra* note 14, at 67 (referring to compounded growth in arguing the instrumental, economic value of creativity).

144. I take the example that follows—with the numbers translated to some extent—from Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.1 n.2. Chen and Cooter use similar examples. *See* Chen & Cooter, *supra* note 14, at 67–68.

145. Country comparisons of this sort are also made by Chen & Cooter, *supra* note 14, at 67.

could say, applies on a society-wide basis: when it comes to compound growth, an opportunity forgone can never be made up.

The power of steady, compounding growth leads Chen, Cooter, Edlin, and Schäfer to what they call the "overtaking theorem" or "overtaking principle," which is that if there is sufficiently rapid exponential growth, then various economic desiderata—static efficiency, equal distribution of wealth, etc.—are rendered unimportant.[146] What is more, the argument goes, it does not matter whether economic well-being is measured by income, consumption, or something else.[147]

This leads to a bold normative claim: that the pursuit of economic growth is so important, it can justify ignoring other policy concerns, including economic loss from monopoly pricing that leaves some consumers priced-out.[148] In other words, the claim is that growth can justify ignoring inefficiency. For instance, Chen and Cooter write, "Creativity is so valuable instrumentally that, after growth is sustained at, say, 2 percent or more, nothing else matters much for wealth and welfare. Growth from innovation overtakes the effects of other policy values like efficiency and redistribution."[149]

Suppose a given policy causes great disparities in well-being among people in a society, and further suppose this causes a large amount of waste by putting goods and services to less than optimal uses by channeling them to people who value them less. Yet suppose this policy nonetheless enables rapid exponential growth. The overtaking principle says the policy is a good one, even though it has allocated resources inefficiently. As Cooter puts it colorfully: "[C]ompound growth . . . swamps static inefficiency like a tsunami swamps a scow."[150]

The most eye-catching claim Cooter, Chen, Edlin, Hacohen, and Schäfer make based on the overtaking principle is that it is a justification for not

146. *See* Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.4–1.5 ("For all economic measures, exponential growth overtakes static effects. The *overtaking principle* in economics is my name for the proposition that rapid exponential economic growth quickly overtakes the direct effects of static efficiency and redistribution on wealth and welfare. Given fast growth, static efficiency and income redistribution effects are important for their contribution to growth, and unimportant in themselves."); Chen & Cooter, *supra* note 14, at 68 ("The overtaking principle refers to the proposition that rapid exponential economic growth quickly overtakes the direct effects of static efficiency and redistribution on wealth and welfare."); COOTER & SCHÄFER, *supra* note 15, at 51–54.

147. Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.4 ("The vertical axis in Figure 1.2 is unlabeled because the measure of growth—total or per capita wealth, income, consumption, utility, or welfare—matters little to our conclusions.").

148. Cooter & Hacohen, *supra* note 15, at 196, 213; Chen & Cooter, *supra* note 14, at 69; Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.17 ("The overtaking principle supplies the normative justification for prioritizing growth economics over static economics.").

149. Chen & Cooter, *supra* note 14, at 69.

150. COOTER WITH EDLIN, *supra* note 5, at ix.

worrying about inequality in policymaking.[151] As Madhavi Sunder has observed, the incentive-focused utilitarian view of intellectual property has long been unconcerned with values like equality.[152] But the Overtaking Theorists are not merely looking past such values, they are positing a utilitarian account that actually challenges ethics- and justice-based arguments about inequality and poverty. This is striking because, as mentioned above,[153] utility maximization and the pursuit of justice/fairness/equality can be viewed as two different ways of keeping score in contests about which legal doctrines are preferable. Law-and-economics proponents commonly seek to sidestep critiques revolving around concepts such as justice, equity, and fairness.[154] But not the proponents of the overtaking principle. Their claim, in essence, is that the overtaking principle can jump theoretical paradigms. Their intertheoretic move is that given sufficiently rapid growth, conditions of inequality and poverty are rendered unimportant as policy considerations. They are saying, in essence, that getting the short end of the stick can be the best outcome if the stick is big enough.[155]

Cooter and Hacohen advocate strong real-world applicability for Overtaking/Fertility/Separation Theory with regard to patents. They claim that the overtaking principle often renders unnecessary the balancing of consumer access to products and incentives to innovate.[156] In controversies

151. Chen & Cooter, *supra* note 14, at 69; Cooter & Hacohen, *supra* note 15, at 213; COOTER & SCHÄFER, *supra* note 15, at 51–54, 63 ("The welfare effects of sustained growth overtake redistribution, so law and policy should not sacrifice growth for the sake of equality."); Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.17 ("The overtaking principle also challenges ethical theories concerning the redistribution of wealth. Controversies about fair distribution, social welfare, the marginal utility of income, and time-discounting do not matter when growth is rapid. In much of political philosophy, fairness concerns distributing shares of fixed income, and economic equality is an end in itself. With rapid growth, however, putative ends turn out to be only valuable as means.").

152. Sunder, *supra* note 25, at 259 ("Unlike its cousins property law and the First Amendment, which bear the weight of values such as autonomy, culture, equality, and democracy, in the United States intellectual property is understood almost exclusively as being about *incentives* . . . . Intellectual property utilitarianism does not ask who makes the goods or whether the goods are fairly distributed to all who need them." (footnote omitted)).

153. *See supra* note 50 and accompanying text.

154. Korobkin & Ulen, *supra* note 21, at 329–30 (noting law-and-economics scholars' responses include "that equity is not a coherent concept . . . ; that law and economics' concentration on efficiency is dictated by underlying microeconomic theory and not by an evaluation that efficiency is necessarily a superior value to equity; and that, in reality, little difference exists between efficiency and traditional, justice-based analyses . . . ." (footnotes omitted)).

155. I will not attempt a thorough justice/fairness/equality-based critique of the Overtaking Theorists' contention in this regard. Doing so would require dealing with some important complications and nuances. That is the case because there are varied conceptions of justice, fairness, and equality. But I will simply note that one could argue that the Overtaking Theorists seem to be looking past what is perhaps the most basic kind of fairness/justice/equality argument: no matter how big the stick is, getting the short end is still getting the short end.

156. Cooter & Hacohen, *supra* note 15, at 196.

about pharmaceutical companies using "evergreening" practices[157] to extend their patent monopoly beyond the original patent term, Cooter and Hacohen write, "[I]n the absence of aggravating circumstances, escalated consumer products' prices should not justify a patent reform."[158]

What is more, the overtaking idea makes a bold claim to scholarly importance within the law-and-economics sphere. The principle implies that the whole law-and-economics project, in its fixation on efficiency, has been built on the wrong foundation.[159]

2. The Innovation-Growth Link

The argument continues by upholding the key importance of innovation for economic growth by citing Solow's growth model.[160] Cooter and Edlin take the straightforward lesson from Solow's work: that capital accumulation is subject to diminishing returns and can only fuel economic growth to the point at which capital investment offsets capital depreciation.[161] To go beyond that point, a society needs an accumulation of what Solow called "knowledge" (or "effectiveness of labor"), what Cooter and Edlin tend to call "ideas," and what is more commonly called innovation. In other words, past the point of capital investment/depreciation equilibrium, to achieve economic growth, a society needs the sort of nonrivalrous/nonexcludable intangibles with which intellectual property law is generally concerned.[162]

---

157. For a helpful discussion of pharmaceutical evergreening practices, see Robin Feldman, *May Your Drug Prices Be Evergreen*, 5 J.L. & BIOSCIENCES 590 (2018). Feldman calls "evergreening" a "strategic behavior[]" comprising "artificially extending the life of a patent or other exclusivity by obtaining additional protections to extend the monopoly period." *Id.* at 596.

158. Cooter & Hacohen, *supra* note 15, at 196.

159. Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.17 ("The overtaking principle supplies the normative justification for prioritizing growth economics over static economics. It challenges conventional law and economics that treats static efficiency as a fundamental goal of law and policy.").

160. Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.6. See *supra* Section I.D.2 for a summary of the Solow model.

161. *See supra* note 100 and accompanying text.

162. A note about terminology: Intellectual property lawyers and scholars tend to avoid using the word "ideas" to describe the subject matter of intellectual property. It is blackletter law that a patent can be gotten only on an *invention*, not on a mere idea. *See* Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 216 (2014) ("'Laws of nature, natural phenomena, and abstract ideas are not patentable.' We have interpreted § 101 and its predecessors in light of this exception for more than 150 years." (internal citations omitted) (quoting Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 589 (2013))); Rubber-Tip Pencil Co. v. Howard, 87 U.S. (20 Wall.) 498, 507 (1874) ("An idea of itself is not patentable . . . ."). Similarly, it is blackletter law that a copyright can be gotten only on *expression*, not on a mere idea. *See* Eldred v. Ashcroft, 537 U.S. 186, 219 (2003) ("'In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.' . . . Due to this [idea/expression] distinction, every idea, theory, and fact in a copyrighted work becomes instantly available for public exploitation at the moment of

As discussed above, in the mainstream economic account, these intangibles—inventions, artistic creations, etc.—are different from land and chattels in that they are nonrivalrous and nonexcludable.[163] Cooter, Edlin, Hacohen, and Chen seek to add to this conception by saying that ideas are also *fertile*.[164] By this, they mean that ideas beget more ideas. As examples of the fertility of ideas, Cooter and Edlin cite the continuing productiveness of the Pythagorean Theorem in pure mathematical research and the exponential increase in the number of transistors that can be placed on an integrated circuit.[165] Cooter and Edlin assert that "[w]ith a continuing stream of fertile innovations, growth can continue indefinitely and production can rise like the falcon's gyre."[166]

3. An IP Prescription for Accelerated Growth

The various threads of argument about overtaking, fertility, and separation come together in the form of a policy prescription for intellectual property law. The Overtaking Theorists' main takeaway is that intellectual property law should sacrifice static efficiency in order to maximize dynamic efficiency.[167] "Maximizing innovation," Cooter writes, "requires transferring resources from consumption and production to innovating."[168] This is an innovation-flavored version of the trade-off recognized in the Solow growth model with regard to capital accumulation. In the Solow model, the trade-off is that a society can increase growth over the longer term by lowering consumption in the shorter term, trading off consumption in the present for capital accumulation that will allow greater productivity and hence greater consumption in the future.[169] In this new schema, the

publication." (quoting 17 U.S.C. § 102(b))); Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 349–50 (1991) ("[C]opyright assures authors the right to their original expression, but encourages others to build freely upon the ideas and information conveyed by a work."). This semantic distinction is unhelpful to discussing macroeconomic theory. Suffice it to say that when Solow says "knowledge," and when Cooter and Edlin say "ideas," they are talking about intangible advances that allow increased economic production from a set of resources, and those intangible advances would embrace some things that are currently protectable under intellectual property law (whether patent, copyright, trade secret, or some other form), and some things that are not currently protectable.

163. *See supra* notes 53–57 and accompanying text.

164. Cooter & Hacohen, *supra* note 15, at 205–07; Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.9; Chen & Cooter, *supra* note 14, at 69.

165. Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.9; *see also* Cooter & Hacohen, *supra* note 15, at 199 (analogizing to a "falcon's gyre"); Chen & Cooter, *supra* note 14, at 68–69 (same).

166. Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.9; *see also* Cooter & Hacohen, *supra* note 15, at 199 ("When ventures [as described] repeat themselves, innovation grows on itself, and social welfare spirals up like the falcon's gyre.").

167. *See* Cooter, *Intellectual Property*, *supra* note 135, at 6.1 et seq.

168. *Id.* at 6.5.

169. *See, e.g.*, COWEN & TABARROK, *supra* note 80, at 151–52.

trade-off is exchanging present consumption of the fruits of innovation for more innovation in the future.

To make this argument, the Overtaking Theorists start with the conventional view that IP rights—patents, for the most part—are an effective means of incentivizing innovation, working by means of giving the innovator market power so as to allow the innovator to charge supracompetitive prices, thus transferring wealth—consumer surplus, in economics speak—from buyers to sellers.[170] Proceeding from this premise, the Overtaking Theorists say that intellectual property protection should be strong—that is, expansive in terms of duration, scope, and remedy[171]—against producers and consumers.[172] And correspondingly they say that intellectual property protection should be weak or non-existent against innovators.[173] This is the "separation principle,"[174] which Cooter and Hacohen call "the first principle of the economics of patents."[175]

These scholars are not the first to suggest separating out producers and consumers with an eye toward maximizing beneficial effects.[176] But the Overtaking Theorists distinguish their view both in the strength of their conviction and the extent and specificity of the practical lessons they take from it.

For instance, in a circumstance in which innovators sell to consumers and producers, Cooter and Hacohen say the optimal duration of a patent may

---

170. *See, e.g.*, Cooter & Hacohen, *supra* note 15, at 202 ("By blocking competitors, a patent enables the seller to raise the price, which transfers wealth from buyers to the seller. The original seller is the inventor who received the patent. Buyers use the innovation to consume, produce, or innovate. Thus, the patent transfers wealth to innovating that comes from consuming, producing, or innovating."). This assumption—that patents are effective in providing incentives this way—is not unquestionable. Indeed, there is considerable reason to doubt the extent to which it corresponds to the real world. *See, e.g.*, Johnson, *Incentive Fallacy*, *supra* note 27, at 661–66.

171. Cooter, *Intellectual Property*, *supra* note 135, at 6.2. Note that Cooter uses the terms "duration, breadth, and remedy." I've replaced "breadth" with "scope" in keeping with common usage in the IP literature. At any rate, the concept is one IP right being "broader or narrower than another." *Id.* at 6.3.

172. Cooter & Hacohen, *supra* note 15, at 202; Cooter, *Intellectual Property*, *supra* note 135, at 6.2.

173. Cooter & Hacohen, *supra* note 15, at 195 ("In sum, the first principle of the economics of patents is the *separation principle*: to promote progress in the useful arts, patent protection should be strong against using an innovation to consume or produce, and weak against using an innovation to innovate."); Cooter, *Intellectual Property*, *supra* note 135, at 6.8 ("The separation principle favors strong patent protection over static activities (consuming and producing) and weak or no patent protection over dynamic activities (innovating).").

174. Cooter & Hacohen, *supra* note 15, at 202–05; Cooter, *Intellectual Property*, *supra* note 135, at 6.8.

175. Cooter & Hacohen, *supra* note 15, at 195.

176. *See* Meurer, *supra* note 121, at 98 n.177 (suggesting scope and duration as levers that can be used to find the right balance between ensuring incentives for an innovator and ensuring access needed for follow-on innovation) ("[A]n optimal copyright policy might have broad scope against end users but a narrow scope against input users [or a] . . . shorter duration for one class of users.").

be infinite.[177] Cooter and Hacohen offer new pharmaceuticals as a possible example of something for which patent protection should not end.[178] In a circumstance where innovators sell to each other and innovations are used to make further innovation, the optimal patent duration may, according to Cooter and Hacohen, be zero.[179]

C. Problems with Overtaking/Fertility/Separation Theory

The work of the Overtaking Theorists makes a significant contribution to thought about intellectual property law by pushing scholars to consider macroeconomic/growth-oriented thinking as a challenge to conventional, microeconomics-dominated law-and-economics thinking. But the specific arguments made—including the argument for simplifying policy prescriptions for intellectual property law—are faulty for at least three independent reasons. I set forth those reasons in this section, and I discuss them in order of increasing intractability: (1) the implementability of the fertility-separation prescription is not plausible, (2) the overtaking principle is built on faulty premises regarding the compoundability of growth, and (3) their argument is ultimately self-defeating at a fundamental level because it rests on conflicting premises about innovation incentives.

1. The Implausibility of Implementation

The first problem to discuss is the implausibility of implementing the fertility-separation prescription. Cooter downplays the practical problems with requiring "lawmakers and courts [to] distinguish the uses of an innovation into consuming, producing, and innovating."[180] He suggests that we can expect courts to use "[c]ommon sense" and make "non-technical judgments of the kind that courts routinely make without statistics or mathematical theories."[181] Cooter and Hacohen suggest that "ordinary language and economic analysis both provide a basis for making the required distinctions."[182] In "hard cases" Cooter suggests economists can help.[183] But optimism in this regard seems unjustified. Indeed, it is difficult

177. Cooter, *Intellectual Property*, *supra* note 135, at 6.14; Cooter & Hacohen, *supra* note 15, at 214–15.

178. Cooter & Hacohen, *supra* note 15, at 215.

179. Cooter, *Intellectual Property*, *supra* note 135, at 6.14; Cooter & Hacohen, *supra* note 15, at 216.

180. Cooter, *Intellectual Property*, *supra* note 135, at 6.6.

181. *Id.*

182. Cooter & Hacohen, *supra* note 15, at 205.

183. Cooter, *Intellectual Property*, *supra* note 135, at 6.6 ("In hard cases, economists can assist by drawing on their long history of distinguishing these three activities. Economists can also assist by

to reconcile Cooter's optimism for economist expertise in comprehending and predicting innovation fertility with his view that economists have heretofore been unseeing of the possibility and utility of doing so.

To begin to appreciate the implementability problems with the proposed fertility-separation analysis, consider copyright law's fair use doctrine. Fair use allows subsequent creators to make use of prior creators' work, notwithstanding an active copyright on it.[184] Fair use is a particularly illustrative comparator to Cooter's proposal because fair use, like fertility-separation analysis, is meant at least in part to create a safe harbor for fostering follow-on productive creativity. In practice, however, as many scholars have observed, the productivity-enhancing function of fair use is severely undercut by practical problems.[185] Lawrence Lessig, for instance, writes that while "[t]he law has the right aim; practice has defeated the aim."[186] He explains, "In theory, fair use means you need no permission . . . . But in practice, fair use functions very differently. The fuzzy lines of the law, tied to the extraordinary liability if lines are crossed, means that the effective fair use for many types of creators is slight."[187] To be sure, fair use does have a real-world beneficial effect in clearing the way for some productive re-use of copyrighted content, and the quantity is undoubtedly substantial. But fair use fails a great deal as well, allowing fear of liability to sway decisionmaking and leaving an enormous quantity of productive re-use undone.[188] Thus, the real-world's experience of substantial problems with copyright fair use casts severe doubt on the idea that fertility-separation analysis would be workable at all.

In short, the idea that the fertility-separation prescription could be practically implemented is an extraordinary claim that is at odds with experience. For the fertility-separation principle to be taken seriously, there

predicting the effect of different distinctions on the goal underlying the separation principle: maximizing innovation.").

184. *See* 17 U.S.C. § 107 ("[T]he fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching . . . , scholarship, or research, is not an infringement of copyright.").

185. *See, e.g.*, Jake Phillips, eBay*'s Effect on Copyright Injunctions: When Property Rules Give Way to Liability Rules*, 24 BERKELEY TECH. L.J. 405, 415 (2009) ("The fuzzy borders of fair use, coupled with the harsh specter of an injunction when fair use is denied, has arguably led to the underproduction of useful derivative works."); Robert T. Sherwin, *Clones, Thugs, 'N (Eventual?) Harmony: Using the Federal Rules of Civil Procedure to Simulate a Statutory Defamation Defense and Make the World Safe from Copyright Bullies*, 64 DEPAUL L. REV. 823, 840–41 (2015) (discussing a lack of freedom for creators to produce new works making use of others because of the chilling effects of a fear of litigation).

186. LESSIG, *supra* note 24, at 99.

187. *Id.*

188. *See, e.g.*, Eric E. Johnson, *The NFL, Intellectual Property, and the Conquest of Sports Media*, 86 N.D. L. REV. 759, 777–82 (2010) (describing the National Football League's success in dissuading television media companies from making fair uses of game telecasts).

would need to be a great deal of careful work demonstrating the plausibility of its practical application. Barring that work being done, the fertility-separation prescription is unavailing.

2. The Unjustified Assumption of Compound Growth

A second and even more acute problem with the argument of the Overtaking Theorists is that it proceeds on unfounded premises with regard to the compoundability of growth. This is crucial, because in the view of Overtaking/Fertility/Separation Theory, the transcendent importance assigned to innovation springs from its ability to instigate compound growth.[189] Cooter invokes the example of compounding interest to illustrate exponential growth.[190] Yet the Overtaking Theorists never explain why innovation is, like dollars in a bank account, subject to compounding. In fact, there is strong reason to believe the opposite is true.

We know that dollars in a savings account will accrue interest paid in dollars, and thus interest begets interest. But note that this bank-interest effect depends on the fact that one dollar is just like another. That is, each dollar has the same potential to earn interest as any other dollar. Because of this, dollars will bring on more dollars, which in turn will bring on still more dollars.

But will innovations bring on more innovations? The Overtaking Theorists assume this is the case.[191] Yet almost nothing is said as to why this might be true. Chen and Cooter, in positing that "growth can continue indefinitely," offer that this is "a reasonable conclusion from the last century of experience."[192] This conclusion, however, seems hasty. Reasoning from the past to the future requires some assurance of a causative mechanism that is common to the past and future. Such a mechanism cannot be assumed. And the Overtaking Theorists do not offer one.

It is certainly the case that assumption of compounding growth from innovation does not follow from analogy to bank interest. We know that

189. Cooter & Hacohen, *supra* note 15, at 207–08 (using the words "[c]ompounded" and "compound" to describe economic growth); *id.* at 208–09 (describing growth as being able to build upon itself at a constant proportional rate leading to exponential increase, and connecting this description of growth to real-world modern economies); Cooter & Edlin, *Overtaking*, *supra* note 23, at 1.1–1.2 (using the words "[c]ompounded" and "compound growth").

190. *See* Cooter, *Freedom*, *supra* note 15, at 5.

191. *See* Cooter & Hacohen, *supra* note 15, at 198–99 (stating that when profitable business ventures based on new ideas "repeat themselves, innovation grows on itself, and social welfare spirals up"); Cooter & Edlin, *Separation*, *supra* note 139, at 4.8 ("Innovations build on each other. The value of each innovation spills over to other innovations, with large effects on growth.").

192. Chen & Cooter, *supra* note 14, at 69. Chen and Cooter also state indefinite, accelerating growth "is also a reasonable conclusion from recent technological and scientific progress, especially developments in computers, nanotechnology, robotics, genetics, and medicine." *Id.* Given that this statement is not elaborated upon, it does not appear to offer anything different in substance.

innovations are not like dollars. While each dollar is the same as every other, each innovation is different. Indeed, each successive innovation *must* be different and unique, or else it wouldn't be an innovation.

The Overtaking Theorists would have to concede that innovations are not all alike because that is an implication of a premise of their argument. Recall that part of their argument is built on being able to distinguish "fertile" from non-fertile innovations:[193] a fertile innovation can be used to create further innovation; a non-fertile one cannot.[194] But recognizing that some innovations are fertile does not mean that these fertile innovations will foster money-like compound growth. Why not? A fertile innovation, even if it gives rise to successive innovations, does not necessarily give rise to successive *fertile* innovations. And if it does not, the alleged compoundability of fertile innovation does not hold.

An example will illustrate this. Suppose a new class of molecule is discovered, one which eventually gives rise to 50 useful pharmaceutical compounds. The initial discovery of the new class of molecule is a fertile innovation in the overtaking schema. But then it stops. Each of those 50 molecules will not beget a new class of molecule. So while money in the bank is entirely fungible and capable of geometric growth if we assume a steady positive interest rate, fertile innovations are not fungible, and they cannot be counted upon to produce an endlessly increasing stream of more fertile innovations.

None of this is to say that truly compound innovation is a logical impossibility. Suppose pharmaceutical researchers produce a drug that makes pharmaceutical researchers smarter—smart enough, in fact, that they can develop a next-generation drug that makes them even smarter in developing smartness-enhancing drugs. And so on. Such a situation would get the Overtaking Theorists the kind of compounding innovation they envision. But an accelerating chain reaction of novel nootropic pharmaceuticals is a far-fetched hypothetical. Certainly a snowballing phenomenon of self-accelerating cognitive-enhancement drug development does not characterize innovation generally.

In addition to not holding together as a logical matter, the Overtaking Theorists' assumption of compounding growth in the real world conflicts

193. In fact, importantly, they distinguish between "*fertile*" and "*sterile*" innovations. Cooter & Edlin, *Fertility*, *supra* note 139, at 5.2–5.3.

194. *Id.*

with the teachings of contemporary macroeconomics. In discussing how to model endogenous growth, macroeconomist David Romer notes that:

> [T]he effect of the existing stock of knowledge on the success of R&D . . . can operate in either direction. On the one hand, past discoveries may provide ideas and tools that make future discoveries easier. . . . On the other hand, the easiest discoveries may be made first. In this case, it is harder to make new discoveries when the stock of knowledge is greater . . . .[195]

Indeed, given certain assumptions about the effect of existing technological knowledge on the rate of technological advance, Romer notes that the production of new knowledge would not be self-sustaining.[196]

What is more, there is real-world analysis that not only conflicts with the notion of the compoundability of innovation but also conflicts with the assumption of regular, continuous innovation-fueled economic growth. Macroeconomist Robert J. Gordon, in an extensive study of economic growth, takes issue with those who would assume that growth "operat[es] in a 'steady state' in which a continuing inflow of new ideas and technologies creates opportunities for investment."[197] Gordon observes that this conception of economic growth is inapplicable for most of human history.[198] In contradistinction to the steady state assumption, Gordon makes the case for what he calls a "'special century' approach" to understanding economic growth, focusing on the period in the United States from 1870 to 1970, which he calls "a singular interval of rapid growth that will not be repeated."[199]

Gordon's central thesis is that "some inventions are more important than others."[200] Notably, this is in accord with Cooter, Edlin, and Hacohen's idea that some innovations are more fertile than others.[201] But with a careful, empirically based macroeconomic-analytic examination, Gordon arrives at a view that contradicts the Overtaking Theorists' compoundability assumption. Gordon attributes huge strides in growth to a series of "great

195. ROMER, *supra* note 7, at 103–04.

196. *Id.* at 107 (discussing parameter values where "the contribution of additional knowledge to the production of new knowledge is not strong enough to be self-sustaining").

197. *See* GORDON, *supra* note 90, at 2.

198. *See id.* ("[A]rticles on growth theory rarely mention that the model does not apply to most of human existence.").

199. *See id.* at 3. Note that Gordon focuses on the United States because, in his view, since the American Civil War, the United States has led the developed world in pushing the frontiers of technology. Other nations, in achieving their own periods of stupendous growth, can be seen as catching up to the United States. *See id.*

200. *See id.* at 2 (emphasis omitted).

201. *See* Cooter & Edlin, *Fertility*, *supra* note 139, at 5.2–5.3; Cooter & Hacohen, *supra* note 15, at 205–06.

inventions"—such as steamships, railroads, telegraphy, electric lighting, the internal combustion engine, the automobile, refrigeration, and automatic washing machines.[202] Those inventions, he observes, quickly and irreversibly transformed American society from being a mostly agrarian society dominated by small-town life to an industrial society based around city life featuring strong institutions, both governmental and private.[203] The problem with expecting a continuation of this growth, in Gordon's assessment, is that the inventions themselves cannot be repeated.[204] Inventions since the 1970s have, Gordon observes, changed the way we communicate and spend leisure time, but they do not approach the kind of society-altering transformation brought on by the special-century innovations.[205]

The assumptions the Overtaking Theorists make about the compoundability of growth underpin their extraordinary willingness to jettison concerns along the lines of fairness, inequality, and distributive justice.[206] Because their assumptions are flawed, their argument for subordinating values of fairness, inequality, and distributive justice in pursuit of economic growth is unavailing.

Contrary to the contentions of the Overtaking Theorists, a macroeconomic view that is grounded in macroeconomics literature should be seen as counseling a heightened concern about inequality. That is because factors slowing growth in the contemporary economy, according to Gordon, include "inequality, education, demography, and fiscal [issues]," which are reducing the rate of median real disposable income growth below the rate of growth in productivity.[207] So while innovation was key to increases in the standard of living the United States has seen over the last century and a half, Gordon sees the future as distinct. He views rising inequality as the most important of headwinds to growth, which he says are "blowing like a gale to slow down the vessel of progress."[208]

The Overtaking Theorists would, as a formal matter, allow that to the extent inequality is an impediment to growth, it would be important to address.[209] But their practical prescription is clear enough: inequality

202. *See* GORDON, *supra* note 90, at x, 2, 96, 151.
203. *See id.* at 6.
204. *See id.* at 4.
205. *See id.* at 7 ("Progress after 1970 continued but focused more narrowly on entertainment, communication, and information technology, in which areas progress did not arrive with a great and sudden burst as had the byproducts of the Great Inventions. Instead, changes have been evolutionary and continuous.").
206. *See supra* notes 144–158 and accompanying text.
207. *See* GORDON, *supra* note 90, at xi.
208. *See id.* at 2.
209. *See* Cooter & Hacohen, *supra* note 15, at 212–13.

concerns, along with efficiency concerns, should largely be disregarded.[210] In this, they are wrong. A macroeconomically nuanced, empirically based view suggests that equality would seem to deserve more attention, not less.

3. The Argument's Internal Contradictions

The third and most intractable problem for the Overtaking Theorists is that their ultimate conclusions about intellectual-property policy depend simultaneously on contradictory premises. Put differently, the argument argues against itself. This problem is not necessarily clear on the face of things, but it becomes evident when one drills down into how the argument is built and what its implications are.

Cooter and his colleagues perceive that market power with fertile innovations can dampen innovation. So, to avoid putting brakes on growth, in this view, fertile innovations must not be given innovation-stifling market power. As Cooter puts it, "[I]nnovators should have weak intellectual property rights against each other, or none at all."[211] The problem arises when one considers that, according to the theory, it is precisely the fertile innovations that need to be incentivized, because those are the ones that would generate still other fertile inventions allowing us—according to the argument—to achieve the rapid growth that permits disregarding static efficiency and fairness/equality concerns. Thus, the argument, in the end, contradicts itself.

To illustrate, suppose we have two inventions: One invention is a new anti-malaria drug. The other invention is a new way of simulating the pharmacological effect of novel proteins in a human cell. The anti-malaria drug would be non-fertile, so according to Overtaking/Fertility/Separation Theory, it should get very strong patent protection, and equity/efficiency concerns can be disregarded. That means, ex ante, the incentive to create the new drug is strong. The protein-cell-pharmacology simulation process is an innovation used by other innovators to produce more innovations. So it is fertile. That means, according to the theory, it should get weak or no protection in the market. Thus, the ex-ante incentive to create the simulation process would be weak or non-existent.

---

210. *Id.* at 254 ("With rapid innovation, growth in human welfare overtakes losses from inefficiency or inequality. The effects of patents on efficiency and distribution on welfare are unimportant relative to their effects on growth. Like the constitution, welfare overtaking suggests that patent interpretation and policy should focus on innovation and dispense with balancing.").

211. Cooter, *Intellectual Property*, *supra* note 135, at 6.6; *see also* Cooter & Hacohen, *supra* note 15, at 195 ("[T]o promote growth, patent protection should be weak against using an innovation for innovating.").

That much is what Overtaking/Fertility/Separation Theory tells us. But if we take the analysis to the next step, we can see where things begin to fall apart.

Since the drug is non-fertile, why shouldn't we care about efficiency and equity concerns, and thus rein in the patent's scope, duration, and available remedies? It seems there is no reason not to. After all, the non-fertile quality of the invention means that we don't have to worry about knock-on effects on successive generations of innovation.

And if the pharmacology simulation process has little or no incentive that can be felt ex ante, then one of two things must be the case—either of which appears to be a fatal problem for Overtaking/Fertility/Separation Theory. One possibility is that the simulation process—lacking the IP incentive—will never be developed in the first place. This would be very bad because then we have not incentivized the innovation we most care about, that being the innovation that begets further innovation. The other possibility is that the simulation process—even without the IP incentive—would have been developed anyway. If that is the case, then there is something wrong with the premise that business venture profits are crucial to innovation.

Note that the three problems set out above are all independent reasons that the overtaking/fertility/separation prescriptions for intellectual property law are flawed. For example, even if one could solve the implementability concerns and even if it were somehow shown that innovation really tended to compound like bank interest, the prescription still wouldn't work because incentivizing fertile innovations with intellectual property entitlements inexorably leads to destroying their fertility. Notwithstanding these difficulties, however, the Overtaking Theorists do succeed in provocatively raising the issue of the importance of economic growth in thinking about intellectual property law. Next, I turn to my own attempt to make a general case for the importance of macroeconomics in intellectual property law and policy.

III. PRIORITIZING A MACROECONOMIC PERSPECTIVE FOR IP

This part presents a general case for why the macroeconomic perspective should take precedence with regard to economic justifications for intellectual property and with regard to economics-based prescriptions as to IP's shape and extent. Section A explains that the macroeconomic perspective is, as an abstract analytical matter, the right intellectual framing for discussions about intellectual property. Section B argues that using a macroeconomic lens for intellectual property policy is important because the stakes at the macro level are extremely high. Of course, it would matter little that the macroeconomic stakes are high if the microeconomic view did

not offer distinct policy prescriptions. Section C, however, shows that a macroeconomic view can indeed be difference-making in terms of figuring out which policies are best. Finally, Section D offers reasons why—even if we accept that seeking economic growth is the most urgent concern for policymakers—the presumption should be against the granting of intellectual property rights as a means to accomplish that growth.

A. The Macroeconomic Perspective Captures Unique, Important Concepts for IP Policy

In this section, I will make the case that the macroeconomic framing brings in crucial concepts about intellectual property that are not captured by a microeconomic lens, and I will argue that the macroeconomic perspective ought to be dominant.

1. Thoughtful Matchmaking

At the outset, putting macroeconomics and the study of intellectual property together is an exercise in thoughtful matchmaking based on mutual interests. Macroeconomics' most central concern is economic growth, and macroeconomics' central focus in investigations of economic growth is innovation. Meanwhile, intellectual property law is largely or mostly concerned with innovation and the production and spread of knowledge. Thus, at this abstract level—before even engaging with any substance—there is an indication that the lack of attention to macroeconomics in intellectual property legal scholarship is troubling.

A slightly more filled-out case for why scholarly and policy-making discussions of intellectual property law should put macroeconomic growth concerns front and center comes from considering the insights that have followed from Solow's model. As explained above, Solow's model identifies innovation and knowledge as importantly different from other goods in the workings of economics at the broadest levels.[212] And as discussed, Solow's growth model teaches us that these intangibles are special because of their quality of being able to serve as the engine for economic growth in a mature economy—where achieving further growth requires something other than capital investment.[213] Post-Solow models of economic growth concur in the insight that innovation and knowledge are importantly different from other economic inputs.[214]

212. *See supra* notes 98–110 and accompanying text.

213. *See supra* notes 106–115 and accompanying text. As noted, innovation and knowledge become essential where capital investment's marginal returns to growth have shrunk to zero.

214. *See, e.g.,* ROMER, *supra* note 7, at 101–45.

It follows from these considerations that when it comes to bringing economic analysis to bear, it may be productive to consider intellectual property law and policy as importantly different from other matters of law and policy. Yet we have not treated IP law and policy as importantly different. Indeed, IP scholarship has habitually treated innovation as just another good for the economy to produce. If we take to heart the lesson of Solow's growth model, we ought to see intellectual property policy not merely as a way to fix a perceived market failure for a public good; we ought to see it as something that can substantially affect—positively or negatively—economic growth and societal progress.

2. Imperishability and Progress

There are also compelling particular reasons why the study of intellectual property law needs illumination from macroeconomics. Here, I will argue that intellectual intangibles—as the objects of concern for intellectual property law—are importantly different from other economics goods because intellectual intangibles exhibit *imperishability*, a quality that is explicitly linked to *progress*, which is a distinctly macroeconomic concept.

The most obvious place to start is with intellectual property law's theoretical grounding in the incentive theory. The incentive theory is the idea that intellectual property law is justified by the need to provide incentives for technological innovation and the creation and dispersion of knowledge and creative expression.[215] The incentive theory has formed the foundation for IP theory and policy throughout U.S. history.[216] And in operationalizing the incentive theory, the yardstick has been maximizing social welfare.[217]

If one does not come to the matter with a lot of microeconomic baggage, then these things may intuitively seem to be primarily macroeconomic concerns—since we are talking about social welfare, and macroeconomics is concerned with the society-wide big picture and the future-embracing long term. But conventional economic wisdom is that focusing on efficiency—as microeconomics does—illuminates the path to the accumulation of social welfare.

When microeconomics points the way toward efficiency, it is indeed pointing the way toward increased social welfare—at least in that market or that sort of transaction. Accordingly, conventional wisdom is that social welfare in individual markets adds up to social welfare gains across society.

---

215. *See supra* Section I.C.1.

216. *See supra* note 36 and accompanying text.

217. Fisher, *supra* note 62, at 169 (observing that the most popular theory for justifying intellectual property law is "the maximization of net social welfare").

To stop the analysis there is to imply that by focusing on the small things, the bigger picture will take care of itself.

Let us assume for argument's sake that this amalgamation story is appropriate for most goods, such as oranges and oil.[218] Is there a reason to think that knowledge, technological innovation, and the sort of things that are the subject of IP might be different enough from ordinary economic goods that the big picture might not take care of itself?

There is. Consider that the traditional explanation for how intellectual property is distinct from oil and oranges is that intangibles are plagued by the public goods problem.[219] And the incentive theory is the idea that IP's exclusive rights are necessary to overcome the public goods problem. Yet on examination, this is a cramped comprehension of the incentive role of IP. When it comes to innovation and knowledge, IP is not just a means to encourage production. It is, as the U.S. Constitution puts it, a means to promote progress.[220] And progress is something more than production.

An emphasis on merely encouraging production makes sense when one's focus is fixed firmly on the public goods problem. Inventions, maps, books, and other subject matter of patent and copyright are public goods because they are nonrival and nonexcludable. Therefore, in neoclassical conventional wisdom, these goods are beset by a market failure that calls for the government to provide some sort of external incentive. Enter intellectual property law.

While intellectual intangibles are indeed public goods, they aren't like other public goods. Consider traditional examples of public goods that aren't intellectual intangibles: clean air, highway beautification, fireworks displays. These things are like intellectual works in that they are nonrival and nonexcludable. But clean air, highway beautification, and fireworks are also *perishable*. Air that has been made clean won't stay that way without continuing effort. Highways that are seeded with wildflowers will eventually need reseeding. And fireworks displays are about as ephemeral as it gets.

Intellectual intangibles, however, are not only nonrival and nonexcludable, they are also *imperishable.* An invention, once invented, is invented forever. And a book, once written, does not need to be written again. While a physical copy of a book eventually crumbles to dust, its words are capable of indefinite duration. This perishability distinction

218. *See supra* notes 26–27 and accompanying text (discussing oranges and oil as examples of ordinary economic goods).

219. *See id.*; *see also supra* Section I.B.

220. U.S. CONST. art. I, § 8, cl. 1, 8 ("The Congress shall have Power . . . 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 . . . .").

between ordinary public goods and intellectual works is crucial, because when you are talking about making something that can provide continuing value forever, that is not merely production—it is *progress*.

Here we should pause to acknowledge some nuance. It is of course true that even if innovation and knowledge are imperishable in the abstract, they can nonetheless decline in value over time. The works of Homer continue to hold great value. But the stories in today's newspaper will be worth only a tiny fraction of their value tomorrow. Movies tend to retain value for substantially longer than news, but the top five box-office hits of 1961 are certainly worth only a sliver of what the top five movies of last year can bring in. Declining value applies not just to expressive works. It applies to inventions as well. The economic value of the invention of the wheel remains very strong today. But the incandescent light bulb—the quintessential valuable invention—offers only marginal value compared to more recent light-making technologies, such as LED light bulbs.

Yet observing the widespread phenomenon of declining value of intellectual works over time does not change the fact that such works effect a ratchet of societal progress. The incandescent light bulb, once invented, does not need to be invented again. The attentions of engineers, scientists, and entrepreneurs can be turned in new directions, where they can uncover new means of creating economic value from the world around us. And expressive works, once authored and published, give future authors material to build upon or react against.

B. Getting the Macroeconomics Right Is Important Because the Stakes Are High at the Macro Level

To this point, I have tried to introduce the perspective that starting with macroeconomics, and putting it at the center of intellectual property policy, is the right intellectual framing. That is to say, it is the analytically sound course. But there is more: getting the analysis right is important because the stakes are high for the human condition. Indeed, the macroeconomic perspective clarifies how and why this is the case.

That IP concerns should be centered around macroeconomics follows from these premises: (1) economic growth is vital to the human condition, (2) economic growth beyond a certain point requires innovation, (3) society relies on IP for incentivizing innovation, and (4) innovation accelerated or delayed is extremely significant to humanity.

The first premise—that economic growth is vital to improving the human condition—follows from the fact that economic growth corresponds to an

increased standard of living and favorable outcomes.[221] Those outcomes include a population that is more educated and longer-lived.

The second premise—that economic growth beyond a certain point requires innovation—follows from Solow's work.[222] As Solow's model shows, economic growth based on capital investment must slow down and eventually stop because of capital depreciation and the law of diminishing returns. This leaves new knowledge or innovation as the most plausible means of escaping permanent stagnation.

The third premise is that society relies on intellectual property for incentivizing innovation. Unlike the first two premises, this is not definitional or a constraint imposed by economics. Rather, it is a reality humanity has created for itself. As legal historian and intellectual property theorist William Fisher has put it, "[F]or better or worse, the primary strategy employed for many centuries by most governments to fulfill their responsibilities to foment innovation has been to create copyrights and patents."[223] Given that reality, intellectual property law has outsized importance.

The fourth premise is that innovation accelerated or delayed may be extremely significant to humanity. Support for this point is found in Cooter and colleagues' argument that the most important thing in law and economics is not economic efficiency, but innovation and economic growth.[224] As noted above, one of the problems with their argument is in its assumption that growth is homogenous. And Gordon's macroeconomic work offers a persuasive refutation on this point. But while Gordon seems correct in categorizing the explosive U.S. economic growth of 1870 to 1970 as singular,[225] it is not inconceivable that more singular explosive-growth episodes lie ahead. One could imagine a growth burst from the discovery of a new cheap and clean source of energy: Consider that if electricity became essentially costless in comparison to today, such a development would work transformational changes on the economy. A similarly revolutionary transformation might be caused by a technological leap in energy storage—one providing cheap, clean, capacious, and lightweight battery capacity. Still another plausible future episode of explosive growth could come from a nanotechnology revolution, in which humanity gains a generic ability to employ molecule-sized machines to make whatever materials and finished

221. *See supra* notes 83–85 and accompanying text.

222. *See supra* note 109 and accompanying text.

223. Fisher, *supra* note 26, at 21.

224. *See, e.g.*, COOTER WITH EDLIN, *supra* note 5, at ix ("After years of teaching and writing about economic efficiency and the law, I sat up in bed one morning and thought, 'Maybe efficiency is wrong and innovation is right.'"). *See supra* Section II.B.1.

225. *See supra* note 199 and accompanying text.

products consumers want on an on-demand basis—self-assembling bridges and buildings, self-tailoring clothes, and so forth. Indeed, it is plausible that such a technological advance would slash all sorts of wants of our current world and might lead to a fundamentally reordered society—in ways that could be good, bad, or both.[226] A leap ahead in artificial intelligence is another plausible pathway to transformational future growth. In fact, a giant step forward in artificial intelligence could itself lead to massive advances in energy generation, energy storage, and nanotechnology.

Putting all of this together, it appears that our choices in the architecture of intellectual property law—and our ability to think about those choices in a macroeconomic context—are potentially momentous.

C. Macroeconomic Views Can Be Difference-Making for IP Policy

While the macroeconomic perspective may be the right intellectual framing, and while the stakes may be high, the prioritization of the macroeconomic perspective arguably matters little if there is no conflict between the micro- and macroeconomic perspectives or between the goals of economic efficiency and economic growth. In other words, the argument for a shift to a macroeconomic perspective is made much stronger if the macroeconomic perspective makes for some sort of a difference in the policy debate.

A primary reason to believe that seeking allocative efficiency in the here-and-now is a serious and significant threat to economic growth comes from the progressive nature of economic growth. As discussed above, the Overtaking Theorists lack justification for their assertion that innovation is subject to compounding in a manner similar to money in the bank.[227] Nevertheless, it is clear that innovation is *progressive*, meaning that it is often the case in technological progress that one thing needs to happen before the next thing can happen. For instance, you cannot invent the internet until you've invented computers. And you cannot invent computers until you've invented electricity. So while innovation is not exponential in its essential nature, innovation can indeed exhibit multiplicative effects in idiosyncratic but important ways. Advances in transportation and telecommunications, for example, are capable of multiplying the welfare gains of all kinds of inventions. The bottom line is that even without compounding, it is plausible that delaying or speeding innovation in the

226. See NEAL STEPHENSON, THE DIAMOND AGE: OR, A YOUNG LADY'S ILLUSTRATED PRIMER (1995) for a novel imagining such a technology and offering a vision of the political and social changes that might accompany it.

227. *See supra* notes 190–205 and accompanying text.

short term may have magnified effects on the future—indeed effects that grow larger as the future stretches out further in front of us.

One potential example of how a macroeconomic perspective can make a difference to contemporary policy analysis with regard to intellectual property comes from software patents. Many have suggested that software patents are broadly unnecessary for innovation and that they can be discouraging of innovation.[228] The macroeconomic perspective has the potential to sharpen arguments against software patents and to raise the stakes: a macroeconomic perspective suggests that innovation delayed by software patenting may have ramifications on future lives. This is because software is a foundational technology that empowers higher layers of innovation.

Consider that contemporary automobiles depend on huge amounts of software. And higher education depends on software to deliver and enhance teaching, to deal with student data, and to provide measurement and assessment of student learning. And consider as well that the modern brick-and-mortar retail business depends on software to take payments, track inventory, and enable smarter merchandise purchasing decisions by way of analyzing sales and consumer preferences. If software development is held back because of patenting, it is straightforwardly plausible that innovation will suffer across the automobile, higher education, and brick-and-mortar retail sectors—and indeed the entire landscape of industry. Software patents thus plausibly act to restrain economic growth in a substantial way. Put differently, the downside of mistaken policy choices for software patenting is not just a lack of allocative efficiency for current and near-term software makers and users. The downside of software patenting is possibly putting the brakes on innovation across vast swaths of industry and applying a stagnating influence on the economy across the globe.

Another example of how a primary focus on macroeconomic analysis could make a difference to a contested area within intellectual property is

228. *See, e.g.*, James Bessen, *A Generation of Software Patents*, 18 B.U. J. SCI. & TECH. L. 241, 249–50 (2012) ("[P]atent litigation since the early 1990s . . . implies that software patents imposed significant disincentives for investment in R&D for most industries including software."); *id.* at 261 ("[I]f software patents were socially beneficial, this should show up in the evidence from the software industry. In this regard, it is notable that after more than a decade of experience, this economic experiment played out in a highly innovative industry still lacks clear evidence of net benefit."); Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CALIF. L. REV. 1, 56–57 (2001) (concluding that the application of existing doctrine in the context of software tends toward patents of extraordinary breadth) ("Because of the unique technical and economic characteristics of software, patent protection that is broader than usual is much more likely to hinder innovation than to foster it."); *see also* Adina Sivaraman, *The Shield Act: A Good Attempt at Curbing Patent Trolls That Leaves Us Wanting More*, 7 J. BUS., ENTREPRENEURSHIP, & L. 209, 226 n.101 (2013) (collecting cites); Joanna M. Grigas, *Defining Patent Eligibility by Extrapolating the Judicial Outlook of Software onto Biotechnology Patents*, 18 SUFFOLK J. TRIAL & APP. ADVOC. 221, 233 nn.80–83 (2013) (collecting cites).

with regard to patenting in the pharmaceutical and medical treatment sector. The research pharmaceutical industry is often attacked for having a pricing strategy that keeps prices high in order to maximize profits while leaving many patients priced out of access to life-transforming or life-saving drugs.[229] A macroeconomic perspective could potentially support the argument that the wealth-income inequality effects should be deemphasized or ignored, because the more important consideration is the long-term gain to economic growth from undimmed incentives to innovate that comes from monopoly profits.[230] But such an argument, to be compelling, would require some plausible story for how subordinating distributive justice goals could lead to substantially enhanced growth.[231]

On the other hand, one might argue—also on a macroeconomic basis—that because wealth-income inequality is one of the most important current impediments to economic growth, a patenting regime that causes an increase in healthcare inequality, if that translates to higher wealth-income inequality, ought not to be tolerated given the potential for long-term growth ramifications.[232]

A macroeconomic pointer to inequality concerns also suggests considering inequalities directly associated with IP law and the role of the IP system in seeking to spur innovation. For example, in a recent paper Colleen Chien argues that the patent system can exacerbate inequalities with regard to who can participate and succeed in innovation work.[233] Chien also argues that the patent system can alleviate innovation inequalities.[234] She proposes a number of means to broaden access to innovating activity, including providing access to tools that increase the quality of patent applications[235] and using equity metrics.[236]

229. *See, e.g.*, Abbey Meller & Hauwa Ahmed, *How Big Pharma Reaps Profits While Hurting Everyday Americans*, CTR. FOR AM. PROGRESS (Aug. 30, 2019), https://www.americanprogress.org/article/big-pharma-reaps-profits-hurting-everyday-americans/ [https://perma.cc/Q9MC-ZGLW].

230. This would seem to be the Cooter perspective. *See supra* note 151 and accompanying text.

231. The Overtaking Theorists have notably not made such a case.

232. For some component parts of such an argument, see GORDON, *supra* note 90, at 2 (discussing rising inequality as impediment to growth, "blowing like a gale to slow down the vessel of progress") and Kapczynski, *supra* note 117, at 264 (discussing "appalling global disparities in health outcomes around the world, the importance of health to development, and the high economic returns of investment in health" (footnotes omitted)).

233. Colleen V. Chien, *The Inequalities of Innovation*, 72 EMORY L.J. 1, 23–24, 31–46 (2022)

234. *Id.* at 24–31.

235. *Id.* at 50.

236. *Id.* at 57–61.

D. The Policy Default Should Be Against IP Entitlements

The desirability of economic growth is a conventional tenet of macroeconomics. If we start from the assumption that we want large, rapid economic growth, then what? Intellectual property rights can affect growth either way—spurring innovation, frustrating it, or even doing both at the same time. Thus, we want rigorous empirical evidence that feeds into careful economic analysis. Unfortunately, that is difficult and expensive to get. In the real world, courts and legislatures forge ahead in interpreting and reforming intellectual property law under conditions of great uncertainty about the effects—economic and otherwise. Courts and legislatures rely on theory and thin evidence to decide whether IP rights should be reined in, left alone, or expanded. So it makes sense to ask whether macroeconomic thinking can tell us anything useful about what we ought to view as the default—where we ought to lean when uncertainty looms large.

In this section, I argue that the default presumption—for use when empirical evidence is lacking and economic theory offers the guiding light—should be against any expansion of the scope, remedies, and duration of IP rights. If anything, the presumption ought to run the other way—to reducing or even phasing out IP rights regimes where the economic effects are uncertain.

A general presumption against the expansion of IP rights is contrary to what many would regard as conventional wisdom and common sense. If one wants to order up more innovation, expanding intellectual property entitlements seems like a go-to solution. Indeed, one could use the macroeconomic perspective to bolster the case by arguing that because of the opportunity costs of forgone economic growth, there is such a need to accelerate innovation that we ought to err on the side of throwing everything we can at the encouragement of innovation.[237] And that could seem, at first blush, to suggest a policy default of expanding IP scope, remedies, and duration—even when there is doubt as to the likely effectiveness of doing so in spurring innovation and knowledge creation.

While that story may make some intuitive sense, I will argue here that there is a stronger case that the default policy prescription should be against the expansion of intellectual property rights, and even in favor of their contraction.

The starting place for arguing for a default policy against IP begins with the observation that there is a lack of a convincing empirical case that intellectual property entitlements are generally necessary to incentivize

237. See *supra* notes 156–159 and accompanying text.

innovation. Rather, the main rationale for IP entitlements as innovation incentives is a theoretical one, and empirical evidence has undermined it.[238]

The fact that IP rights are, on the whole, ineffective for incentivizing innovation is not necessarily the end of the matter. One might still argue that intensifying and expanding intellectual property rights is nonetheless advisable policy if one places supreme importance on seeking as much economic growth as possible as soon as possible. That is to say, one might argue that even if IP rights are largely ineffective, the mere chance that they might incentivize at least some innovation and knowledge creation makes them well worth employing as a policy measure. Such an argument cannot work, however, if there is reason to believe that intellectual property rights might possibly discourage innovation.

As it turns out, there is substantial reason to believe that IP rights can and do discourage innovation. For one, IP rights on a more primitive or foundational technology can interfere with other parties building upon that technology—improving it or using it as a tool for further innovation. Potential entrepreneurs might stay away from an entire sector of industry if it is dominated by established rivals and entry entails an expectation of having to defend against expensive IP litigation. And because ultimately invalid IP rights can form the basis for litigation, entrepreneurs can be dissuaded from charting a course that steers clear of infringement so long as it comes close enough to the lines that the journey will require vindication in court.

Indeed, there is considerable evidence that IP entitlements have innovation-discouraging effects.[239] In particular, there is evidence that

238. For a comprehensive account of how empirical evidence contradicts the theory, see Johnson, *Incentive Fallacy*, *supra* note 27. A variety of legal scholars have discussed the role of intrinsic motivation in various contexts. *See, e.g.*, Diane Leenheer Zimmerman, *Copyrights as Incentives: Did We Just Imagine That?*, 12 THEORETICAL INQUIRIES L. 29, 57–58 (2011) (expressing skepticism of copyrights as a way of incentivizing creativity in view of psychological research, but maintaining the view that copyrights are a way "to overcome the public goods problem"); Rebecca Tushnet, *Economies of Desire: Fair Use and Marketplace Assumptions*, 51 WM. & MARY L. REV. 513, 515 (2009) ("[T]he desire to create can be excessive, beyond rationality, and free from the need for economic incentive. Psychological and sociological concepts can do more to explain the creative impulses than classical economics. As a result, a copyright law that treats creativity as a product of economic incentives can miss the mark and harm what it aims to promote."); John Quiggin & Dan Hunter, *Money Ruins Everything*, 30 HASTINGS COMMC'NS & ENT. L.J. 203 (2008); Benkler, *supra* note 73, at 426 (exploring the importance of intrinsic motivation in amateur innovation and production on the internet); YOCHAI BENKLER, THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM 106–16 (2006) (discussing intrinsic incentives in "commons-based peer production," including with regard to open-source software.).

239. *See, e.g.*, FED. TRADE COMM'N, *Chapter 3: Business Testimony: Current Innovation Landscape in Selected Industries*, *in* TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY 23–26 (2003), http://www.ftc.gov/os/2003/10/innovationrpt.pdf [https://perma.cc/XPD4-HM33] (describing how patents can impede innovation in biotechnology); *id.* at 34–41 (describing the potential for patents to

patents can impede follow-on innovation[240]—which is precisely what one would want to encourage for accelerating economic growth. What is more, scholars have explained that copyright can dampen artistic innovation by encouraging investments in marketing and promotion of the most popular properties, a pattern of investment that can reduce overall creative production.[241] These observations suggest that even where IP rights might encourage certain innovations, there remains the possibility that from an overall perspective IP entitlements could be having a significant negative effect on economic growth.

I have attempted to show that there are strong reasons to expect that adding or expanding IP rights will do more harm than good. This much should at least debunk the idea that it is sensible to have a presumption in favor of expanding or adding IP entitlements to encourage innovation. The case for going further, flipping presumption the other way—against expansion and in favor of contraction—is greatly bolstered by considering error costs. Joseph Scott Miller, for instance, has argued that a consideration of error costs counsels exactly in this direction—in favor of narrowing and against expanding.[242] The macroeconomic view greatly bolsters this case.

Once a form of intellectual property entitlement has been established, it

impede innovation in computer hardware); *id.* at 50–55 (describing the potential for patents to impede innovation in computer software and internet applications); W. Keith Robinson, *Protecting American Innovators by Combating the Decline of Patents Granted to Small Entities*, 88 ST. JOHN'S L. REV. 379, 394 (2014) ("Low-quality patents hinder innovation due to the high cost incurred by others to defend against an assertion of patent infringement or licensing of a low-quality patent that may be invalid. Moreover, low-quality patents discourage investment in innovation and harm the overall economy." (footnotes omitted)).

240. *See, e.g.*, Calandrillo, *supra* note 76, at 332 (reviewing research indicating that patents can discourage follow-on innovations); Lucas S. Osborn, Joshua M. Pearce & Amberlee Haselhuhn, *A Case for Weakening Patent Rights*, 89 ST. JOHN'S L. REV. 1185, 1187 (2015) ("[T]he patent system can also burden society by impeding follow-on technology . . . . Patents can discourage follow-on research by preventing the inventor of an improvement from commercializing it to the extent that it infringes the first patent." (footnotes omitted)).

241. Mark S. Nadel, *How Current Copyright Law Discourages Creative Output: The Overlooked Impact of Marketing*, 19 BERKELEY TECH. L.J. 785, 785 (2004) ("I[n] the current lottery-like environment of many media markets, copyright law disproportionately inflates the revenues of the most popular creations, which leads publishers to spend increasing amounts on promotional campaigns, which, intentionally or not, drowns out economically marginal creations. This discourages, rather than encourages, investment in many new creations. Consequently, current copyright law may actually reduce the overall production of new creations."); *see also* Glynn S. Lunney, Jr., Copyright's Excess *Revisited*, 6 TEX. A&M J. PROP. L. 59, 60 (2020) (reviewing Lunney's empirical research on popular music showing that greater copyright incentives were negatively correlated with measures of quality and quantity of music).

242. Joseph Scott Miller, *Error Costs & IP Law*, 2014 U. ILL. L. REV. 175, 176–77 (2014) (arguing that when in doubt about the scope of a statutory intellectual property entitlement, courts should choose the narrower scope because the error cost is lower—an excessively narrow right is easier for a legislature to correct).

is very difficult to get rid of as a political matter.[243] Intellectual property rights regimes tend to be a one-way ratchet.[244] This observation undercuts expansionist arguments for IP rights based on fear of forgone opportunities for economic growth. A macroeconomic perspective, recognizing the importance of economic growth over the long term, points up the high stakes involved: Adopting or expanding an IP rights regime may not only mean a forgone opportunity for economic growth today but also a continuing brake on growth going into the future. Thus, attention to the importance of economic growth counsels that we should be very careful of expanding current IP regimes or adopting new ones.

Unless policymakers are presented with a bulletproof case for an expansion in available intellectual property entitlements, it seems the better course is to demur. Theory and empirical evidence, abetted by a macroeconomic perspective, strongly suggest that the policy default should be declining the invitation to expand market-distorting exclusive rights. Programs of intellectual property entitlements can always be added later, if the evidence-based case for them eventually becomes strong. But the potential mistake the other way—creating difficult-to-remove engines of stagnation—is more dire. And if we do adopt any top-down means to encourage innovation, whether through bestowing prizes and rewards or handing out intellectual property entitlements, then the macroeconomic perspective counsels that those programs should be created with a built-in

243. *See id.* at 184–85 ("When a court decision establishes, incorrectly, an IP entitlement, the false positive calls into being a focused interest group for resisting any subsequent legislative correction . . . . Relative to the general public, which might want to correct the false positive, these rights holders—who stand to lose most directly from a legislative correction to the statute—constitute a smaller, more easily organized group."); Eric E. Johnson, *An Intellectual Property Fix for Platform Salesjacking*, 116 NW. U. L. REV. ONLINE 306, 326 (2022) (arguing that intellectual property rights, once established, are difficult to undo); Frank H. Easterbrook, *Cyberspace Versus Property Law?*, 4 TEX. REV. L. & POL. 103, 107–08 (1999) (observing that when politically created rules can be targeted on industry-specific bases, concentrated interests can obtain rules that favor those concentrated interest even as they disfavor the public interest generally).

244. *See, e.g.*, Mark A. Lemley, *Romantic Authorship and the Rhetoric of Property*, 75 TEX. L. REV. 873, 886–87 (1997) (reviewing JAMES BOYLE, SHAMANS, SOFTWARE, AND SPLEENS: LAW AND THE CONSTRUCTION OF THE INFORMATION SOCIETY (1996)) ("Copyright law has gone through numerous statutory iterations over the past 210 years, almost always changing in the direction of expanded protection for copyright owners—increasing the number of things that are copyrightable, increasing the duration of copyright protection, making it easier to qualify for copyright protection, and increasing the rights copyright owners have to control uses of their works." (footnotes omitted)); PETER DRAHOS, THE GLOBAL RATCHET FOR INTELLECTUAL PROPERTY RIGHTS: WHY IT FAILS AS POLICY AND WHAT SHOULD BE DONE ABOUT IT 1–2 (2003), https://www.anu.edu.au/fellows/pdrahos/reports/pdfs/2003globalipratchet.pdf [https://perma.cc/LNM6-GZK5] (discussing how the negotiation and accession process of international trade treaties has caused a "ratcheting" up of intellectual property rights) ("[E]ach subsequent bilateral or multilateral agreement can and usually does establish a higher standard of IP protection.").

expiration date.[245] That is, they should have a sunset clause included within them.[246]

Along these lines, it should be noted that a particular hazard arises when international treaties enshrine the availability of IP rights or their expansion.[247] There are at least two reasons for this. First, treaties are even more difficult to change than domestic legislation, making mistakes harder to undo. Second, where IP entitlements are created or expanded by way of international treaty, growth-hampering effects will necessarily be international, potentially global.

Securing the law against uncertain expansions of IP entitlements that are potentially disastrous for growth is a first policy priority. Next, it makes sense to begin actively considering narrowing and even sunsetting IP rights regimes as a means for spurring economic growth and societal progress.

CONCLUSION

Despite the longstanding economic orientation of intellectual property law, there has been scant attention to macroeconomic concepts. Instead, the intellectual property literature has focused on microeconomic ideas as a means of generating fresh insights. That should be surprising. The economic justification of intellectual property is anchored to the production of innovation, knowledge, and information, and those things are at the center of interest for macroeconomists. Indeed, contemporary macroeconomics sees these intangibles as the essential factor in allowing continuing improvements in standards of living in mature economies—beyond the limits of what capital investment can do. In other words, macroeconomics celebrates innovation and the advancement of knowledge for allowing us to derive more value from the resources we already have.

This Article has offered an initial, broad outline of what a macroeconomic focus could mean for intellectual property law and policy. It has argued that the macroeconomic perspective provides new insight and that, going forward, when it comes to the economic side of intellectual property theory, the macroeconomic perspective ought to receive primacy over the microeconomic perspective. Put differently, for intellectual

245. *See* Johnson, *Incentive Fallacy*, *supra* note 27, at 675–78 (making the case for putting sunset provisions in laws that create intellectual property entitlements).

246. *See id.*

247. For a relevant discussion, see Ruth L. Okediji, *The Regulation of Creativity Under the WIPO Internet Treaties*, 77 FORDHAM L. REV. 2379, 2390 (2009) (explaining that the Berne Convention "established an intractable momentum toward consolidation of a strong, harmonized multilateral accord for global copyright protection" and that it "in effect, defin[ed] legitimate treaty activities in the copyright realm as only those that unambiguously enhance the rights of authors and owners").

property law, getting the economics right means first and foremost getting the macroeconomics right.

There have been a number of strains in intellectual property scholarship suggesting a willingness to move beyond narrow microeconomic framings. But the most decisive move toward a macroeconomic approach—while not labeling it as such—has been the work of the Overtaking Theorists, led by Robert Cooter. Their analysis claims to show that in the pursuit of economic growth, intellectual property policy should move decisively toward allowing firms to have substantially stronger exclusive rights. And their work argues that the need to do so is urgent. Moreover, they contend that with sufficient growth, policymakers can ignore concerns about economic efficiency and even justice-based concerns over fairness and equality. If they are correct, much of contemporary thought about intellectual property must be thrown out. A careful appraisal, however, shows their arguments to be logically conflicted and at odds with contemporary macroeconomic understandings.

But that is not the end of the story. There is great potential for rethinking intellectual property through the intentional and explicit adoption of a macroeconomic perspective. A macroeconomic understanding fits snuggly with the U.S. Constitution's mandate for intellectual property law—that it is for the promotion of progress. And the macroeconomic approach is capable of yielding practical, real-world prescriptions. Indeed, it offers prescriptions that are distinct from those that spring from a microeconomic view focused on individual markets and efficiency.

At the broadest levels, the wide scope of macroeconomics—taking in the view of the whole economy and the long term—invites us to confront the biggest sorts of questions about what we should be striving toward as a society. That makes sense, because intellectual property law has always been tomorrow-oriented, implicitly calling on the assumption that technological progress and the advancement of knowledge is an arrow pointing to humanity's future. Given that framework, it follows that arguments about intellectual property law will benefit from careful consideration of the economic picture from the widest possible vantage point.