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Intellectual Property versus Prizes: Reframing the Debate

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The academic literature on the prize system describes prizes as a radical alternative to intellectual property. The debate over which system is preferable has existed for centuries and usually boils down to a single question: Can the government determine the appropriate reward for innovations without relying on intellectual property rights to reveal their value to consumers? If yes, scholars assume that prizes are superior because they avoid deadweight loss and provide equal or better incentives for innovation. This reflects a fundamental misunderstanding of the nature of intellectual property rights. It equates intellectual property with uniform monopoly pricing and monopoly profits, while depicting the prize system as the only effective strategy to achieve efficient consumer pricing and government control over rewards. In reality, intellectual property merely provides a right to exclude others from the market. Governments can and often do institute policies that resemble prize systems—in both their structure and objectives—alongside intellectual property systems. Governments use subsidies (and sometimes price controls) to push consumer prices closer to marginal cost and adjust the incentives for innovation. Given these other policy levers available within an intellectual property regime, the existing prize literature has exaggerated and misconceived the differences between the two systems. Under many circumstances, the prize system has no advantage over intellectual property in terms of avoiding deadweight loss. Moreover, intellectual property will frequently offer superior incentives to prizes—irrespective of whether it is used to measure an invention’s value to consumers—because it provides an ongoing check against expropriation, thereby permitting renegotiation of rewards over time to reflect changing estimations of an invention’s social value. Contrary to the long-standing framework used to compare the two systems, intellectual property may be superior to prizes even when the government can determine the appropriate reward for innovations.

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INTRODUCTION

The intellectual property system is a central component of innovation policy, but it has always been controversial.¹ The system is designed to encourage innovation by offering a temporary monopoly right over inventions or works of authorship (hereinafter “inventions”).² However, the benefits from promoting innovation through intellectual property rights are at least partially offset by the deadweight loss from allowing innovators to charge monopoly prices for their inventions.³ Moreover, the allure of monopoly profits offers imperfect incentives for innovation, providing inadequate rewards for many socially valuable inventions⁴ while overrewarding some socially wasteful inventions.⁵ A “growing number” of academics have concluded that the government could correct those problems by replacing some or all of the intellectual property system with prizes.⁶ These scholars argue that the government should award monetary prizes instead of intellectual property rights⁷ for inventions and

¹ See Adam B. Jaffe and Josh Lerner, *Innovation and Its Discontents: How Our Broken Patent System Is Endangering Innovation and Progress, and What to Do about It* 79–95 (Princeton 2004); Mark D. Janis, *Patent Abolitionism*, 17 *Berkeley Tech L J* 899, 922–48 (2002); Fritz Machlup and Edith Penrose, *The Patent Controversy in the Nineteenth Century*, 10 *J Econ Hist* 1, 15–16 (1950).

² See US Const Art I, § 8, cl 8 (giving Congress the power “[t]o 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”).

³ See F.M. Scherer, *Industrial Market Structure and Economic Performance* 379–99 (Rand McNally 1970) (discussing the classical economic analysis of the patent system); Steven Shavell, *Foundations of Economic Analysis of Law* 137–66 (Harvard 2004).

⁴ See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in National Bureau of Economic Research, ed, *The Rate and Direction of Inventive Activity: Economic and Social Factors* 609, 617, 619 (Princeton 1962).

⁵ See Jean Tirole, *The Theory of Industrial Organization* 399–400 (MIT 1988).

⁶ Amy Kapczynski, *The Cost of Price: Why and How to Get beyond Intellectual Property Internalism*, 59 *UCLA L Rev* 970, 976 n 19 (2012).

⁷ While the theoretical literature almost always depicts prize systems as an alternative to intellectual property, there are very few historical or present-day examples of prizes offered as a replacement for intellectual property rights. See generally Knowledge Ecology International, *Selected Innovation Prizes and Reward Programs* (2008), online at http://www.keionline.org/misc-docs/research_notes/kei_rn_2008_1.pdf (visited Aug 12, 2014) (listing a few examples of such systems). The vast majority of prizes have been

propose systems in which the government determines the prize payouts for inventions *ex post* (that is, after their development)⁸ based on an estimate of each invention's social value.⁹ According to most prize advocates, this approach would avoid the deadweight loss associated with intellectual property and provide

used as a supplement to intellectual property. See Liam Brunt, Josh Lerner, and Tom Nicholas, *Inducement Prizes and Innovation*, 60 *J Indust Econ* 657, 659 (2012) (examining the use of prizes by the Royal Agricultural Society of England from 1839 to 1939); Deborah D. Stine, *Federally Funded Innovation Inducement Prizes* *3–17 (Congressional Research Service June 29, 2009), online at <http://fas.org/sgp/crs/misc/R40677.pdf> (visited Aug 12, 2014) (detailing various prizes offered by the federal government to promote particular innovations).

⁸ See Julien Penin, *Patents versus Ex Post Rewards: A New Look*, 34 *Rsrch Pol* 641, 644 (2005) (reviewing the literature on proposals for *ex post* prize systems and patent buyouts). The government could set prize payouts *ex ante* rather than *ex post*, offering a specific monetary reward to anyone who solves a particular problem in a manner satisfying certain predetermined conditions. See Lee Davis and Jerome Davis, *Prizes as Incentives: Reflections on a Century of Aviation Contests*, in Jon Sundbo, et al, eds, *Contemporary Management of Innovation: Are We Asking the Right Questions?*, 230, 230–47 (Palgrave Macmillan 2006); Thomas Kalil, *Prizes for Technological Innovation* *18–19 (Brookings Institution Discussion Paper 2006-08, Dec 2006), online at http://www.hamiltonproject.org/files/downloads_and_links/Prizes_for_Technological_Innovation.pdf (visited Aug 12, 2014). *Ex ante* prizes might seem superior to *ex post* prizes because, assuming that the government's commitment to pay is credible, *ex ante* prizes avoid the potential *in terrorem* effect of setting prizes when the innovator's costs are already sunk. However, *ex ante* prizes are not a broad substitute for intellectual property rights because, in many cases, the government has trouble foreseeing socially valuable inventions prior to their development and thus cannot post their prize payout *ex ante*:

[G]overnments often will be less likely than private investors to know of the existence of possible creations or inventions, much less of their value . . . [t]he key insight [for prize advocates] is that the size of a prize need not be established *ex ante*. It can also be determined *ex post*—when there is better and more widely distributed information about value.

Kapczynski, 59 *UCLA L Rev* at 986 (cited in note 6). See also Joseph E. Stiglitz, *Economic Foundations of Intellectual Property Rights*, 57 *Duke L J* 1693, 1724 (2008). Indeed, *ex ante* prizes can be extremely challenging to establish and administer, since the government must specify ahead of time the precise performance standards necessary for inventions to win the prize. As Professor Fiona Murray and her coauthors explain, specifying the criteria for winning a prize “is not nearly as clear or simple as either theorists or advocates have assumed,” since “multiple dimensions of performance [must] be assessed” and “[s]ome of these dimensions can neither be quantified nor anticipated, while others may change as the competition unfolds.” Fiona Murray, et al, *Grand Innovation Prizes: A Theoretical, Normative, and Empirical Evaluation*, 41 *Rsrch Pol* 1779, 1791 (2012). This same problem frequently plagues R & D contract bidding in the defense department. See John A. Alic, *Trillions for Military Technology: How the Pentagon Innovates and Why It Costs So Much* 69–70, 102–08 (Palgrave Macmillan 2007).

⁹ Governments could attempt to link prize payouts to each invention's total R & D costs instead of its social value, but prize advocates generally assume that the government has better information about inventions' social value than about their R & D costs. See Stephen M. Maurer and Suzanne Scotchmer, *Procuring Knowledge*, 15 *Adv Stud Entrepreneurship, Innovation & Econ Growth* 1, 5 (2004).

superior incentives for innovation.¹⁰ But many scholars argue vehemently against such proposals, usually on the ground that the government would likely mismanage the prize payouts, jeopardizing the incentives for innovation.¹¹

This debate dates back to at least the nineteenth century¹² and may be “as old as the patent system” itself.¹³ However, the past two decades have seen a virtual explosion of scholarship on prize systems,¹⁴ particularly within the economic¹⁵ and legal

¹⁰ See, for example, Steven Shavell and Tanguy van Ypersele, *Rewards versus Intellectual Property Rights*, 44 J L & Econ 525, 544–45 (2001) (arguing that an optional-prize system is superior to intellectual property rights); Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 Q J Econ 1137, 1146–48 (1998) (proposing a patent buyout regime for pharmaceutical patents).

¹¹ See, for example, Joseph A. DiMasi and Henry G. Grabowski, *Patents and R&D Incentives: Comments on the Hubbard and Love Trade Framework for Financing Pharmaceutical R&D* *11–13 (2004), online at <http://who.int/intellectualproperty/news/en/Submission3.pdf> (visited Aug 12, 2014); F. Scott Kieff, *Property Rights and Proprietary Rules for Commercializing Inventions*, 85 Minn L Rev 697, 705–17 (2001); National Research Council, *Innovation Inducement Prizes at the National Science Foundation* 33 (National Academies 2007) (“The [NSF] committee counsels against any requirement that the winner [of an innovation-inducement prize] make the intellectual property underlying the winning innovation available to the world at no cost or on concessional terms.”).

¹² See Machlup and Penrose, 10 J Econ Hist at 19 (cited in note 1).

¹³ Fritz Machlup, *An Economic Review of the Patent System*, Study No 15, Subcommittee on Patents, Trademarks, and Copyrights of the Senate Committee on the Judiciary, 85th Cong, 2d Sess 1, 15 (1958). See also Peter Eckersley, *Virtual Markets for Virtual Goods: The Mirror Image of Digital Copyright?*, 18 Harv J L & Tech 85, 95–96 (2004) (citing various champions of proposals to replace patents with prizes, dating as far back as 1660); Janis, 17 Berkeley Tech L J at 899 (cited in note 1); Machlup and Penrose, 10 J Econ Hist at 19 (cited in note 1); Christine MacLeod, *Inventing the Industrial Revolution: The English Patent System, 1660–1800* 182–200 (Cambridge 1988).

¹⁴ See Daniel J. Hemel and Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 Tex L Rev 303, 305 (2013) (“In recent years, articles comparing the relative merits of patents, prizes, and grants have consumed thousands of pages in law reviews and economics journals.”); Amy Kapczynski and Talha Syed, *The Continuum of Excludability and the Limits of Patents*, 122 Yale L J 1900, 1912 n 38, 1954–56 & nn 172–80 (2013) (compiling a list of sources reflecting the “resurgence of interest recently in comparative analysis of patents and innovation policy alternatives”). Compare Shavell and van Ypersele, 44 J L & Econ at 528 (cited in note 10) (noting that in the “[m]odern economic literature” as of 2001, “the possibility of rewards is paid relatively little attention”), with Knowledge Ecology International, *Scholarly and Technical Articles and Books on Innovation Prizes*, online at <http://www.keionline.org/content/view/82/1> (visited Aug 12, 2014) (listing more than fifty articles and books about prizes published after 2001).

¹⁵ See, for example, Davis and Davis, *Prizes as Incentives* at 230 (cited in note 8); Eric A.A. de Laat, *Patents or Prizes: Monopolistic R&D and Asymmetric Information*, 15 Intl J Indust Org 369, 370 (1996); Earl L. Grinols and James W. Henderson, *Replace Pharmaceutical Patents Now*, 25 Pharmacoeconomics 355, 357 (2007); Robert C. Guell and Marvin Fischbaum, *Toward Allocative Efficiency in the Prescription Drug Industry*, 73 Milbank Q 213, 220–25 (1995); Hugo Hoppenhayn, Gerard Llobet, and Matthew Mitchell,

literatures¹⁶ on intellectual property, but also in political philosophy¹⁷ and public health.¹⁸ Some of this literature is largely

Rewarding Sequential Innovators: Prizes, Patents and Buyouts, 114 J Polit Econ 1041, 1042–45 (2006); William A. Masters, *Research Prizes: A Mechanism to Reward Agricultural Innovation in Low-Income Regions*, 6 AgBioForum 71, 72–73 (2003); Paul Romer, *When Should We Use Intellectual Property Rights?*, 92 Am Econ Rev 213, 216 (2002); Suzanne Scotchmer, *Innovation and Incentives* 41–46 (MIT 2004); Shavell, *Foundations* at 161–66 (cited in note 3); Stiglitz, 57 Duke L J at 1719–21 (cited in note 8); Burton A. Weisbrod, *Solving the Drug Dilemma*, Wash Post A21 (Aug 22, 2003); Nancy Gallini and Suzanne Scotchmer, *Intellectual Property: When Is It the Best Incentive System?*, in Adam B. Jaffe, Josh Lerner, and Scott Stern, eds, 2 *Innovation Policy and the Economy* 51, 54 (MIT 2002). See also generally Brunt, Lerner, and Nicholas, 60 J Indust Econ 657 (cited in note 7); V.V. Chari, Mikhail Golosov, and Aleh Tsyvinski, *Prizes and Patents: Using Market Signals to Provide Incentives for Innovations*, 147 J Econ Theory 781 (2012); J.A. DiMasi and H.G. Grabowski, *Should the Patent System for New Medicines Be Abolished?*, 82 Clinical Pharmacology & Therapeutics 488 (2007); Aidan Hollis, *An Efficient Reward System for Pharmaceutical Innovation* (unpublished draft, June 10, 2004), online at <http://www.who.int/intellectualproperty/news/Submission-Hollis6-Oct.pdf> (visited Aug 12, 2014); Kremer, 113 Q J Econ 1137 (cited in note 10); Penin, 34 Rsrch Pol 641 (cited in note 8); Shavell and van Ypersele, 44 J L & Econ 525 (cited in note 10). Of course, the idea of prizes is not new to economics. See Michael Polanyi, *Patent Reform*, 11 Rev Econ Stud 61, 64–65 (1944) (arguing that the patent system should be replaced with a prize regime); Brian D. Wright, *The Economics of Invention Incentives: Patents, Prizes, and Research Contracts*, 73 Am Econ Rev 691, 696–700 (1983).

¹⁶ See, for example, Jordan Barry, *When Second Comes First: Correcting Patent's Poor Secondary Incentives through an Optional Patent Purchase System*, 2007 Wis L Rev 585, 590–95; 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 IP Media & Ent L J 301, 342–44 (1998); John F. Duffy, *The Marginal Cost Controversy in Intellectual Property*, 71 U Chi L Rev 37, 49–51 (2004); William Fisher, *Intellectual Property and Innovation: Theoretical, Empirical, and Historical Perspectives* *2–3 (unpublished essay, Programme Seminar on Intellectual Property and Innovation in the Knowledge-Based Economy, May 2001), online at <http://cyber.law.harvard.edu/people/tfisher/Innovation.pdf> (visited Aug 12, 2014); Eckersley, 18 Harv J L & Tech at 106–11 (cited in note 13); William W. Fisher III, *Promises to Keep: Technology, Law, and the Future of Entertainment* 199–258 (Stanford 2004); Janis, 17 Berkeley Tech L J at 939–42 (cited in note 1); Amy Kapczynski, *Commentary: Innovation Policy for a New Era*, 37 J L Med & Ethics 264, 265–66 (2009); F. Scott Kieff, *Coordination, Property, and Intellectual Property: An Unconventional Approach to Anticompetitive Effects and Downstream Access*, 56 Emory L J 327, 403–04 (2006); Kieff, 85 Minn L Rev at 705–17 (cited in note 11); Saul Levmore, *The Impending iPrize Revolution in Intellectual Property Law*, 93 BU L Rev 139, 151–58 (2013); Jessica Litman, *Sharing and Stealing*, 27 Hastings Comm & Ent L J 1, 41–45 (2004); James Love and Tim Hubbard, *The Big Idea: Prizes to Stimulate R&D for New Medicines*, 82 Chi Kent L Rev 1519, 1534–43 (2007); Gregory N. Mandel, *Promoting Environmental Innovation with Intellectual Property Innovation: A New Basis for Patent Rewards*, 24 Temple J Sci Tech & Envir L 51, 64–69 (2005); Arti K. Rai, *The Ends of Intellectual Property: Health as a Case Study*, 70 L & Contemp Probs 125, 128–30 (2007); Peter K. Yu, *P2P and the Future of Private Copying*, 76 U Colo L Rev 653, 734–35 (2005). See also generally, Michael Abramowicz, *Perfecting Patent Prizes*, 56 Vand L Rev 115 (2003); William Fisher and Talha Syed, *Chapter 7: Prizes* (unpublished draft, Feb 24, 2012), online at http://cyber.law.harvard.edu/people/tfisher/Drugs_Chapter7.pdf (visited Aug 12, 2014); Marhi Kim and Bryan Schwartz, *Economic Prizes: A New Model for Pharmaceutical*

theoretical, but much of it discusses relatively specific proposals to replace intellectual property with prizes in particular fields. The majority of these discussions are about whether to finance pharmaceutical innovation through a prize system rather than through patents.¹⁹ There are also proposals to eliminate copyrights on music, movies, and books in favor of prizes,²⁰ as well as

Innovations, 6 *Asper Rev Intl Bus & Trade L* 1 (2006); Douglas Gary Lichtman, *Pricing Prozac: Why the Government Should Subsidize the Purchase of Patented Pharmaceuticals*, 11 *Harv J L & Tech* 123 (1997); Kevin Outterson, *Patent Buy-Outs for Global Disease Innovations for Low- and Middle-Income Countries*, 32 *Am J L & Med* 159 (2006); Talha Syed, *Should a Prize System for Pharmaceuticals Require Patent Protection for Eligibility?* (IGH Discussion Paper No 2, June 10, 2009), online at http://www.healthimpactfund.com/files/DP2_Syed.pdf (visited Aug 12, 2014); Marlynn Wei, *Should Prizes Replace Patents? A Critique of the Medical Innovation Prize Act of 2005*, 13 *BU J Sci & Tech L* 25 (2007).

¹⁷ See, for example, Thomas Pogge, *Medicines for the World: Boosting Innovation without Obstructing Free Access*, in Thomas Pogge and Michael J. Selgelid, eds, *Health Rights* 315, 328–35 (Ashgate 2010); Michael J. Selgelid, *A Full-Pull Program for the Provision of Pharmaceuticals: Practical Issues*, 1 *Pub Health Ethics* 134, 134–36 (2008).

¹⁸ See, for example, E. Richard Gold, et al, *Are Patents Impeding Medical Care and Innovation?*, 7 *PLoS Med* 1, 2 (2009); Alan Lyles, *Creating Alternative Incentives for Pharmaceutical Innovation*, 28 *Clinical Therapeutics* 126, 126–27 (2006); Carl Nathan, *Aligning Pharmaceutical Innovation with Medical Need*, 13 *Nature Med* 304, 306 (2007).

¹⁹ See generally, for example, Abramowicz, 56 *Vand L Rev* 115 (cited in note 16); Dean Baker, *Financing Drug Research: What Are the Issues?* (Issue Brief, Center for Economic and Policy Research, Sept 22, 2004), online at http://www.cepr.net/documents/publications/intellectual_property_2004_09.pdf (visited Aug 12, 2014); Barry, 2007 *Wis L Rev* at 638–40 (cited in note 16); DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* 488 (cited in note 15); Fisher and Syed, *Prizes* (cited in note 16); Gold, et al, 7 *PLoS Med* 1 (cited in note 18); Grinols and Henderson, 25 *Pharmacoeconomics* 355 (cited in note 15); Guell and Fischbaum, 73 *Milbank Q* 213 (cited in note 15); Hollis, *An Efficient Reward System for Pharmaceutical Innovation* (cited in note 15); Aidan Hollis and Thomas Pogge, *The Health Impact Fund: Making New Medicines Accessible for All* (Global Health 2008); Kapczynski, 59 *UCLA L Rev* 970 (cited in note 6); Kapczynski, 37 *J L Med & Ethics* 264 (cited in note 16); Kim and Schwartz, 6 *Asper Rev Intl Bus & Trade L* 1 (cited in note 16); Kremer, 113 *Q J Econ* 1137 (cited in note 10); Levmore, 93 *BU L Rev* 139 (cited in note 16); Lichtman, 11 *Harv J L & Tech* 123 (cited in note 16); Love and Hubbard, 82 *Chi Kent L Rev* 1519 (cited in note 16); James Love and Tim Hubbard, *Prizes for Innovation of New Medicines and Vaccines*, 18 *Annals Health L* 155 (2009); Lyles, 28 *Clinical Therapeutics* 126 (cited in note 18); Nathan, 13 *Nature Med* 304 (cited in note 18); Outterson, 32 *Am J L & Med* 159 (cited in note 16); Rai, 70 *L & Contemp Probs* 125 (cited in note 16); Selgelid, 1 *Pub Health Ethics* 134 (cited in note 17); Stiglitz, 57 *Duke L J* 1692 (cited in note 8); Syed, *Should a Prize System for Pharmaceuticals Require Patent Protection for Eligibility?* (cited in note 16); Weisbrod, *Solving the Drug Dilemma*, *Wash Post* A21 (cited in note 15).

²⁰ See, for example, Michael Abramowicz, *Copyrighted Works as Public Goods* (IP-Central Rev, 2004) (on file with author); Eckersley, 18 *Harv J L & Tech* at 97–100 (cited in note 13); Fisher, *Promises to Keep* at 199–258 (cited in note 16); Levmore, 93 *BU L Rev* at 158–61 (cited in note 16); Litman, 27 *Hastings Comm & Ent L J* at 41–45 (cited in note 16); Romer, 92 *Am Econ Rev* at 216 (cited in note 15); Yu, 76 *U Colo L Rev* at 739–44 (cited in note 16); Raymond Shih Ray Ku, *The Creative Destruction of Copyright: Napster and the New Economics of Digital Technology*, 69 *U Chi L Rev* 263, 312–15 (2002)

proposals to use prizes instead of patents to spur innovation in clean energy.²¹

This literature almost invariably describes the prize system as a dramatic departure from an intellectual property regime.²² Professors Terry Fisher and Talha Syed characterize prizes as a “radically different approach” to promoting innovation with monopoly rights.²³ Professor Steven Shavell states that the prize system “provides a fundamental alternative to property rights in information.”²⁴ Professor Michael Abramowicz describes prize proposals as a “challenge [to] the foundations of intellectual property law.”²⁵ Professor Amy Kapczynski argues that the

(proposing “[s]tatutory levies . . . on subscriptions for Internet service and the sales of computer, audio, and video equipment” to “provide a source of revenue for musicians and songwriters instead of copyright”); Glynn S. Lunney Jr., *The Death of Copyright: Digital Technology, Private Copying, and the Digital Millennium Copyright Act*, 87 Va L Rev 813, 852–53, 911–12 (2001) (offering a qualified endorsement of plans “to authorize private copying while attempting to compensate copyright owners by collecting levies on sales of the equipment and blank storage media that enable such copying”); Neil Weinstock Netanel, *Impose a Noncommercial Use Levy to Allow Free Peer-to-Peer File Sharing*, 17 Harv J L & Tech 1, 35 (2003) (proposing a “Noncommercial Use Levy” for “allowing unhindered P2P file swapping while compensating copyright holders with proceeds of some sort of compulsory license or levy”); Mark A. Lemley and R. Anthony Reese, *Reducing Digital Copyright Infringement without Restricting Innovation*, 56 Stan L Rev 1345, 1406–10 (2004) (discussing some of the pros and cons of a “levy” system for financing innovation).

²¹ See, for example, Bronwyn H. Hall and Christian Helmers, *Innovation and Diffusion of Clean/Green Technology: Can Patent Commons Help?*, 66 J Envir Econ & Mgmt 33, 33–34 (2013); Chris Israel, *A Survey of the Global Policy Landscape for Green Technology and Intellectual Property* *22 (Institute for Policy Innovation Policy Report 193, Apr 2011), online at http://www.ipi.org/docLib/20120106_Green_Tech.pdf (visited Aug 12, 2014); Jerome Reichman, et al, *Intellectual Property and Alternatives: Strategies for Green Innovation* *21–22 (Energy, Environment and Development Programme Paper, Chatham House, Dec 2008), online at http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=2915&context=faculty_scholarship (visited Aug 12, 2014); Jonathan H. Adler, *Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization*, 35 Harv Envir L Rev 1, 12–19 (2011) (discussing the use of prizes as a supplement to intellectual property to promote green technology).

²² For example, James Love and Tim Hubbard characterize proposals to replace drug patents with prizes as “The Big Idea.” Love and Hubbard, 82 Chi Kent L Rev at 1519 (cited in note 16). And in the popular press, the titles of articles discussing prize proposals commonly contain the word “radical.” See, for example, Brian Vastag, *‘Radical’ Bill Seeks to Reduce Costs of AIDS Drugs by Awarding Prizes Instead of Patents* (Wash Post May 19, 2012), online at http://www.washingtonpost.com/national/health-science/radical-bill-seeks-to-reduce-cost-of-aids-drugs-by-awarding-prizes-instead-of-patents/2012/05/19/gIQAEGfabU_story.html (visited Aug 12, 2014); John Simons, *A Radical Plan to Lower Drug Costs*, Fortune (Nov 30, 2007), online at http://archive.fortune.com/2007/11/28/magazines/fortune/simons_patent.fortune/index.htm?postversion=2007113004 (visited Aug 12, 2014).

²³ Fisher and Syed, *Prizes* at *42 (cited in note 16).

²⁴ Shavell, *Foundations* at 161 (cited in note 3).

²⁵ Abramowicz, 56 Vand L Rev at 119 (cited in note 16).

renewed interest in prizes is (or should be) forcing intellectual property scholars “to telescope out from a singular focus on IP as the privileged way to promote scientific and cultural production,” showing that “we should rethink the contours of the field of IP.”²⁶

This Article does not take a side in the debate whether to replace intellectual property with prizes. Rather, it challenges the literature’s depiction of the prize system as a radical alternative to intellectual property. This Article will show that the basic theoretical framework that scholars use to compare intellectual property to prizes is based on a fundamental misunderstanding of intellectual property rights. As a result of this error, the literature focuses on purported differences between the two systems that are either illusory or greatly exaggerated, and it overlooks other differences with important policy implications.

The literature comparing intellectual property to prizes traditionally framed the comparison as a choice between the benefits of market-based incentives for innovation under an intellectual property system and the benefits of competitive consumer pricing under a prize system.²⁷ Since the prize system eliminates the temporary monopoly rights provided by intellectual property, the literature predicts that the prize system would increase competition in the market for inventions and thus move prices closer to marginal cost.²⁸ Consequently, the literature largely takes for

²⁶ Kapczynski, 59 *UCLA L Rev* at 979, 1026 (cited in note 6).

²⁷ See, for example, Gallini and Scotchmer, *Intellectual Property* at 55 (cited in note 15); Wright, 73 *Am Econ Rev* at 704 (cited in note 15) (noting that the choice between intellectual property and prizes “rests on the tradeoff between the excess burden of the patent system and its informational advantage over prizes”).

²⁸ See Baker, *Financing Drug Research* at *17 (cited in note 19) (“The key feature that all four of these [prize] proposals have in common is that they largely eliminate the gap between price and marginal cost that is created by the current patent system.”); Calandrillo, 9 *Fordham IP Media & Ent L J* at 326–28, 336–37 (cited in note 16) (“Once the award is given, the innovation falls into the public domain such that it can be reproduced without penalty and distributed to all those whose willingness to pay is equal to or exceeds the marginal cost of production.”); Chari, Golosov, and Tsyvinski, 147 *J Econ Theory* at 782 (cited in note 15) (“Prizes reward innovators while making the fruits of the innovation public. Competitive markets then produce an efficient number of units of the good or exploit the idea associated with the innovation as efficiently as possible.”); Patricia M. Danzon and Adrian Towse, *Differential Pricing for Pharmaceuticals: Reconciling Access, R&D and Patents*, 3 *Intl J Health Care Fin & Econ* 183, 185 (2003); Kremer, 113 *Q J Econ* at 1148 (cited in note 10) (“Deadweight losses due to monopoly pricing would be eliminated if patents were put in the public domain.”); Penin, 34 *Rsrch Pol* at 645 (cited in note 8) (“[E]x post rewards increase the competition for the production and distribution of a given innovation and they lead to price decrease as compared with the patent system.”); Shavell and van Ypersele, 44 *J L & Econ* at 529, 535 (cited in note 10) (assuming “no deadweight loss from monopoly pricing” in their model of the prize system);

granted that the prize system is “superior to patent in that deadweight loss due to monopoly pricing is avoided.”²⁹ Intellectual property has a different virtue. It introduces artificial scarcity into the market for inventions, forcing consumers to reveal their willingness to pay for those products. As a result, it allows the government to link the profits from innovation to consumer demand—a market-based metric for social value.³⁰ Many scholars are skeptical that the government possesses enough information about the social value of inventions to calculate prize payouts adequate to replace these market-based incentives,³¹ particularly if there is no artificial scarcity in the market to reveal consumer demand.

Joseph E. Stiglitz, *Scrooge and Intellectual Property Rights*, 333 *BMJ* 1279, 1279 (2006) (“The power of competitive markets would ensure a wide distribution [of drugs] at the lowest possible price, unlike the current system, which uses monopoly power, with its high prices and limited usage.”); Stiglitz, 57 *Duke L J* at 1724 (cited in note 8).

²⁹ Shavell and van Ypersele, 44 *J L & Econ* at 530 (cited in note 10). See also Philippe Aghion and Peter Howitt, *The Economics of Growth* 438 (MIT 2009) (describing how patent buyouts are appealing for “eliminating the (static) monopoly distortions generated by innovations in the absence of imitations”); Scotchmer, *Innovation* at 41 (cited in note 15) (“The advantage of prizes over patents is that they can avoid the deadweight loss of proprietary pricing.”). A minority position in the literature holds that the distortion caused by the higher taxes necessary to finance the prize system is worse than the distortion from monopoly pricing. See notes 118–24 and accompanying text.

³⁰ See John Stuart Mill, *Principles of Political Economy: With Some of Their Applications to Social Philosophy* 933 (Longmans, Green 1926):

[A]n exclusive privilege, of temporary duration, is preferable [to a government-determined prize] . . . because the reward conferred by it depends upon the invention’s being found useful, and the greater the usefulness the greater the reward; and because it is paid by the very persons to whom the service is rendered, the consumers of the commodity.

But see Jean Tirole, *Intellectual Property and Health in Developing Countries*, in Abhijit Vinayak Banerjee, Roland Bénabou, and Dilip Mookherjee, eds, *Understanding Poverty* 303, 313 (Oxford 2006) (“The patent system, for all its flaws, has the major benefit that its market-based reward approach is not subject to the two rocks that bureaucratic procedures usually strike: capture and overpayment, and opportunistic expropriation and underpayment.”).

³¹ See, for example, Scherer, *Industrial Market Structure* at 398 (cited in note 3) (“[E]stimating the value of inventive contributions is a difficult task, and any bureaucratic council entrusted with the job is bound to make mistakes and perpetrate inequities. When inequity is inevitable, one might prefer that it be the result of an impersonal income distribution mechanism.”); George Stigler, *The Organization of Industry* 124 (Chicago 1983) (“The difficulties of devising even remotely objective estimates of the social value of pieces of knowledge are prodigious.”). But see Arrow, *Allocation of Resources for Invention* at 623 (cited in note 4) (“The difficulties of even ex post calculation of rates of return [from inventions] are formidable though possibly not insuperable.”).

This framework for comparing intellectual property to prizes has created a “unifying theme” in the literature.³² Most scholars accept that if the government can use prize payouts to offer equal or better incentives for innovation without using intellectual property to gauge the social value of inventions, then the government should replace intellectual property with prizes.³³ In this scenario, the prize system would rival or exceed the intellectual property system’s ability to promote innovation while avoiding the deadweight loss caused by monopoly pricing from intellectual property.

More recent literature adds a twist to the traditional framework comparing intellectual property to prizes. The literature continues to assume that prizes allow for more efficient consumer pricing than intellectual property and thus retains the traditional unifying theme.³⁴ However, prize advocates now argue that prizes are superior to intellectual property not only because they reduce consumer deadweight loss, but also because they offer better incentives for innovation.³⁵ The literature identifies a variety of reasons why the intellectual property system offers suboptimal—usually inadequate—incentives for innovation.³⁶ By emphasizing the drawbacks of linking incentives to monopoly profits, prize advocates have argued that if the government has even limited information about consumer demand for inventions or access to some other signal of inventions’ social

³² Peter S. Menell and Suzanne Scotchmer, *Intellectual Property Law*, in A. Mitchell Polinsky and Steven Shavell, eds, *2 Handbook of Law and Economics* 1473, 1531 (Elsevier 2008) (“A unifying theme [of the prize literature] is that, if a prize giver can base the prize on the value of the innovation, then he should do so, and prizes may dominate intellectual property rights.”).

³³ See, for example, de Laat, 15 Intl J Indus Org at 370 (cited in note 15) (“[P]rizes or contracts are always better than patents [when] the instruments can generate the same reward structure, [since] the patent does so at a considerable welfare loss.”); Gallini and Scotchmer, *Intellectual Property* at 62 (cited in note 15) (“[When] value is observable ex post[,] . . . IP should not be used at all, since prizes . . . can serve the same screening function, and can motivate firms to the same levels of effort, but prizes avoid the deadweight loss.”).

³⁴ See, for example, Fisher and Syed, *Prizes* at *2 (cited in note 16); Kapczynski and Syed, 122 Yale L J at 1910 (cited in note 14); Kremer, 113 Q J Econ at 1148 (cited in note 10); Love and Hubbard, 82 Chi Kent L Rev at 1554 (cited in note 16); Shavell and van Ypersele, 44 J L & Econ at 545 (cited in note 10) (arguing that prizes are superior to intellectual property because of the efficiency of consumer pricing for inventions).

³⁵ See, for example, Fisher and Syed, *Prizes* at *2 (cited in note 16); Kapczynski and Syed, 122 Yale L J at 1941 (cited in note 14); Kremer, 113 Q J Econ at 1148 (cited in note 10); Love and Hubbard, 82 Chi Kent L Rev at 1553–54 (cited in note 16); Shavell and van Ypersele, 44 J L & Econ at 545 (cited in note 10).

³⁶ See notes 72–84 and accompanying text.

value, it could offer prizes that would outperform the intellectual property system.³⁷ Defenders of intellectual property acknowledge that the incentives for innovation offered by temporary monopoly rights are also suboptimal but argue that the government lacks sufficient information about inventions' social value and the institutional capacity to calculate prize payouts that offer better incentives.³⁸ Once again, the debate boils down to whether the government can calculate prize payouts providing equal or better incentives for innovation relative to monopoly profits from intellectual property rights.³⁹

This debate has been premised on a highly stylized comparison of prizes and intellectual property that reflects mistaken assumptions about the two systems. The literature generally equates a prize system with perfectly efficient marginal cost pricing and government control over the rewards for innovation. And it depicts intellectual property as providing innovators with monopoly profits while forcing consumers to bear the full brunt of deadweight loss associated with monopoly pricing. In reality, patents and copyrights merely give innovators the right to exclude others from the market.⁴⁰ They do not give innovators a

³⁷ See, for example, Fisher and Syed, *Prizes* at *2–3 (cited in note 16) (“The superiority of the government’s information concerning the social benefits of particular innovations gives a prize system an equally clear advantage over a patent system, under which research-and-development investments are directed toward lines of innovation that private firms consider most potentially lucrative, not those that are most socially beneficial.”); Kapczynski and Syed, 122 *Yale L J* at 1907 (cited in note 14) (arguing that prizes “can help promote important but highly nonexcludable innovations that would be neglected by the patent system, and also help to counter the distortionary pressures that may be generated by patents”); Kremer, 113 *Q J Econ* at 1162 (cited in note 10) (“Patent buyouts could potentially increase incentives for original invention closer to their social value [and] reduce incentives for wasteful ‘me too’ research.”); Love and Hubbard, 82 *Chi Kent L Rev* at 1553 (cited in note 16) (“By decoupling the rewards for successful R&D investment from the sales of products, the new model will permit governments to create more efficient and useful incentives for R&D that focus on inventions that improve health outcomes.”); Shavell and van Ypersele, 44 *J L & Econ* at 545 (cited in note 10) (noting that prize systems offer “potential gains from enhanced incentives to innovate, as profits from patent and copyright may fall considerably short of consumer surplus”); Stiglitz, 57 *Duke L J* at 1724 (cited in note 8) (“The innovation incentives are strong in the patent system, but they are distorted, whereas the prize system can provide equivalently strong incentives that are less distorted.”).

³⁸ See, for example, DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* at 489 (cited in note 15).

³⁹ See Kapczynski and Syed, 122 *Yale L J* at 1954 (cited in note 14); Kremer, 113 *Q J Econ* at 1138 (cited in note 10).

⁴⁰ Patents give firms the exclusive right to make, use, and sell their inventions for a limited period of time. See 35 USC § 271(a). Similarly, copyrights give the authors of literary, musical, choreographic, dramatic, and artistic works the exclusive right to

right to monopoly profits, nor do they prevent the government from intervening in the market in other ways to improve incentives for innovation or to prevent deadweight loss. The literature's flawed comparison of the two systems leads scholars to frame the debate in absolute terms, overlooking market forces and other policy levers that may achieve the same basic objectives as the prize system without eliminating intellectual property rights. The true comparison between intellectual property and prizes may be much less dramatic than scholars currently imagine, and it often involves different considerations than those addressed in the existing literature on prizes.⁴¹

The literature's flawed comparison between intellectual property and prizes is most evident in the debate over replacing drug patents with prizes—a field in which most developed countries already accomplish (or could accomplish) the same basic objectives of the prize system through their national prescription-drug insurance programs without eliminating drug patents. Ironically, prize advocates often claim that the potential gains from switching to a prize system would be greatest in the pharmaceutical industry.⁴² They note that by replacing drug

reproduce, adapt, distribute, and publicly display those creations. See Robert A. Gorman and Jane C. Ginsburg, *Copyright: Cases and Materials* 38 (Foundation 6th ed 2002).

⁴¹ These observations explain why some of the early prize advocates who proposed systems for replacing drug patents with prizes now advocate systems with government-funded rewards for drugs in which innovators keep their drug patents and the government imposes price controls along with its rewards. See, for example, Rachel Glennerster and Michael Kremer, *A Better Way to Spur Medical Research and Development*, 23 Reg 34, 38 (Summer 2000) (advocating advanced purchase commitments instead of patent buyouts—that is, prizes—to incentivize the development of vaccines for tropical diseases, even though “[a] patent buyout would allow firms to compete freely to manufacture a vaccine, [since] given the technical complexity of manufacturing vaccines and the arduous process of securing regulatory approval, competition might not be intense even if patents were put in the public domain”); Hollis and Pogge, *The Health Impact Fund* at 16 (cited in note 19) (concluding that, in their proposed system of reward payments for drugs, the government would need to control consumer drug prices instead of relying on competition to drive prices to marginal cost, and as a result, pharmaceutical companies would not need to give up their patent rights in order to receive the reward payments).

⁴² See note 19. See also Fisher and Syed, *Prizes* at *2 (cited in note 16) (arguing that there is a strong case for replacing drug patents with prizes because “governments have (or can obtain) better information concerning the aggregate health benefits of drugs than private parties”); Kremer, 113 Q J Econ at 1163 (cited in note 10):

Pharmaceuticals are a natural area to try patent buyouts, since markets would be relatively competitive in the absence of patents; patent protection is effective; monopoly markups are large; drugs are nondurable; “me too” inventions are widespread; and considerable information is generated during FDA trials, so potential bidders could make informed bids.

patents with prizes, prescription drugs would quickly be forced to compete with generics, and consumers would be able to purchase them at prices far lower than the full monopoly price soon after they reach the market.⁴³ The monetary prize for each new drug would be determined and financed by the government, presumably through higher taxes. Although consumers would bear the burden of those higher taxes, they would be spared the deadweight loss caused by monopoly pricing of new drugs. Assuming—as many prize advocates claim—that the government has sufficient information about drugs' social value to offer better incentives for innovation through prize payouts,⁴⁴ the government could also improve the pharmaceutical industry's innovative output. No country (other than the Soviet Union⁴⁵) has ever attempted to implement such a system.⁴⁶ Instead, in most developed countries, prescription drugs are purchased and distributed through a national health insurance system.⁴⁷ Governments provide consumers with prescription drug insurance, which allows them to purchase drugs at the price of a typically modest co-payment ("co-pay") instead of the full monopoly price for drugs.⁴⁸ These co-pays are often similar to marginal cost pricing and therefore avoid much of the deadweight loss associated with monopoly pricing.⁴⁹ The government pays pharmaceutical companies an agreed-upon reimbursement rate for each prescription filled, and citizens pay higher taxes to finance this system.⁵⁰ The government still effectively determines the reward for new drugs when it sets the reimbursement price, much the same as it

See also Shavell and van Ypersele, 44 *J L & Econ* at 544–45 (cited in note 10) (noting that "the possible advantages of reward systems . . . [are] exemplified by development of pharmaceuticals, computer software, and recorded music and visual products," "where the difference between price and production cost (after innovation) is large").

⁴³ See, for example, Shavell and van Ypersele, 44 *J L & Econ* at 545 (cited in note 10).

⁴⁴ See, for example, Fisher and Syed, *Prizes* at *2 (cited in note 16).

⁴⁵ See note 96.

⁴⁶ See Timothy J. Brennan, Molly K. Macauley, and Kate S. Whitefoot, *Prizes or Patents for Technology Procurement: An Analysis and Analytical Framework* *7–10 (Discussion Paper, Resources for the Future, Dec 2012), online at <http://www.rff.org/RFF/Documents/RFF-DP-11-21-REV.pdf> (visited Aug 12, 2014).

⁴⁷ See US Department of Commerce, *Pharmaceutical Price Controls in OECD Countries: Implications for U.S. Consumers, Pricing, Research and Development, and Innovation* *7–9 (Dec 2004), online at <http://www.ita.doc.gov/td/chemicals/drugpricingstudy.pdf> (visited Aug 12, 2014).

⁴⁸ See *id.* at *7.

⁴⁹ See DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* at 488 (cited in note 15).

⁵⁰ See text accompanying notes 183–85.

would in a prize system. The primary difference between a national health insurance system and the proposed prize schemes is that, with the former, drug companies keep their patents.⁵¹

The close structural and functional similarities between some proposed prize systems for drugs and national prescription-drug insurance programs contrast sharply with the literature's depiction of prize systems as a radical alternative to intellectual property. Other scholars—including some prize advocates—have noted that national prescription-drug insurance programs are incredibly similar to a prize system.⁵² But this insight has not softened the debate over replacing drug patents with prizes, nor has it led scholars to revisit the existing theoretical framework for comparing intellectual property to prizes.

Prize advocates mistakenly assume that promoting innovation with prizes instead of intellectual property is the only effective strategy for avoiding deadweight loss from monopoly pricing.⁵³ According to prize advocates, the chief structural advantage of prizes over intellectual property rights is the capacity to “de-link” the prices consumers pay for inventions from the profits innovators earn, thereby facilitating access to the invention for everyone who values it more than the marginal cost of production.⁵⁴ Prize advocates often depict the de-linking of rewards from consumer prices as a fundamental advantage of prizes over intellectual property, but this de-linking also occurs naturally in the market through a form of price discrimination known as the “two-part tariff.”⁵⁵ Perhaps not coincidentally, the two-part tariff is often found precisely where scholars have proposed switching

⁵¹ See Part II.

⁵² See, for example, Fisher, *Intellectual Property and Innovation* at *12 (cited at note 16); Rai, 70 L & Contemp Probs at 128–30 (cited in note 16).

⁵³ See, for example, Fisher and Syed, *Prizes* at *3–4 (cited in note 16) (noting that deadweight loss under “a patent system can be mitigated in various ways,” but “such devices at best can reduce the problem, not solve it. A prize system, by contrast, is capable of eliminating this problem altogether” because “competition among [drug] manufacturers . . . would keep prices low for everyone”); Joseph E. Stiglitz and Arjun Jayadev, *Medicine for Tomorrow: Some Alternative Proposals to Promote Socially Beneficial Research and Development in Pharmaceuticals*, 7 J Generic Meds 217, 221 (2010) (“[M]arket competition provides the only effective mechanism to enforce market discipline and ensure that drugs are provided as close to cost as possible, following the discovery of the new chemical entity.”).

⁵⁴ James Love, *De-linking R&D Costs from Product Prices* *2–3 (Knowledge Ecology International Apr 6, 2011), online at http://www.who.int/phi/news/phi_cewg_1stmeet_10_KEI_submission_en.pdf (visited Aug 12, 2014).

⁵⁵ See text accompanying notes 208–24.

to prizes—prescription drugs and online digital media. The government also effectively de-links consumer prices within the patent system when it subsidizes consumers' purchasing power for inventions. As noted above, this appears to be the strategy that most developed countries are using to provide consumers with access to prescription drugs. The United States uses a similar strategy in subsidizing prescription drug insurance for certain populations and offering tax credits for energy-efficient technology. The resulting structures are remarkably similar to those in many prize proposals.⁵⁶

The literature's stylized depiction of prizes also leads scholars to take for granted the prize system's superiority in reducing deadweight loss. In many cases, a number of forces will persist even after eliminating intellectual property that prevent a prize system from moving consumer prices to marginal cost, including innovators' trade secrets, other barriers to entry, and high fixed production costs. At the same time, the government exercises broad authority within an intellectual property system to intervene and force prices closer to marginal cost. The combination of these two factors means that, contrary to the oftentimes explicit assumption in the prize literature, eliminating intellectual property will not necessarily achieve more-efficient consumer prices than is possible under an intellectual property system and sometimes doing so may have the opposite effect.⁵⁷

Contrary to the stylized example, intellectual property is not a legal right to monopoly profits. Intellectual property merely provides the government an option to allow innovators to collect monopoly profits. Governments can and frequently do intervene in the market to adjust or void entirely the innovator's opportunity for monopoly profits. Replacing intellectual property with prizes does not provide the government with any new information or mechanism for setting superior incentives not already available to the government in an intellectual property system through existing tools such as subsidies, taxes, and government purchases. To the extent that the government could improve the incentives for innovation by adjusting rewards through a prize system, it could just as easily improve those incentives with payments to or taxes on innovators supplementing the intellectual property system.⁵⁸

⁵⁶ See Part III.A.

⁵⁷ See Part III.B.

⁵⁸ See Part IV.B.

Finally, the stylized example of prizes depicts the government's control over payments to the innovator as absolute, whereas prize proposals often contemplate negotiation of the prize between the government and innovator. Indeed, many of the most prominent prize proposals are "optional," meaning that the innovator is given a choice between accepting payment in the form of an intellectual property right or a prize.⁵⁹ The primary justification for these optional-prize systems is to provide a check against the government setting inadequate rewards for innovation.⁶⁰ However, intellectual property rights serve the same function as an optional-prize system in countries where the government is both setting the price and purchasing inventions, as with drugs in most developed countries. Here, drug patents provide firms with at least a modicum of leverage in negotiations with the government. Since governments often renegotiate reimbursement rates (that is, reward payments) over time as new information about their value becomes available, eliminating this safeguard could be problematic.⁶¹ This previously overlooked harm from switching to prizes may justify retaining intellectual property even when the government can determine the necessary reward to provide an equivalent incentive for innovation without intellectual property.⁶²

Ultimately, the government's ability to implement a prize-like system without eliminating intellectual property rights calls into question the relevance and accuracy of the prize literature's "unifying theme." The market forces and other government policies mentioned above can push consumer prices toward marginal cost without eliminating intellectual property rights.⁶³ In many cases, these tools may result in more-efficient consumer pricing (and, therefore, less deadweight loss) than would be achieved

⁵⁹ See, for example, Fisher and Syed, *Prizes* at *33 (cited in note 16); Hollis and Pogge, *The Health Impact Fund* at 6–8 (cited in note 19); Kremer, 113 Q J Econ at 1158–59 (cited in note 10); Shavell and van Ypersele, 44 J L & Econ at 541–45 (cited in note 10).

⁶⁰ See, for example, Shavell and van Ypersele, 44 J L & Econ at 544 (cited in note 10). But see Fisher and Syed, *Prizes* at *34–36 (cited in note 16) (arguing that the government might be limited to instituting an optional-prize system because of the TRIPS agreement).

⁶¹ See Shavell and van Ypersele, 44 J L & Econ at 542 (cited in note 10) ("As events unfold and information flows to the government, it could appropriately supplement rewards, perhaps on an annual basis. . . . It would be a gross mistake to envision the reward as having to be premised on the government's estimate of valuation at the time an innovation is registered.").

⁶² See Part V.A.

⁶³ See Part V.A.

through a simple switch to prizes,⁶⁴ since eliminating intellectual property rights alone will often leave a significant gap between the price of inventions and their marginal cost.⁶⁵ The same government policies that help avoid deadweight loss also enable the government to adjust the incentives for investing in research and development (“R & D”) without eliminating intellectual property.⁶⁶ Indeed, the desired superior incentives will often be better achieved without moving to a prize system. Intellectual property rights give innovators the option to reject the government’s offer for a reward, which provides a check against the otherwise-significant risk of expropriation.⁶⁷ The optional-prize systems favored by many prize advocates have a similar property.⁶⁸ However, by retaining intellectual property rights, innovators and the government can renegotiate reward payments over time as they acquire new information about the social value of inventions.⁶⁹ Consequently, even if the government has the ability to calibrate prize payouts offering equal or better incentives for innovation, eliminating intellectual property rights might be a mistake.

Part I of this Article reviews the ongoing debate over prizes as an alternative to intellectual property to promote innovation. This Part recounts the traditional and more recent comparisons of the benefits and drawbacks of an intellectual property system versus a prize system. It explains the basis in these comparisons for the unifying theme of prize literature and the widely accepted conclusion that a prize system is desirable if the resulting gains from efficient access to innovation exceed the harm—if any—from relying on the government to set the reward for innovation. Part II identifies an apparent contradiction of the unifying theme in the decision of a vast majority of developed countries to continue to grant drug patents though not using them to determine the incentives for drug development. Part III reexamines the presumed superiority of prizes at reducing deadweight loss. It describes how the projected reductions in existing scholarship are based on faulty comparisons of patents to prizes that typically

⁶⁴ See Part V.A.

⁶⁵ See Part III.B.

⁶⁶ See Part IV.A.

⁶⁷ See Part IV.B.

⁶⁸ See, for example, Fisher and Syed, *Prizes* at *33–34 (cited in note 16); Kremer, 113 *Q J Econ* at 1137–38 (cited in note 10); Shavell and van Ypersele, 44 *J L & Econ* at 530–31 (cited in note 10).

⁶⁹ See Part IV.B.

ignore the substantial reductions in deadweight loss already achieved within the patent system through price discrimination, subsidies, taxes, and price controls. It also describes how the comparisons overlook other forces that persist after eliminating patents and prevent the introduction of price competition from materially lowering consumer prices and reducing deadweight loss. Part IV revisits the debate whether prizes might offer superior incentives for innovation compared to intellectual property. Contrary to the widely accepted position in the existing literature, the prize system does not offer any fundamental advantages over intellectual property in improving the incentives for innovation, since any incentive achievable with prizes could also be achieved through subsidies, taxes, or price controls without eliminating intellectual property. This Part also explains that when the government sets rewards for innovation, retaining the intellectual property system operates in a manner similar to an optional-prize system. However, unlike an optional-prize system, intellectual property rights provide an ongoing check against suboptimal government rewards and provide flexibility for innovators and the government to adjust reward payments over time. Part V builds on insights in Parts III and IV to reframe the comparison between intellectual property and prizes.

I. BACKGROUND

Among scholars and policymakers, there is a broad consensus that without government intervention, private industry would significantly underinvest in the R & D of new ideas and expressions.⁷⁰ Historically, such intervention took the form of intellectual property rights, but prizes have gained increasing support. The primary benefit of the intellectual property system has always been viewed as its ability to offer a market-based incentive for innovation tied to consumers' willingness to pay. Its principal drawbacks have been considered to be the inevitable creation of deadweight loss when generating that information about consumer demand and the failure to motivate socially valuable innovation when undervalued by the market. In contrast, the primary benefit of a prize system has typically been

⁷⁰ See Adam B. Jaffe, *Building Program Evaluation into the Design of Public Research-Support Programs*, 18 *Oxford Rev Econ Pol* 22, 22 (2002) ("It is widely accepted that, in the absence of policy intervention, the social rate of return to R&D expenditure exceeds the private rate, leading to a socially suboptimal rate of investment in R&D.")

viewed as its ability to avoid the deadweight loss associated with patents. The principal drawback of the prize system has recently been challenged, but has generally been considered the difficulty of setting incentives for innovation *without* knowledge of consumers' willingness to pay and *with* greater political involvement (and the attendant risks of corruption or incompetence). Based on these comparisons of benefits and drawbacks, a relatively simple framework has been developed. That is, a prize system is desirable if the resulting gains from efficient access to innovation exceed the harm—if any—from relying on the government to set the reward for innovation.⁷¹

A. The Need for Government Intervention to Incentivize Innovation

In a competitive market, the incentives for private actors to invest in the R & D of new ideas and expressions tend to be inadequate.⁷² The problem stems from the intangibility of ideas and expressions, which can make it hard to prevent others from copying them. At the same time, the innovative process is often expensive and risky.⁷³ Writing a book or developing a drug usually requires a significant investment of time and resources, and the innovator always faces the risk that the project will end as a technological or commercial failure. If competitors can sell inexpensive duplicates of successful books or drugs without incurring the same costs and risks, price competition may prevent innovators from ever profiting on their R & D investment. The innovator is also unrewarded for the substantial “knowledge spillovers” generated by a successful invention, which advance society’s storehouse of knowledge and fuel subsequent innovation.⁷⁴ The empirical evidence suggests that spillover benefits constitute a sizable portion of the total social returns from

⁷¹ See Penin, 34 Rsrch Pol at 645–46 (cited in note 8); Shavell and van Ypersele, 44 J L & Econ at 530 (cited in note 10).

⁷² See Arrow, *Allocation of Resources for Invention* at 617 (cited in note 4); Richard R. Nelson, *The Simple Economics of Basic Scientific Research*, 67 J Polit Econ 297, 302 (1959).

⁷³ See F.M. Scherer, *New Perspectives on Economic Growth and Technological Innovation* 53–88 (Brookings 1999).

⁷⁴ See Brett M. Frischmann and Mark A. Lemley, *Spillovers*, 107 Colum L Rev 257, 268–69 (2007); John M. Golden, *Innovation Dynamics, Patents, and Dynamic-Elasticity Tests for the Promotion of Progress*, 24 Harv J L & Tech 47, 61–63 (2010); Joel Mokyr, *The Contribution of Economic History to the Study of Innovation and Technical Change: 1750–1914*, in Bronwyn H. Hall and Nathan Rosenberg, eds, 1 *Handbook of the Economics of Innovation* 11, 14 (Elsevier 2010). See also William J. Baumol, *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism* 11–12 (Princeton 2002).

investments in R & D,⁷⁵ so the inability of competitive markets to adequately compensate and incentivize their creation is problematic.⁷⁶ In a perfectly competitive market, therefore, private actors will be unwilling to invest as much as is socially desirable in the production of new ideas and expressions that others can freely copy.⁷⁷

Ironically, the very attribute that leads private actors to underinvest in innovation—that is, the ease with which ideas can be copied and built on—is the quality that has made innovation so socially valuable. Ideas are public goods in the technical sense of the term: their use by one person does not reduce their availability to others.⁷⁸ Since ideas can be used over and over again without diminishment, they allow for increasing returns to scale on the world's finite stock of human and capital resources.⁷⁹ By extracting increasing value out of society's labor and capital, innovation has generated much of the world's economic growth since the Industrial Revolution.⁸⁰ Innovation in

⁷⁵ See Nicholas Bloom, Mark Schankerman, and John Van Reenen, *Identifying Technology Spillovers and Product Market Rivalry*, 81 *Econometrica* 1347, 1374–80 (2010) (estimating that knowledge spillovers cause the social returns from R & D to be roughly double the private returns); Frischmann and Lemley, 107 *Colum L Rev* at 259–61 & n 5 (cited in note 74) (reviewing a number of studies on the spillover benefits from R & D); Elhanan Helpman, *The Mystery of Economic Growth* 42–46 (Harvard 2004) (discussing the theoretical and empirical literature on R & D spillovers); Rebecca Henderson and Iain Cockburn, *Scale, Scope, and Spillovers: The Determinants of Research Productivity in Drug Discovery*, 27 *RAND J Econ* 32, 45–55 (1996) (reporting large knowledge-spillover benefits from private-sector R & D in the pharmaceutical industry); Kremer, 113 *Q J Econ* at 1141 (cited in note 10).

⁷⁶ Of course, private actors can be incentivized by forces other than monetary compensation, but monetary incentives are the predominant currency in private industry.

⁷⁷ See Shavell, *Foundations* at 138–40 (cited in note 3). This does not imply that markets free from government intervention cannot support investments in the production of knowledge or information—only that those investments will tend to be inadequate. See Scherer, *Industrial Market Structure* at 384 (cited in note 3).

⁷⁸ See Paul A. Samuelson, *The Pure Theory of Public Expenditure*, 36 *Rev Econ & Stat* 387, 387 (1954) (defining a public good as one for which “each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good”). More than a century earlier, Thomas Jefferson offered a more elegant formulation of why information and knowledge are different from tangible goods: “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.” Thomas Jefferson, *Letter to Isaac McPherson* (Aug 13, 1813), online at http://press-pubs.uchicago.edu/founders/documents/a1_8_8s12.html (visited Aug 12, 2014).

⁷⁹ See Charles I. Jones, *Growth and Ideas*, in Philippe Aghion and Steven N. Durlauf, eds, *1B Handbook of Economic Growth* 1063, 1065–66 (Elsevier 2005); Paul M. Romer, *Endogenous Technological Change*, 98 *J Polit Econ* S71, S73–S78 (1990).

⁸⁰ See Menell and Scotchmer, *Intellectual Property Law* at 1476 (cited in note 32) (“It is now widely recognized that technological advancement and enhanced human capital

the form of new ideas, and particularly new technologies, is believed to be responsible for much of the wealth of modern industrialized societies.⁸¹

This dual nature of innovation—simultaneously prone to underinvestment and essential to social welfare—makes government intervention to promote innovation crucial to society's well-being in some circumstances. Without government intervention, private investments in R & D would tend to be inadequate—and perhaps significantly so.⁸² Economists often disagree about the best policies for encouraging socially valuable innovation,⁸³ but they all seem to accept the need for some form of government intervention.⁸⁴

B. A Brief History of the Choice between Patents and Prizes

Most developed nations rely on intellectual property as their primary tool for promoting private investment in innovation. An alternative approach is for the government to reward innovators with a prize instead of an intellectual property right, thereby allowing the innovation to enter “immediately into the public domain” for all to use.⁸⁵

The idea of replacing intellectual property rights with prizes is said to be nearly as old as the intellectual property system

are the principal engines of economic growth in the United States and other industrialized countries.”); Joel Mokyr, *Long-Term Economic Growth and the History of Technology*, in Philippe Aghion and Durlauf, eds, 1B *Handbook of Economic Growth* 1114, 1116–19 (cited in note 79) (linking the Industrial Revolution and subsequent technological innovation with the unprecedented economic growth of modern industrialized societies); Paul M. Romer, *Two Strategies for Economic Development: Using Ideas and Producing Ideas*, Proceedings of the World Bank Annual Conference on Development Economics 63, 64 (1992) (arguing for the importance of innovation and dissemination of “ideas”—rather than just technology—for economic growth).

⁸¹ See Philippe Aghion and Peter Howitt, *Growth with Quality-Improving Innovations: An Integrated Framework*, in Philippe Aghion and Steven N. Durlauf, eds, 1A *Handbook of Economic Growth* 67, 69 (Elsevier 2005) (noting that “[t]echnological progress” is “the mainspring of long-run economic growth”); Richard R. Nelson, *The Sources of Economic Growth* 31 (Harvard 1996) (“Virtually all scholars of productivity growth now agree on the central role of technological advance.”).

⁸² See Jones, *Growth and Ideas* at 1087 (cited in note 79).

⁸³ See, for example, Menell and Scotchmer, *Intellectual Property Law* at 1477–78 (cited in note 32).

⁸⁴ See, for example, Michele Boldrin and David K. Levine, *Against Intellectual Monopoly* 237, 257–59 (Cambridge 2008) (advocating the abolition of intellectual property but acknowledging that, at least in the pharmaceutical industry, the government would need to increase public financing of clinical drug development).

⁸⁵ Penin, 34 *Rsrch Pol* at 642 (cited in note 8).

itself.⁸⁶ James Madison actually proposed a prize system during the Constitutional Convention,⁸⁷ although it appears that it was never discussed,⁸⁸ and the delegates clearly opted for the Intellectual Property Clause now found in the Constitution.⁸⁹ In Europe in the mid-eighteenth century, at a time when many governments were considering abolishing the patent system altogether, prizes were a frequently discussed alternative.⁹⁰ The antipatent movement attracted less attention in the United States at that time, although in 1886 a congressman actually introduced a bill in the US House of Representatives to repeal the patent laws and establish a system of rewards for inventors.⁹¹

Defenders of intellectual property ultimately won out over the system's critics.⁹² Enthusiasm for the prize system dwindled

⁸⁶ See note 13.

⁸⁷ See Max Farrand, ed, 2 *The Records of the Federal Convention of 1787* 325 (Yale 1911) (quoting Madison's proposal to grant Congress the power "[t]o encourage by premiums & provisions, the advancement of useful knowledge and discoveries."). See also James Madison, *Letter to Thomas Jefferson* (Oct 17, 1788), online at http://www.constitution.org/jm/17881017_tj.htm (visited Aug 12, 2014):

With regard to monopolies they are justly classed among the greatest nuisances in Government. But is it clear that as encouragements to literary works and ingenious discoveries, they are not too valuable to be wholly renounced? Would it not suffice to reserve in all cases a right to the Public to abolish the privilege at a price to be specified in the grant of it?

⁸⁸ See Farrand, ed, 2 *The Records of the Federal Convention of 1787* at 325 (cited in note 87).

⁸⁹ US Const Art I, § 8 ("The Congress shall have Power . . . [t]o 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.").

⁹⁰ See Janis, 17 *Berkeley Tech L J* at 939–41 (cited in note 1) (comparing modern proposals for a prize system with a proposal by Robert Andrew Macfie in 1864); Machlup and Penrose, 10 *J Econ Hist* at 19 (cited in note 1):

The alternatives most frequently recommended in lieu of patents were bonuses granted to inventors (a) by the government, (b) by professional associations financed through voluntary contributions by private industries, (c) by an inter-governmental agency, or (d) by an international association maintained through contributions from industries of all countries. Proposals along these lines were discussed in the professional journals and conferences almost everywhere.

See also Shavell and van Ypersele, 44 *J L & Econ* at 526 (cited in note 10), citing MacLeod, *Inventing the Industrial Revolution* at 191–96 (cited in note 13).

⁹¹ See Knowledge Ecology International, *Selected Innovation Prizes* at *46 (cited in note 7).

⁹² See Machlup and Penrose, 10 *J Econ Hist* at 19–20 (cited in note 1) (noting that although proposals to give inventors prizes instead of patents "were discussed in the professional journals and conferences almost everywhere" in the mid- and late 1800s, they "did not receive great support"); Janis, 17 *Berkeley Tech L J* at 939–41 (cited in note 1).

in the late 1800s.⁹³ By the turn of the century, economists showed little interest in the idea of replacing intellectual property with a prize system.⁹⁴ With a few notable exceptions, the economic literature was devoid of any serious analysis of the prize system for most of the twentieth century.⁹⁵

In practice, governments now rarely use prizes as an alternative to intellectual property,⁹⁶ leading some scholars to label prizes the “neglected innovation incentive.”⁹⁷ Although governments and private organizations frequently offer prizes to promote certain types of innovation, the vast majority of these prizes are not conditioned on innovators giving up their intellectual property rights.⁹⁸ These prizes simply supplement the existing intellectual property system.

⁹³ See Shavell and van Ypersele, 44 J L & Econ at 527 (cited in note 10).

⁹⁴ See *id.*

⁹⁵ See Kremer, 113 Q J Econ at 1144–46 (cited in note 10) (discussing two examples of patent buyouts in the early nineteenth century).

⁹⁶ There are a few examples of prize offerings that required the invention be placed in the public domain. In 1802, South Carolina purchased Eli Whitney’s patent rights on the cotton gin within the state for \$50,000, although Whitney experienced some trouble collecting the prize. See *id.* at 1145. In 1839, France awarded the inventor of photography an annual pension of 10,000 francs in exchange for his patent rights, which the government then devoted to the public domain (except in England). See *id.* at 1144. In 1855, the Steam-Coal Collieries’ Association at Newcastle offered a £500 reward for a “method for preventing the emission of smoke from the chimneys of multitubular boilers,” with payment conditional on the absence of patent rights or certain restrictions on those rights. Knowledge Ecology International, *Selected Innovation Prizes* at *18 (cited in note 7). In 1859, the British Horological Institute offered a reward for the invention of a watch that was “the best English-made going-barrel movement that can be made in fair trade at a moderate price” without a “patent [or] exclusive right.” *Id.* at *45. In 1931, the Soviet Union created an authorship-certificate program wherein inventors could receive prizes in lieu of a patent, which was maintained until 2001. See *id.* at *47–48. In 1946, the United States abolished patents on inventions related to the use of atomic energy for military purposes and established the US Patent Compensation Board, which had authority to offer rewards for those inventions. See *id.* at *19. In 2007, an unnamed entity posted a \$20,000 prize on InnoCentive.com, a registry for scientific-innovation prizes, for the invention of a dry-based biolatrine along with “no patents or patent applications preventing the use of the solution.” *Id.* at *27–28.

⁹⁷ Jüri Saar, *Prizes: The Neglected Innovation Incentive* *1 (unpublished paper, Lund University Masters Programme, 2006), online at http://www.taaler.ee/vabalog/Saar_2006-Prizes.pdf (visited Aug 12, 2014). See also Shavell and van Ypersele, 44 J L & Econ at 527 (cited in note 10).

⁹⁸ See generally Knowledge Ecology International, *Selected Innovation Prizes* (cited in note 7).

C. The Traditional Critique of Intellectual Property: Deadweight Loss

1. The inevitability of deadweight loss in an intellectual property system.

The fundamental critique of using intellectual property to promote innovation has always been that it reduces the public's access to new innovations. Intellectual property creates deadweight loss by allowing an innovator to prevent competitors from entering the market and driving down the price of the invention.⁹⁹ The higher prices resulting from these monopoly rights cause some consumers to exit the market even though they value the innovation above its marginal cost of production.¹⁰⁰ In an efficient market, consumers have access to goods whenever they value them more than their marginal cost. Since the higher prices caused by intellectual property are the mechanism through which the system promotes innovation, deadweight loss is often said to be an inevitable consequence of the system.¹⁰¹

The classic depiction (and defense) of intellectual property is that it reveals consumers' willingness to pay by allowing the innovator to introduce artificial scarcity into the market for its invention.¹⁰² Without intellectual property, the innovator cannot make consumers reveal how much they value and are willing to pay for the innovation, because the innovator will be undersold by other firms offering the innovation at a lower price. With intellectual property, the innovator can test the market's willingness to pay for the innovation. However, the higher monopoly price charged by the innovator pushes at least some consumers out of the market even though they value the innovation at more than its marginal cost to produce. In short, by using artificial scarcity to base the reward for inventions on consumers'

⁹⁹ See note 247.

¹⁰⁰ See Hal R. Varian, *Intermediate Microeconomics: A Modern Approach* 445–49 (Norton 8th ed 2009).

¹⁰¹ See, for example, Stiglitz, 57 *Duke L J* at 1700 (cited in note 8); William D. Nordhaus, *Invention, Growth, and Welfare: A Theoretical Treatment of Technological Change* 82, 86 (MIT 1969) (“The optimal system of production of knowledge has a price for information of zero, whereas the patent system ensures a nonzero price for the life of the patent.”).

¹⁰² Scarcity does not naturally occur in the market for innovation because, unlike most goods, ideas can be used and reused endlessly without depletion or scarcity. See notes 78–79 and accompanying text.

willingness to pay, intellectual property rights can result in an inefficient allocation of those goods and the associated deadweight loss.¹⁰³

Defenders of the intellectual property system are quick to note that because innovators can engage in price discrimination, their monopoly rights do not necessarily create deadweight loss.¹⁰⁴ Firms have an incentive to offer discounts to consumers who are unwilling to pay the full monopoly price.¹⁰⁵ Every consumer who values a good above its marginal cost but below the monopoly price represents a potentially profitable transaction for the patent holder. If the firm can continue to charge an elevated price to most consumers while offering discounts to those who are unwilling to pay the full monopoly price, the firm can avoid the deadweight loss from monopoly pricing.¹⁰⁶

Although perfect price discrimination could eliminate the deadweight loss caused by intellectual property, that type of pricing is usually impossible.¹⁰⁷ Two primary hurdles stand in the way of discriminatory pricing. First, firms need a way to identify consumers who are unwilling to pay the monopoly price so that they can offer those consumers a discount. Since all consumers prefer a lower price, firms cannot easily identify the ones who need a lower price merely by asking.¹⁰⁸ They can charge different prices based on the quantity or quality of goods purchased, which may help sort consumers according to their willingness to pay, or they can offer discounts to consumers based on observable characteristics that are associated with a weaker

¹⁰³ See notes 99–101 and accompanying text.

¹⁰⁴ See, for example, Kieff, 85 *Minn L Rev* at 727–32 (cited in note 11) (arguing that “[c]oncerns about dead-weight loss also do not provide a proper motivation for seeking alternatives to the system” because “[t]he ability to price discriminate actually gives the patentee strong financial incentive to elect *not* to restrict output”).

¹⁰⁵ See William W. Fisher III, *When Should We Permit Differential Pricing of Information?*, 55 *UCLA L Rev* 1, 14–16 (2007); Scotchmer, *Innovation and Incentives* at 37 (cited in note 15).

¹⁰⁶ See Lars A. Stole, *Price Discrimination and Competition*, in Mark Armstrong and Rob Porter, eds, 3 *Handbook of Industrial Organization* 2221, 2226 (Elsevier 2007).

¹⁰⁷ See William M. Landes and Richard A. Posner, *The Economic Structure of Intellectual Property Law* 375–77 (Harvard 2003); Lichtman, 11 *Harv J L & Tech* at 133 n 25 (cited in note 16); Arti K. Rai, *The Information Revolution Reaches Pharmaceuticals: Balancing Innovation Incentives, Cost, and Access in the Post-Genomics Era*, 2001 *U Ill L Rev* 173, 188; Scotchmer, *Innovation and Incentives* at 37 (cited in note 15) (“Price discrimination can go a long distance toward redressing the inefficiency of deadweight loss, but it is hard to implement.”).

¹⁰⁸ See Fisher, 55 *UCLA L Rev* at 3–4 (cited in note 105); Scotchmer, *Innovation and Incentives* at 37–38 (cited in note 15); Tirole, *The Theory of Industrial Organization* at 137 (cited in note 5).

demand for the product.¹⁰⁹ Both strategies can be costly and are almost always imperfect sorting devices.¹¹⁰ Second, firms must be able to stop the consumers who receive discounts from reselling the good to the consumers who are willing to pay the full price.¹¹¹ There are often practical and legal difficulties with barring consumers from reselling intellectual property goods, which can reduce firms' ability to price discriminate.¹¹²

Given the limited capacity of monopolists to achieve perfect price discrimination, deadweight loss is widely viewed as a fundamental and inevitable drawback of the intellectual property system.¹¹³ As discussed later in this Article, the existing literature often overlooks certain critical forms of price discrimination that alleviate the deadweight loss attributable to intellectual property in these markets.¹¹⁴ Nevertheless, it is clear that when the government awards monopoly rights to promote innovation and does not otherwise intervene in the market for those goods, firms will rarely be able to eliminate deadweight loss through perfect price discrimination.¹¹⁵

2. Avoiding deadweight loss with a prize system.

Based on this description of how intellectual property rights distort consumer prices and cause deadweight loss, the chief advantage of prizes over intellectual property seems almost self-explanatory. By eliminating intellectual property rights, the prize system would remove an impediment to efficient consumer pricing, thereby alleviating deadweight loss. As a result, the avoidance of deadweight loss associated with intellectual property has historically been the most appealing aspect of using prizes to set incentives for innovation.¹¹⁶

¹⁰⁹ See Michael J. Meurer, *Copyright Law and Price Discrimination*, 23 *Cardozo L Rev* 55, 69–75 (2001).

¹¹⁰ See generally Peter T. Leeson and Russell S. Sobel, *Costly Price Discrimination*, 99 *Econ Letters* 206 (2008). Certain pricing schemes, such as second-degree price discrimination involving quality differentiation, can sometimes reduce total social surplus. See Meurer, 23 *Cardozo L Rev* at 71–80 (cited in note 109).

¹¹¹ See Meurer, 23 *Cardozo L Rev* at 69–75 (cited in note 109).

¹¹² See Fisher, 55 *UCLA L Rev* at 13–20 (cited in note 105); Meurer, 23 *Cardozo L Rev* at 83–85 (cited in note 109).

¹¹³ See notes 99–101 and accompanying text.

¹¹⁴ See Part III.A.

¹¹⁵ See text accompanying notes 107–12.

¹¹⁶ See, for example, Gallini and Scotchmer, *Intellectual Property* at 62 (cited in note 15) (“IP and prizes can serve the same screening function, and can motivate firms to the same levels of effort, but prizes avoid the deadweight loss.”); Shavell, *Foundations* at 162

Of course, the literature on prizes recognizes that a prize system would create its own deadweight loss because the government must raise revenue to pay for those awards.¹¹⁷ Revenue raised with sales or service taxes increases the price of access to the innovation and causes some portion of consumers that would otherwise enjoy the invention to exit the market. Similarly, revenue raised with income taxes will cause labor distortion, as consumers' incentive to work beyond a certain point is reduced in favor of leisure time.¹¹⁸ Although these and related costs can be significant,¹¹⁹ the conventional wisdom is that the deadweight loss from monopoly pricing on particular goods and services is usually worse.¹²⁰ Some economists even argue that, because of redistributive effects and the potential for an offsetting tax adjustment, any labor-distortion costs from financing public goods through an income tax should be ignored.¹²¹ Although the amount of deadweight loss attributable to taxation remains controversial, the literature on prizes widely assumes that deadweight loss is generally a greater concern with intellectual property than with prizes¹²²—at least in most instances.¹²³

(cited in note 3) (describing the prize system as one in which, “[i]n general, due to competition, goods embodying new information would tend to sell at prices resembling production cost, meaning that the quantity sold would tend toward the optimal”).

¹¹⁷ See, for example, Gallini and Scotchmer, *Intellectual Property* at 54 (cited in note 15).

¹¹⁸ See Alan J. Auerbach, *The Theory of Excess Burden and Optimal Taxation*, in Alan J. Auerbach and Martin Feldstein, eds, 1 *Handbook of Public Economics* 61, 110–12 (Elsevier 1985).

¹¹⁹ See Martin Feldstein, *Tax Avoidance and the Deadweight Loss of the Income Tax*, 81 *Rev Econ & Stat* 674, 677–79 (1999).

¹²⁰ See, for example, Gallini and Scotchmer, *Intellectual Property* at 54–55 (cited in note 15); Guell and Fischbaum, 73 *Milbank Q* at 214 (cited in note 15); Romer, 92 *Am Econ Rev* at 215 (cited in note 15); Stiglitz, 57 *Duke L J* at 1713–14 (cited in note 8); Wright, 73 *Am Econ Rev* at 691 (cited in note 15). But see Duffy, 71 *U Chi L Rev* at 46 (cited in note 16):

A reward system cannot be compared to IP rights without comparing the distortionary effects of patents and taxes. . . . Given that the IP right holder also has the potential constraint of competition from other technology, it is by no means clear that the IP right holder will cause greater distortions than the government's revenue agents.

¹²¹ See, for example, Louis Kaplow, *The Theory of Taxation and Public Economics* 222–25 (Princeton 2010) (arguing that labor distortion incidental to the financing and provision of public goods normally should not weigh against the efficiency gains from such a program because that distortion could be avoided with an offsetting adjustment to the income tax, and because the costs of the distortion need to be measured against the corresponding redistributive benefits).

¹²² See note 120 and accompanying text.

¹²³ The opposite may be true for some innovations. Monopoly pricing is probably preferable for any innovation that increases the value of leisure in relation to labor (for

In short, deadweight loss occurs in an intellectual property system due to monopoly pricing and in a prize system due to taxation for financing the system. Following the economic and legal literature on prizes, this Article assumes that the deadweight loss caused by monopoly pricing is greater than the deadweight loss caused by taxation.¹²⁴ However, as discussed later in this Article, this literature has taken for granted—often through explicit assumption—that eliminating intellectual property will reduce deadweight loss by moving consumer prices closer to marginal cost.¹²⁵

D. The Traditional Justification for Intellectual Property and Its Shortcomings: Incentives

Traditionally, the market-based reward for innovation has been considered the primary benefit of using intellectual property to set incentives for innovation. There have always been flaws in the incentives that result from linking the reward for innovation to consumers' willingness to pay. Many prize advocates have begun to argue that these flaws run so deep that a prize system would offer superior incentives for innovation. However, other scholars remain concerned about the government's ability to set rewards correctly, given its limited information about the social value of inventions and the risks associated with greater political involvement (and the associated risks of corruption and incompetence).

1. A market-based incentive for innovation.

The intellectual property system uses consumers' willingness to pay as the measure of social value on which to base incentives. When consumers decide whether to buy a particular good and how much they are willing to pay for it, they reveal something about its value to them. In the aggregate, these decisions

example, many video games). See Kaplow, *The Theory of Taxation and Public Economics* at 226 (cited in note 121). Arguably, monopoly pricing is also preferable for innovations that benefit only a narrow group of people. See Scotchmer, *Innovation and Incentives* at 38 (cited in note 15).

¹²⁴ See Gallini and Scotchmer, *Intellectual Property* at 54 (cited in note 15); Guell and Fischbaum, 73 *Milbank Q* at 214 (cited in note 15); Romer, 92 *Am Econ Rev* at 215 (cited in note 15); Wright, 73 *Am Econ Rev* at 691 (cited in note 15).

¹²⁵ See note 28 and accompanying text.

constitute the consumer demand for that good.¹²⁶ To the extent that the social value of a good is simply the sum of all the benefits (and costs) that different consumers derive from it, the market provides a way of measuring the social worth of new products. Assuming that consumers do not pay more for innovations than their value to them, intellectual property connects the rewards for innovation to the value they create by allowing firms to keep a portion of that value.

For economists, the principal justification for the patent system has always been this potential to link the reward for inventions to their social value. Despite his fierce opposition to most government-granted monopolies, Adam Smith decided that patents can “be vindicated” as “the easiest and most natural way in which the state can recompense [inventors] for hazarding a dangerous and expensive experiment, of which the public is afterward to reap the benefit.”¹²⁷ John Stuart Mill defended the patent system on the same ground, pointing out that “the reward conferred by [a patent] depends upon the invention’s being found useful, and the greater the usefulness the greater the reward.”¹²⁸ Modern economists still offer this same justification for the patent system.¹²⁹ While legal scholars occasionally emphasize other potential benefits from patents,¹³⁰ the primary justification for the

¹²⁶ See Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green, *Microeconomic Theory* 105–23 (Oxford 1995) (noting the complicated relationship between aggregate consumer demand for a good—that is, the consumer-demand curve—and measures of social value).

¹²⁷ Adam Smith, *2 An Inquiry into the Nature and Causes of the Wealth of Nations* 339, 712 (Oxford 2d ed 1869) (James E. Thorold Rogers, ed).

¹²⁸ Mill, *Principles of Political Economy* at 933 (cited in note 30).

¹²⁹ See, for example, Menell and Scotchmer, *Intellectual Property Law* at 1477 (cited in note 32); Shavell, *Foundations* at 138 (cited in note 3).

¹³⁰ There is a group of legal scholars that defends the patent system on the same grounds as other property rights—that patents encourage the efficient management and use of the property. See, for example, John F. Duffy, Comment, *Intellectual Property Isolationism and the Average Cost Thesis*, 83 *Tex L Rev* 1077, 1094–95 (2005); Kieff, 85 *Minn L Rev* at 747 (cited in note 11); Edmund W. Kitch, *Elementary and Persistent Errors in the Economic Analysis of Intellectual Property*, 53 *Vand L Rev* 1727, 1729–38 (2000); Henry E. Smith, *Intellectual Property as Property: Delineating Entitlements in Information*, 116 *Yale L J* 1742, 1795–97 (2007). A number of scholars have challenged this argument, leading to a lively debate. See generally, for example, James Bessen and Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* (Princeton 2008); Frischmann and Lemley, 107 *Colum L Rev* 257 (cited in note 74); Michael A. Heller and Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 *Sci* 698 (1998); Mark A. Lemley, *Ex Ante versus Ex Post Justifications for Intellectual Property*, 71 *U Chi L Rev* 129 (2004); Peter S. Menell and Michael J. Meurer, *Notice Failure and Notice Externalities*, 5 *J Legal Analysis* 1 (2013); Robert P. Merges and Richard R. Nelson, *On the Complex Economics*

system continues to be that it provides a market-based incentive for the development of socially valuable inventions.¹³¹

2. Flaws in the incentives offered by intellectual property.

In a recent twist of the debate, some prize advocates now argue that the potential for prizes to provide *better* incentives than patents for innovation is an independent reason to replace intellectual property with prizes—separate and aside from the classical justification of reducing deadweight loss.¹³² Prize advocates identify a number of problems with an intellectual property system in which the incentives for innovation are based on consumers' willingness to pay—some more controversial than others.

a) Failure to motivate socially valuable innovation. One problem identified by prize advocates with using intellectual property to determine the incentives for innovation is that consumers' willingness to pay may not accurately measure an innovation's social value. Although a full treatment of the issue is outside the scope of this Article, the connection between consumer demand for an invention and its social value is subject to debate. For example, some scholars argue that the social worth of a good depends (at least in part) on values that are distinct from its utility to consumers.¹³³ A few even go so far as to argue that the

of *Patent Scope*, 90 Colum L Rev 839 (1990). In addition to the property rights debate, there is a small literature about whether patents reduce transaction costs in the licensing of technology. See, for example, Michael J. Burstein, *Exchanging Information without Intellectual Property*, 91 Tex L Rev 227, 276–79 (2012). Scholars have also discussed whether the patent system facilitates innovation by disclosing technical information about inventions in patent applications that other researchers can then use in their own work. See, for example, Jeanne C. Fromer, *Patent Disclosure*, 94 Iowa L Rev 539, 547–56 (2009); Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 Harv J L & Tech 545, 561–65 (2012); Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 Harv L Rev 2007, 2013–26 (2005). There is even a discussion about whether patents are an important signaling device for the value of inventions. See, for example, Clarisa Long, *Patent Signals*, 69 U Chi L Rev 625, 647–49 (2002); Gideon Parchomovsky and R. Polk Wagner, *Patent Portfolios*, 154 U Pa L Rev 1, 20–22 (2005).

¹³¹ See Dan L. Burk and Mark A. Lemley, *Policy Levers in Patent Law*, 89 Va L Rev 1575, 1580 (2003).

¹³² Professor Joseph Stiglitz, for example, writes that “[t]he innovation incentives are strong in the patent system, but they are distorted, whereas the prize system can provide equivalently strong incentives that are less distorted.” Stiglitz, 57 Duke L J at 1724 (cited in note 8). See also Love and Hubbard, 18 Annals Health L at 160 (cited in note 19) (“The use of cash prizes to eliminate legal monopolies for products provides a powerful opportunity to address several flaws that plague the current system. In particular, policy makers would have far more freedom to design incentives efficiently.”).

¹³³ See, for example, Michael J. Sandel, *Justice: What's the Right Thing to Do?* 41–43 (Farrar, Straus & Giroux 2009).

social value of a good is entirely a function of its intrinsic qualities, such as the value of the labor that went into creating it.¹³⁴

Most scholars seem to accept that an invention's social value is related to its value to the people who use it, but many remain uncomfortable with the use of willingness to pay as a measure of that utility because people with higher incomes are usually willing to pay higher prices, implying that the use of an invention by a wealthy person is more valuable than a seemingly equivalent use by a poor person.¹³⁵ As a result, intellectual property can offer an inadequate reward for innovations that primarily benefit the poor.¹³⁶ This issue is thought to be particularly important in the pharmaceutical industry, in which firms devote very little of their R & D investments to diseases like malaria and tuberculosis that primarily affect people who cannot afford to pay high drug prices.¹³⁷

Putting aside this objection, consumers' willingness to pay still does not reflect the positive or negative externalities associated with the creation or use of inventions, which are often significant. Examples of such externalities include knowledge spillovers that spur additional R & D and innovation,¹³⁸ or an anticommons effect that deters them.¹³⁹ Moreover, the true value of an invention to consumers may be different from their willingness to pay for it if there are informational problems in the market, or if consumers have behavioral biases that distort their purchasing decisions.¹⁴⁰ Innovators also do not appropriate the consumer surplus from their inventions.¹⁴¹ The available empirical evidence suggests that innovators typically capture only a small

¹³⁴ See, for example, Karl Marx, *Value, Price and Profit* 14 (International Publishers 1974) (Eleanor Marx Aveling, ed) ("A commodity has a value, because it is a crystallization of social labour. The greatness of its value . . . depends upon . . . the relative mass of labour necessary for its production.") (emphasis omitted).

¹³⁵ See, for example, Cass R. Sunstein, *Willingness to Pay vs. Welfare*, 1 Harv L & Pol Rev 303, 308–16 (2007).

¹³⁶ See Hollis and Pogge, *The Health Impact Fund* at 3–6 (cited in note 19); Stiglitz, 57 Duke L J at 1720–21 (cited in note 8); Fisher, *Promises to Keep* at 234 (cited in note 16).

¹³⁷ See, for example, Ernst R. Berndt, et al, *Advance Market Commitments for Vaccines against Neglected Diseases: Estimating Costs and Effectiveness*, 16 Health Econ 491, 491–92 (2007); DiMasi and Grabowski, 82 Clinical Pharmacology & Therapeutics at 489–90 (cited in note 15).

¹³⁸ See Kremer, 113 Q J Econ at 1141 (cited in note 10).

¹³⁹ See Penin, 34 Rsrch Pol at 652–53 (cited in note 8); Stiglitz, 57 Duke L J at 1711 (cited in note 8).

¹⁴⁰ See Sunstein, 1 Harv L & Pol Rev at 323–28 (cited in note 135).

¹⁴¹ See Arrow, *Allocation of Resources for Invention* at 622 (cited in note 4).

portion of the social value generated by their inventions,¹⁴² which suggests that the incentives for innovation through intellectual property are systematically inadequate.¹⁴³

For all these reasons, prize advocates argue that a fundamental drawback of using intellectual property to set the incentives for innovation is the inability to motivate socially valuable innovation whose value is not reflected in consumers' willingness to pay.¹⁴⁴ This move deemphasizes the prize system's superiority in reducing deadweight loss from monopoly pricing, focusing instead on its capacity to promote socially valuable innovations with inadequate market demand¹⁴⁵ and to promote innovation while also offering significant redistributive benefits.¹⁴⁶

b) Socially wasteful R & D and duplicative innovation. Prize advocates cite another problem with using intellectual property to determine the incentives for innovation: the potential for socially wasteful R & D and duplicative innovation. One social cost of offering greater incentives than are necessary to motivate development is a phenomenon known as "patent racing." Notwithstanding the name, the phenomenon exists in a prize system as well as a patent system.¹⁴⁷ It occurs when an excessive incentive leads firms to engage in socially wasteful behavior to capture those excess profits. Prizes and patents are both a reward for successful innovation. When a larger incentive is given than is necessary to motivate an invention, the excess reward

¹⁴² See Congressional Budget Office, *R&D and Productivity Growth* *23–28 (Discussion Paper, June 2005), online at <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/64xx/doc6482/06-17-r-d.pdf> (visited Aug 12, 2014); Zvi Griliches, *The Search for R&D Spillovers*, 94 *Scand J Econ* S29, S43 (1992); Bronwyn H. Hall, Jacques Mairesse, and Pierre Mohnen, *Measuring the Returns to R&D*, in Bronwyn H. Hall and Nathan Rosenberg, eds, 2 *Handbook of the Economics of Innovation* 1034, 1073 (Elsevier 2010); Charles I. Jones and John C. Williams, *Measuring the Social Return to R&D*, 113 *Q J Econ* 1119, 1134 (1998).

¹⁴³ See Kremer, 113 *Q J Econ* at 1140–42 (cited in note 10); Shavell and van Ypersele, 44 *J L & Econ* at 529 (cited in note 10).

¹⁴⁴ See, for example, Stiglitz, 57 *Duke L J* at 1706–09 (cited in note 8).

¹⁴⁵ See Love and Hubbard, 18 *Annals Health L* at 160 (cited in note 19).

¹⁴⁶ One scholar has observed that "one of the great advantages of an alternative compensation system [of prizes] as compared to a market system" is that:

In the former, unlike the latter, the menu of entertainment products made available to the public would reflect fairly the preferences of all consumers of digital entertainment and would not be tilted toward the tastes of the rich, who are able and willing to pay more for their songs and films.

Fisher, *Promises to Keep* at 234 (cited in note 16).

¹⁴⁷ See Shavell, *Foundations* at 163 (cited in note 3); Stiglitz, 57 *Duke L J* at 1722–23 (cited in note 8); Stine, *Federally Funded Innovation Inducement Prizes* at 20 (cited in note 7); Wright, 73 *Am Econ Rev* at 699–700 (cited in note 15).

creates unnecessary competition between firms to expend resources in ways that, although justifiable for the winning firm, reduce the benefit of the innovation to society as a whole.

This harm can take the form of socially wasteful R & D spending to expedite an invention. When multiple firms compete with one another to produce a new type of innovation, they all may have an incentive to accelerate their R & D to be first to the market and enjoy a lead time advantage over their competitors.¹⁴⁸ The result can be excessive—and therefore socially inefficient—spending on R & D. Although the winner may profit from such expenditures, it does not internalize the R & D costs of the losers.¹⁴⁹

The net loss may also take the form of duplicative innovation or excessive marketing, in which firms develop and promote new innovations that are very similar to ones developed by their competitors, expecting that at least some of their profits will come from capturing market share.¹⁵⁰ An invention that provides little or no benefit compared to an existing technology may have little social value but garner significant profits in a patent system (or a prize system if prize payments are tied to sales volume) if enough consumers decide to buy the new invention.¹⁵¹ To the extent that consumers could have enjoyed the same benefits by purchasing the original invention, the incentive provided for the new invention is excessive, and the competition among firms to capture it leads to socially wasteful R & D and marketing.¹⁵²

Although patent racing exists in both intellectual property and prize systems, some prize advocates argue that the prize system would better avoid the associated harms.¹⁵³ They propose

¹⁴⁸ See William L. Baldwin and Gerald L. Childs, *The Fast Second and Rivalry in Research and Development*, 36 S Econ J 18, 18–19 (1969); Morton I. Kamien and Nancy L. Schwartz, *Timing of Innovations under Rivalry*, 40 Econometrica 43, 58–59 (1972); Glenn C. Loury, *Market Structure and Innovation*, 93 Q J Econ 395, 408–09 (1979); F.M. Scherer, *Research and Development Resource Allocation under Rivalry*, 81 Q J Econ 359, 392–94 (1967); Wright, 73 Am Econ Rev at 691 (cited in note 15).

¹⁴⁹ See Tirole, *The Theory of Industrial Organization* at 399 (cited in note 5).

¹⁵⁰ See *id.* at 397–98.

¹⁵¹ See Baldwin and Childs, 36 S Econ J at 18–20 (cited in note 148).

¹⁵² See Menell and Scotchmer, *Intellectual Property Law* at 1488–90 (cited in note 32); Tirole, *The Theory of Industrial Organization* at 399–400 (cited in note 5). Firms can avoid such waste by licensing their technologies to competitors or by forming joint R & D ventures, but this sort of cooperation is not always possible. See Nancy T. Gallini, *Deterrence by Market Sharing: A Strategic Incentive for Licensing*, 74 Am Econ Rev 931, 937–40 (1984).

¹⁵³ See, for example, Fisher and Syed, *Prizes* at *3 (cited in note 16):

[A] government, relying on its superior knowledge [of the social value of drugs], can construct and administer a prize system in ways that correct . . . the bias

that, because the prize system would give the government direct control over incentives, the government could more easily penalize socially wasteful R & D and duplicative innovation.¹⁵⁴

c) Stifling future innovation. A third problem cited by prize advocates with the incentives for innovation set by intellectual property is the potential for monopoly rights on earlier innovations to stifle later ones. Innovation is a cumulative phenomenon: one advance leads to the next, and researchers are always building on some previous innovations in their own work. Regardless of whether the government is using intellectual property or prizes to encourage innovation, it needs to consider the relationship between past and present innovations when setting rewards.¹⁵⁵ Allocating more than the minimum incentive necessary to earlier innovators can stifle subsequent innovators in either system.

In an intellectual property system, an excessive incentive (for example, a broader, longer, or stronger intellectual property right than necessary) stifles future innovation by making it harder for other researchers to use innovations protected by the intellectual property in their own work.¹⁵⁶ Using the protected innovation typically requires procuring a license from prior innovators, which results in licensing costs (and transaction costs associated with negotiating licenses) for the subsequent innovators. Put differently, intellectual property can raise the price of innovations as research inputs and therefore reduce their use in the production of subsequent innovations.¹⁵⁷

toward "me-too drugs" (the term conventionally used to describe drugs that, when introduced into the market, offer little or no health benefits over extant drugs).

See also Stiglitz, 57 *Duke L J* at 1720 (cited in note 8) ("[T]he prize system has the advantage that there is less incentive to waste money on advertising and to engage in other anticompetitive behaviors designed to enhance monopoly profits.").

¹⁵⁴ See, for example, Fisher and Syed, *Prizes* at *4–5 (cited in note 16).

¹⁵⁵ See Scotchmer, *Innovation and Incentives* at 131 (cited in note 15). For example, when subsequent innovations are made possible by earlier ones, the government may want some of the reward for the new innovations to go to the original innovator. Similarly, innovations that are only minor improvements on older technologies warrant smaller rewards, and to the extent that prior innovations facilitate the R & D of newer ones, the government can offer smaller rewards to motivate the development of the newer ones.

¹⁵⁶ See Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 *Tex L Rev* 989, 996–97 (1997); Merges and Nelson, 90 *Colum L Rev* at 880–84 (cited in note 130); Scotchmer, *Innovation and Incentives* at 127–57 (cited in note 15) (reviewing the economics literature on cumulative innovation).

¹⁵⁷ Debate exists on this point, with many scholars arguing that intellectual property rights can sometimes facilitate the commercialization of inventions and make it easier to

In a prize system, an excessive incentive can stifle future innovation because subsequent innovators will likely be seeking compensation from the same system. It is true that the stifling effects of licensing are avoided in a prize system by placing the innovation immediately into the public domain.¹⁵⁸ However, since government resources are finite, and the government must divide profits among sequential innovators, an excessive incentive for an early innovation will subtract too much profit from the pool for later innovators. To the extent that subsequent innovators anticipate smaller prizes for this reason, an excessive prize could have the same effect on cumulative innovation as an excessive patent (assuming that subsequent innovators will be depending in part on the prize system for their profits).

Although the risk of stifling innovation is present in both systems, some prize advocates argue that the prize system might help avoid this problem by giving the government greater flexibility in tailoring the division of profits between sequential innovators.¹⁵⁹ Accordingly, they cite the greater risk of stifling innovation as a flaw in the incentives for innovation offered by intellectual property.

3. Flaws in the incentives offered by prizes.

Advocates of the intellectual property system offer a standard rebuttal to prize scholars' arguments about the superiority of incentives in a prize system. Namely, the incentives for innovation offered in a prize system are likely to be inferior to the incentives offered in an intellectual property system because incentives under a prize system are not informed by consumers' willingness to pay.

One of the prize system's fundamental drawbacks compared to intellectual property is that the government must estimate the social value of inventions to set their reward without any direct

license new technologies. See, for example, Kieff, 85 Minn L Rev at 705-17 (cited in note 11); Penin, 34 Rsrch Pol at 651-53 (cited in note 8).

¹⁵⁸ For this reason, a number of scholars have proposed that a prize system can foster cumulative innovation. See, for example, Shavell, *Foundations* at 161-64 (cited in note 3); Shavell and van Ypersele, 44 J L & Econ at 543 (cited in note 10).

¹⁵⁹ See, for example, Gallini and Scotchmer, *Intellectual Property* at 61 (cited in note 15); Levmore, 93 BU L Rev at 158 (cited in note 16); Kremer, 113 Q J Econ at 1152 (cited in note 10) (noting that prizes will provide superior incentives for subsequent as well as complementary inventions because "the developer of the complementary invention will not have to split its value with the original inventor or take the risk that unresolved patent disputes with the original inventor will block new complementary products").

knowledge of consumers' willingness to pay for those inventions.¹⁶⁰ Social value is notoriously difficult to measure objectively in most circumstances, and measuring the social value of innovations—which are unique goods by definition—may be particularly difficult.¹⁶¹ The prize system requires the government to identify an appropriate measure of social value because the default measure of social value provided by patents—that is, consumers' willingness to pay—is intentionally eliminated to avoid deadweight loss. Goods are usually valued by way of the market, in which individual consumers reveal their demand for goods through their purchasing decisions. This market-based process for valuing goods works only in the presence of scarcity, however, and since inventions are intangible ideas, they are not scarce goods.¹⁶² As discussed above, the patent system introduces artificial scarcity into the markets for inventions in order to force consumers to reveal their demand for them, but in doing so, it prevents consumers from using those inventions at the efficient level. The prize system eliminates the artificial scarcity created by patents and thus avoids the deadweight loss from higher consumer prices under intellectual property.¹⁶³ However, in the absence of intellectual property, the government will always have limited information about consumer demand. Historically, this was considered by many economists to be the fatal flaw of the prize system.¹⁶⁴

¹⁶⁰ One of the starting premises in the academic literature on prizes is that prize payouts should be linked to the social value of inventions. See, for example, Gallini and Scotchmer, *Intellectual Property* at 60 (cited in note 15). Accordingly, proposals to replace patents with prizes usually propose a mechanism for measuring an invention's social value in order to determine the appropriate prize payout. See, for example, Fisher and Syed, *Prizes* at *3 (cited in note 16); Grinols and Henderson, 25 *Pharmacoeconomics* at 358–60 (cited in note 15); Hollis and Pogge, *The Health Impact Fund* at 13–16 (cited in note 19); Love and Hubbard, 82 *Chi Kent L Rev* at 1536–39 (cited in note 16); Shavell and van Ypersele, 44 *J L & Econ* at 531–35 (cited in note 10).

¹⁶¹ See Joseph E. Stiglitz and Scott J. Wallsten, *Public-Private Technology Partnerships: Promises and Pitfalls*, 43 *Am Behav Sci* 52, 61 (1999) (“Evaluating technology programs is technically very difficult.”).

¹⁶² See notes 78–79, 102, and accompanying text.

¹⁶³ See Barry, 2007 *Wis L Rev* at 620 (cited in note 16); Chari, Golosov, and Tsyvinski, 147 *J Econ Theory* at 782 (cited in note 15); Kremer, 113 *Q J Econ* at 1148 (cited in note 10); Penin, 34 *Rsrch Pol* at 645 (cited in note 8); Stiglitz, 57 *Duke L J* at 1720 (cited in note 8).

¹⁶⁴ See note 31 and accompanying text. See also Nordhaus, *Invention, Growth, and Welfare* at 82 n 19 (cited in note 101) (stating that although a policy of “buying inventions at their social value” could “attain the optimum,” “[i]t is unlikely that [this] ideal solution[] would be feasible given the difficulties involved in administering [it]”).

Prize advocates have proposed a number of solutions to the problem in the form of alternatives for measuring the social value of an invention. First and foremost, the government can link prize payouts to sales volume,¹⁶⁵ which discloses the number of consumers who are enjoying the good and provides a data point for estimating demand.¹⁶⁶ The government could then surmise an innovation's social value by combining the sales-volume data with an estimate of the innovation's utility to consumers¹⁶⁷—perhaps based on evidence from consumer surveys about the nature and frequency of its use,¹⁶⁸ declared consumer preferences through voting,¹⁶⁹ objective evidence of its utility to the average

¹⁶⁵ See Grinols and Henderson, 25 *Pharmacoeconomics* at 356 (cited in note 15) (proposing a prize system for drugs in which prizes are based on “an intertemporal bounty (ongoing payment) that is tied to market sales”); Shavell and van Ypersele, 44 *J L & Econ* at 541–42 (cited in note 10) (“[O]ne supposes that the government could obtain significant information about demand. Most obviously, the government can base its rewards on sales data, which should be relatively easy to obtain.”).

¹⁶⁶ Of course, relying on sales figures can be more complicated when an innovation is only a small component of the purchased product. See Abramowicz, 56 *Vand L Rev* at 144 (cited in note 16) (“When inventions cannot be mapped one-to-one onto products, determining the demand for any particular invention may be extraordinarily difficult.”).

¹⁶⁷ See Abramowicz, *Copyrighted Works as Public Goods* at *4 (cited in note 20). In the context of prizes for music:

Download counts provide just one of many means of assessing the popularity of different recordings, and while the government should be wary of relying exclusively on any single measurement that might be manipulated by authors or publishers, agencies might be able to develop reasonably accurate assessments by considering a variety of different proxies and measurement techniques.

Id. at *6. See also Shavell, *Foundations* at 162 (cited in note 3) (“To give rewards that reflect the social value of information, the state might base the reward on the volume of use of the information, such as the sales volume . . . and on some measure of its utility as well.”). But see Fisher, *Promises to Keep* at 234 (cited in note 16) (proposing that prize payouts for music and movies be based only on utilization rates, not other measurements of the elasticity of consumer demand, because those other measurements are likely to be flawed, require politically controversial decisionmaking, and will tilt the incentives for innovation toward the tastes of the rich).

¹⁶⁸ See Eckersley, 18 *Harv J L & Tech* at 101–02, 143–50 (cited in note 13) (proposing a prize system for digital information goods in which prize payouts are based on each consumer's valuation as estimated by their download count, the number of times they use the good as monitored with software, and voluntary consumer voting); Fisher, *Promises to Keep* at 224 (cited in note 16) (proposing a prize system for music and movies in which the prizes are based on the frequency with which consumers listen to or watch the work); Shavell and van Ypersele, 44 *J L & Econ* at 541–42 (cited in note 10) (“The government could also attempt to measure more about the demand curve than sales at the market price; it could estimate demand elasticities and undertake surveys to determine the character and frequency of use of, for example, computer software, musical recordings, and cinematic and television productions.”).

¹⁶⁹ See Eckersley, 18 *Harv J L & Tech* at 101–02, 143–50 (cited in note 13).

consumer,¹⁷⁰ or observational studies measuring the social value it created.¹⁷¹ An alternative strategy is to introduce a small amount of artificial scarcity into the market from which to estimate consumer demand—such as through an auction¹⁷² or by observing profits in a limited test market.¹⁷³

Each of the alternative mechanisms proposed for measuring social value and setting incentives has problems,¹⁷⁴ and even supporters of the prize system acknowledge that the government cannot accurately estimate consumer demand without intellectual property. However, prize advocates correctly point out that the government does not need perfect information about consumer demand to set prizes that equal patents at motivating

¹⁷⁰ See Love and Hubbard, 82 *Chi Kent L Rev* at 1536–41 (cited in note 16) (proposing a prize system for drugs in which prizes are largely based on a drug's sales volume and an estimate of its therapeutic value compared to other available treatments).

¹⁷¹ See Hollis and Pogge, *The Health Impact Fund* at 27–35 (cited in note 19) (proposing a prize system for drugs based on government assessments of each drug's health impact on the population, an admittedly complicated task that would be accomplished by combining sales volume with information about therapeutic value from clinical trials, epidemiological studies, and other relevant sources).

¹⁷² See Kremer, 113 *Q J Econ* at 1146–48, 1158–62 (cited in note 10) (proposing a prize system in which the government holds an auction to assess the value of patents when there is some small chance that the high bidder purchases the patent, but in all other cases the government pays the innovator double the third-highest bid in the auction). See also Chari, Golosov, and Tsyvinski, 147 *J Econ Theory* at 793–98 (cited in note 15).

¹⁷³ See Guell and Fischbaum, 73 *Milbank Q* at 225 (cited in note 15) (proposing a patent buyout regime for pharmaceuticals through the government's power of eminent domain, and, to assist in assessing the “just compensation” for each patent, allowing “a market appeal” in which “[t]he drug could be marketed by the firm in a specific test area” to observe what “the firm's true monopoly profits [would be] had it kept the patent”). But see Abramowicz, 56 *Vand L Rev* at 135 (cited in note 16) (identifying several potential problems with Guell and Fischbaum's proposal for limited monopoly pricing in specific test areas, including that “it might be difficult to extrapolate from the results in the test market” due to “different demographics from the nation as a whole” and subsequent changes in consumer demand for the product).

¹⁷⁴ A number of articles have criticized one or more of these prize proposals. See, for example, Abramowicz, 56 *Vand L Rev* at 127–211 (cited in note 16); Baker, *Financing Drug Research* at *15–24 (cited in note 19); DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* at 489–90 (cited in note 15); Duffy, 71 *U Chi L Rev* at 41–51 (cited in note 16); Kieff, 85 *Minn L Rev* at 705–17 (cited in note 11). Any effort to measure the utility of innovations will certainly be crude and sometimes costly to administer. The proposals to estimate consumer demand with auctions or test markets would also be expensive, see Kieff, 56 *Emory L J* at 404 (cited in note 16), and, according to some critics, unreliable. See, for example, Abramowicz, 56 *Vand L Rev* at 127–211 (cited in note 16); Kieff, 85 *Minn L Rev* at 705–17 (cited in note 11). It is probably safer to calculate rewards based on sales volume, but this policy might encourage innovators to inflate their sales figures by setting prices below marginal cost. See notes 165–69 and accompanying text.

innovation.¹⁷⁵ In the patent system, firms invest in R & D based on their *ex ante* projections of consumer demand for innovations, which are likely to be imperfect. For the government to offer prizes that rival the incentives from patents, its estimates of consumer demand (which occur *ex post*) need be only as good as firms' *ex ante* projections.¹⁷⁶ Additionally, prize advocates note that the government has room for error when it estimates social value for purposes of setting incentives. To the extent that the private returns from innovation under the patent system are systematically (and substantially) lower than the social returns,¹⁷⁷ this gap provides the government with a crucial margin of error when calculating prize payouts.¹⁷⁸

E. The Unifying Theme

The "unifying theme" of the prize literature flows naturally from the preceding comparison of benefits and drawbacks of a prize system versus an intellectual property system. The intellectual property system gives the government a default measure of social value that ties the incentives for innovation to consumers' willingness to pay. Unfortunately, that measurement of social value is available only by introducing artificial scarcity into the market for the innovation, which inevitably creates deadweight loss. Moreover, the monopoly profits firms might earn from their inventions do not provide ideal incentives for innovation. Advocates of the prize system argue that the government could correct these flaws in the market by switching from intellectual

¹⁷⁵ See, for example, Kremer, 113 Q J Econ at 1140–41 (cited in note 10); Shavell and van Ypersele, 44 J L & Econ at 529–30 (cited in note 10); Stiglitz, 57 Duke L J at 1706–09 (cited in note 8).

¹⁷⁶ See Shavell and van Ypersele, 44 J L & Econ at 542 (cited in note 10).

¹⁷⁷ See Bloom, Schankerman, and Van Reenen, 81 *Econometrica* at 1389 (cited in note 75).

¹⁷⁸ It is plausible to think that, if the government has a well-designed mechanism for determining rewards, it could offer prizes that are generally higher than what firms earn from their patents with minimal risk of overcompensating them. In Professor Michael Kremer's proposed prize system, for example, the government would use an auction mechanism to estimate the private value of patents, and then pay the inventors twice the estimated private value to put their patents in the public domain. Kremer, 113 Q J Econ at 1147 (cited in note 10). Professors Steven Shavell and Tanguy van Ypersele argue that the government could set prizes for inventions by estimating the lower bound of their social value. They reason that as long as the government has limited information about consumer demand for an invention (for example, the number of units sold), even the lowest plausible estimate of its social value will still be higher than firms' anticipated profits from their patents in most cases. See Shavell and van Ypersele, 44 J L & Econ at 540–41 (cited in note 10).

property to prizes. However, without artificial scarcity, the government must measure social value without knowledge of consumers' willingness to pay. Society can promote private-sector R & D while avoiding both drawbacks of intellectual property so long as the government can set equally good incentives for innovation without using intellectual property to measure inventions' value to consumers.¹⁷⁹

Accordingly, the literature offers a simple framework for evaluating society's choice between prizes and intellectual property. The unifying theme provides that, if the government can measure and base its incentives on the social value of an innovation without consulting intellectual property, then prizes should replace patents in order to avoid the deadweight loss attributable to intellectual property.¹⁸⁰ If, as some scholars argue, a prize system can offer superior incentives for innovation, that would be a separate and further reason to replace patents with prizes in these circumstances.¹⁸¹

II. AN EXCEPTION TO THE UNIFYING THEME?

The unifying conclusion in the prize literature is that, if the government can set prize payouts to better reflect the social value of inventions relative to the monopoly profits that firms would earn from intellectual property, then prizes should replace intellectual property because prizes will reduce deadweight loss and may offer superior incentives for innovation. If this is true, then the existence of drug patents in countries with national health insurance systems presents something of a puzzle. In these countries, the government sets the incentives for innovation through a combination of price controls and government reimbursement. Drug patents continue to be issued, but the artificial scarcity that they make possible is never introduced into the market and, therefore, never consulted by the government in

¹⁷⁹ See Shavell and van Ypersele, 44 *J L & Econ* at 541–42 (cited in note 10).

¹⁸⁰ See Gallini and Scotchmer, *Intellectual Property* at 54 (cited in note 15); Hollis, *An Efficient Reward System for Pharmaceutical Innovation* at *3–4 (cited in note 15); Menell and Scotchmer, *Intellectual Property Law* at 1476, 1477, 1531–32 (cited in note 32); Stigler, *The Organization of Industry* at 124 (cited in note 31) (“If a viable system of lump-sum grants equal to the contribution of a piece of knowledge to the national income (or welfare) could be devised, there would be a good case for using that system rather than patents.”); Wright, 73 *Am Econ Rev* at 691–92 (cited in note 15) (explaining that if the “informational imbalance is resolved,” then “any rationale presented here for choosing patents over other incentives with lower excess burden collapses”).

¹⁸¹ See notes 175–79 and accompanying text.

setting incentives. It is possible that these countries are all making a mistake, perhaps as a result of undue political influence or pressure from a foreign power.¹⁸² However, an alternative explanation is that the unifying conclusion in the prize literature reflects an overly narrow view of the government's options in achieving the benefits offered by the prize system and of intellectual property's role in preventing expropriation.

All developed countries grant drug patents, but the vast majority do not use those patents to set market-based incentives for innovation.¹⁸³ In these countries, prescription drugs are purchased and distributed through a national health insurance system. Citizens are given prescription drug insurance through their government, which allows them to purchase drugs at the price of a co-pay instead of the full monopoly price. As the provider of this insurance, the government reimburses drug companies for every prescription that is filled at a reimbursement rate "negotiated" with the drug company.¹⁸⁴ In reality, the government effectively sets the reimbursement rate given its substantial bargaining power as the only buyer in the market in that country.

In these countries with nationalized health care, the incentives for drug development are equal to the sum of the co-pays and reimbursement rates, both of which are set by the government. The government cannot rely directly on its drug patents to inform these incentives, because the measure of social value provided by patents is never generated. That would require introducing artificial scarcity into the market to reveal consumers' willingness to pay, and the government largely preempts this scarcity through its control over prices. Although the companies

¹⁸² For example, one might argue that these countries are retaining drug patents only because they are forced to do so by the nondiscrimination provision in the TRIPS Agreement. See Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (Apr 15, 1994), Art 37(1), 33 ILM 81, 97 (1994). However, most developed countries expressly supported this nondiscrimination provision in the TRIPS Agreement to permit drug companies to retain patents. See Peter Drahos, *Global Property Rights in Information: The Story of TRIPS at the GATT*, 13 *Prometheus* 6, 16 (1995).

¹⁸³ See Livio Garattini, Dante Cornago, and Paola De Compadri, *Pricing and Reimbursement of In-Patent Drugs in Seven European Countries: A Comparative Analysis*, 82 *Health Pol* 330, 336–37 (2007); Brian Godman, et al, *Having Your Cake and Eating It: Office of Fair Trading Proposal for Funding New Drugs to Benefit Patients and Innovative Companies*, 26 *Pharmacoeconomics* 91, 91–93 (2008); David A. Henry, Suzanne R. Hill, and Anthony Harris, *Drug Prices and Value for Money: The Australian Pharmaceutical Benefits Scheme*, 294 *JAMA* 2630, 2632 (2005); Elias Mossialos, David Brogan, and Tom Walley, *Pharmaceutical Pricing in Europe: Weighing Up the Options*, 59 *Intl Soc Security Rev* 3, 9–10 (2006).

¹⁸⁴ Mossialos, Brogan, and Walley, 59 *Intl Soc Security Rev* at 6–8 (cited in note 183).

retain their patents, the actual incentives for drug development are fully determined by the government—or rather, through negotiations between the government and pharmaceutical companies—without consulting the drug patents.

The theoretical prize literature suggests that, by not eliminating patents, all of these countries are forgoing substantial gains in the form of reduced deadweight loss and potentially improved incentives for innovation. As discussed in Part III.B, the intellectual property system is generally justified by its ability to link the rewards for innovation to consumer demand reflected in consumers' willingness to pay for the invention. However, the artificial scarcity used to reveal consumers' willingness to pay inevitably introduces deadweight loss. As a result, the theoretical literature posits that society will always benefit by switching to prizes if the incentives set by the government will be no worse in the absence of intellectual property. When a government does not consult the intellectual property in setting incentives, it would seem that the elimination of that intellectual property cannot worsen incentives. If the incentives set by government will be no worse, the standard economic account of prizes is clear that eliminating intellectual property will reduce deadweight loss by driving down consumer prices.¹⁸⁵ Recent prize literature also claims that eliminating intellectual property in these circumstances would enable superior incentives for innovation that more accurately reflect an invention's social value.¹⁸⁶

The applied literature on prizes is even more emphatic as to the gains that these countries are forgoing by not eliminating patents. Patent scholars regularly give the pharmaceutical industry as an example of an industry in which patents are causing substantial deadweight loss,¹⁸⁷ resulting in greater potential for gains from eliminating patents. Prize advocates argue that,

¹⁸⁵ See Shavell, *Foundations* at 162 (cited in note 3); Penin, 34 *Rsrch Pol* at 645 (cited in note 8).

¹⁸⁶ See notes 175–79. Professor Joseph Stiglitz, for example, writes that “[t]he innovation incentives are strong in the patent system, but they are distorted, whereas the prize system can provide equivalently strong incentives that are less distorted.” Stiglitz, 57 *Duke L J* at 1724 (cited in note 8). See also Love and Hubbard, 18 *Annals Health L* at 160 (cited in note 19) (“The use of cash prizes to eliminate legal monopolies for products provides a powerful opportunity to address several flaws that plague the current system. In particular, policy makers would have far more freedom to design incentives efficiently.”).

¹⁸⁷ See, for example, Kieff, 85 *Minn L Rev* at 731 (cited in note 11); Kremer, 113 *Q J Econ* at 1140 (cited in note 10); Scherer, *Industrial Market Structure* at 390 (cited in note 3) (describing patented pharmaceuticals as an “extreme” case of patents conferring significant market power); Stiglitz, 57 *Duke L J* at 1701 (cited in note 8).

if drug patents were eliminated, there would be nothing to stop generics from quickly entering the market and competing with one another to drive prices toward marginal cost, facilitating greater public access.¹⁸⁸ As Professor Joseph Stiglitz explains, “[t]he power of competitive markets would ensure a wide distribution [of drugs] at the lowest possible price, unlike the current system, which uses monopoly power, with its high prices and limited usage.”¹⁸⁹ If this is true, then countries with nationalized health care are forgoing substantial gains in public access to drugs by maintaining drug patents.¹⁹⁰

The applied literature also proposes that the superior incentives for innovation offered by prizes are supposed to be particularly impressive in the context of replacing drug patents with prizes. One of the most frequently cited problems with the rewards for innovation under the patent system is the failure to encourage the R & D of drugs that would primarily benefit impoverished people in developing countries.¹⁹¹ While there is no question of the tremendous social value of developing drugs for malaria and tuberculosis, it is widely understood that diseases that primarily afflict populations with fewer resources to pay for treatments receive very little R & D investment by pharmaceutical firms.¹⁹² Advocates of the prize system also point to the elimination of drug patents in favor of prizes as a unique opportunity to set superior incentives that discourage wasteful R & D spending.¹⁹³ Scholars often accuse pharmaceutical firms

¹⁸⁸ See, for example, Joseph Stiglitz, *Give Prizes Not Patents*, *New Scientist* 21, 21 (Sept 16, 2006).

¹⁸⁹ Stiglitz, 333 *BMJ* at 1279 (cited in note 28).

¹⁹⁰ Scholars have made a similar point by comparing the relative “distortion” that can be expected when funding pharmaceuticals through prizes as opposed to patents. See Fisher and Syed, *Prizes* at *5–6 (cited in note 16) (arguing that the distortion from monopoly pricing of pharmaceuticals is almost certainly worse than the distortion from tax revenue funding a prize system).

¹⁹¹ See, for example, William W. Fisher and Talha Syed, *Global Justice in Healthcare: Developing Drugs for the Developing World*, 40 *UC Davis L Rev* 581, 583 (2007); Hollis and Pogge, *The Health Impact Fund* at 3–6 (cited in note 19); Stiglitz, 57 *Duke L J* at 1720–21 (cited in note 8).

¹⁹² See, for example, Owen Barder, Michael Kremer, and Heidi Williams, *Advance Market Commitments: A Policy to Stimulate Investment in Vaccines for Neglected Diseases*, *Economists’ Voice* 2–3 (Feb 2006); Berndt, et al, 16 *Health Econ* at 491 (cited in note 137); DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* at 489–90 (cited in note 15).

¹⁹³ See, for example, Fisher and Syed, *Prizes* at *3 (cited in note 16); Hollis and Pogge, *The Health Impact Fund* at 91 (cited in note 19); Kremer, 113 *Q J Econ* at 1148 (cited in note 10); Love and Hubbard, 18 *Annals Health L* at 172 (cited in note 19); Stiglitz, *New Scientist* at 21 (cited in note 188).

of wasting resources on the development of “me-too” drugs, the purpose of which is to capture market share away from their competitors,¹⁹⁴ while offering little or no advantage over existing products.¹⁹⁵ In a prize system, “[m]e-too drugs that do no better than existing ones would get a small prize at best.”¹⁹⁶ Encouraging socially valuable innovation while discouraging redundant or wasteful inventions would seemingly be another reason for these countries in question to eliminate drug patents.

In short, based on the existing prize scholarship, countries with nationalized health care have every reason to eliminate patents in favor of prizes. So why are these countries not taking advantage of the tremendous social gains promised by both theoretical and applied prize scholarship, or even seriously discussing the possibility of eliminating drug patents?

The obvious answer is that the benefits from eliminating drug patents in these countries would be much smaller than predicted by the prize literature, and there might not be any benefits at all. While the prize literature equates intellectual property with consumers paying full monopoly prices for inventions, these governments are intervening in the market to provide consumers with access to patented drugs at a much lower price that is set by the government. The prize literature also equates intellectual property with market-based incentives for

¹⁹⁴ See, for example, Amy Finkelstein, *Static and Dynamic Effects of Health Policy: Evidence from the Vaccine Industry*, 119 Q J Econ 527, 555–56 (2004) (finding that, in response to certain policy changes that increased the potential returns from developing certain types of vaccines, three of the four vaccines examined may have provided little additional value and were driven by “socially wasteful business stealing,” although the fourth new vaccine resulted in massive social benefits); Marcia Angell, *The Truth about the Drug Companies: How They Deceive Us and What to Do about It* 74–93 (Random House 2004).

¹⁹⁵ See, for example, Angell, *The Truth about the Drug Companies* at 80–83 (cited in note 194); Fisher and Syed, *Prizes* at *9–10 (cited in note 16); Rai, 2001 U Ill L Rev at 205–06 (cited in note 107). Some commentators dispute this claim, however, arguing that the social value of these “me too” drugs still outweighs their development costs. See, for example, Albert Wertheimer, Richard Levy, and Thomas O’Connor, *Too Many Drugs? The Clinical and Economic Value of Incremental Innovations*, in Irena Farquhar, Kent Summers, and Alan L. Sorkin, eds, *Investing in Health: The Social and Economic Benefits of Health Care Innovation* 77, 78–82 (Elsevier 2001); F.M. Scherer, *Markets and Uncertainty in Pharmaceutical Development* *20 (Kennedy School of Government Faculty Research Working Paper Series RWP07-039, Sept 2007), online at <https://research.hks.harvard.edu/publications/getFile.aspx?Id=267> (visited Aug 12, 2014).

¹⁹⁶ Stiglitz, *New Scientist* at 21 (cited in note 188). See also Kremer, 113 Q J Econ at 1162 (cited in note 10) (“Patent buyouts could potentially increase incentives for original invention closer to their social value [and] reduce incentives for wasteful ‘me too’ research.”).

R & D, but these governments can control the profits from pharmaceutical innovation without reference to consumers' revealed willingness to pay.

The widespread use of national health insurance systems and prescription drug coverage in nations that grant drug patents indicates that the depiction of intellectual property in the prize literature is flawed. These governments are intervening in the market to provide consumers with a more efficient level of access to patented drugs without eliminating those patents. Moreover, the structure of these policy interventions is eerily similar to many of the proposals for replacing drug patents with prizes, which often involve consumers purchasing drugs at their generic price and governments paying a reward to pharmaceutical companies based on the sales of their drugs.¹⁹⁷ Since these governments already exercise a tremendous amount of control over the profits from pharmaceutical R & D, it is unclear why they must eliminate drug patents in order to alter the incentives for drug development in a beneficial manner. Moreover, since pharmaceutical companies have fought to preserve the drug patent system in these countries,¹⁹⁸ it is possible that patents play an important role in the incentives for innovation even when the government controls the market.

Ultimately, the decision of the vast majority of developed countries to retain drug patents while not using them to set market-based rewards for innovation may well be the logical choice. In any case, the fact that none of these countries have chosen to eliminate patents suggests that there is more going on in the analysis than suggested by the unifying principle. Even if the incentives for innovation will be no worse when set by the government in the absence of intellectual property, other factors may still justify preserving patents in favor of prizes.

III. REVISITING THE PROMISE OF REDUCTIONS IN DEADWEIGHT LOSS

The central advantage of the prize system is supposed to be that it reduces deadweight loss by allowing for efficient consumer pricing of inventions. Despite the recent surge of scholarship on prizes, there has been no systematic analysis of the prize system's

¹⁹⁷ See Love and Hubbard, 82 *Chi Kent L Rev* at 1534–43 (cited in note 16).

¹⁹⁸ See Arthur A. Daemrich, *Pharmacopolitics: Drug Regulation in the United States and Germany* 2 (North Carolina 2004).

likely effects on consumer prices.¹⁹⁹ This gap in the literature leaves a significant hole in the case for the prize system. Improved access is a powerful selling point for replacing intellectual property with prizes since consumer deadweight loss is one of the primary drawbacks of the intellectual property system. However, to the extent that the deadweight loss associated with intellectual property is alleviated by other means available within that system, the incremental improvement of eliminating intellectual property in favor of prizes will be reduced. Moreover, to the extent that the deadweight loss is attributable to forces other than patents, the elimination of intellectual property in favor of prizes will similarly offer limited gains to society in reducing deadweight loss.

A. Reassessing the Inevitability of Deadweight Loss in an Intellectual Property System

This Section examines some of the tools available—and in many cases already used—within an intellectual property system that can help mitigate the deadweight loss associated with monopoly pricing of inventions. This examination leads to two important insights for the comparison between intellectual property and prizes. First, under many circumstances, the tools available within an intellectual property system can be fairly effective at providing consumers access to patented or copyrighted goods at prices close or equal to marginal cost. Second, the pricing structure for inventions created through these tools closely resembles the pricing structure imagined in many proposals for a prize system. In the prize literature, scholars commonly characterize prizes as a means of “de-linking” consumer prices from producer prices, thereby separating the incentives for innovation from the prices consumers must pay for access to inventions.²⁰⁰ However, markets often produce their own version of this price structure through a particular form of price discrimination known as a “two-part tariff.” Notably, it is found in the very industries that have received the most attention from prize advocates—the pharmaceutical and entertainment industries. While a two-part tariff alone is incapable of fully eliminating the deadweight loss attributable to intellectual property, much of what remains can be eliminated with other tools at the government’s

¹⁹⁹ See note 20.

²⁰⁰ Love, *De-linking R&D Costs from Product Prices* at *2–3 (cited in note 54).

disposal, including taxes, subsidies, and price controls. Examples of subsidies familiar to most people in the United States are government-subsidized health care and consumer tax credits for energy-efficient technologies. Moreover, the government can simply purchase inventions on behalf of consumers, which is a common strategy for reducing deadweight loss attributable to drug patents, as discussed in Part II.

1. Prizes as a two-part pricing scheme for the elimination of deadweight loss.

At a basic level, the prize system is a two-part pricing scheme for inventions, in which the government pays firms a reward for their inventions and consumers pay to cover the costs of their use. Among economists, it is well accepted that this type of two-part pricing can allow for efficient access to goods with large fixed costs of production, such as utilities, public infrastructure,²⁰¹ and inventions with high R & D costs.²⁰² As Professor Burton Weisbrod explains, “when R&D costs are very large relative to production costs—as is the case for pharmaceuticals—using price for pills as the only mechanism for rewarding the product developer drives price upward,” causing it to be “far higher than is economically efficient.”²⁰³ Along with most other prize advocates, Weisbrod concludes that “[t]he patent system is the root problem,” because “the only way that R&D, including clinical testing, costs can be covered is through high prices for the resulting pills.”²⁰⁴ The prize system is a natural solution to this problem because, as prize advocates routinely point out, it “de-link[s] R&D costs from product prices.”²⁰⁵ Professor Kenneth

²⁰¹ See Harold Hotelling, *The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates*, 6 *Econometrica* 242, 242–43 (1938).

²⁰² See Romer, 92 *Am Econ Rev* at 214 (cited in note 15).

²⁰³ Weisbrod, *Solving the Drug Dilemma*, *Wash Post* at A21 (cited in note 15).

²⁰⁴ *Id.* See also Arrow, *Allocation of Resources for Innovation* at 617 (cited in note 4) (explaining that “[i]n a free enterprise economy” that encourages innovation with patents rather than prizes, “inventive activity is supported by using the invention to create property rights; precisely to the extent that it is successful, there is an underutilization of the information”).

²⁰⁵ Love, *De-linking R&D Costs from Product Prices* at *2–3 (cited in note 54). Among global-health scholars, it is now standard practice to refer to prize systems and similar proposals for replacing (or limiting) drug patents as “de-linking” initiatives for “divorcing the funding of R&D from product pricing.” Consultative Expert Working Group on Research and Development: Financing and Coordination, *Research and Development to Meet Health Needs in Developing Countries: Strengthening Global Financing and Coordination*, 37–38, 49–63 (World Health Organization 2012). See also Meir Perez

Arrow made the same observation back in 1962, stating that “[i]n an ideal socialist economy, the reward for invention would be completely separated from any charge to the users of the information,” as “exists in the Soviet Union” with its prize system.²⁰⁶ Weisbrod even describes his proposed prize system simply as a regime of “[t]wo prices—one for the R&D, another for the resulting pills.”²⁰⁷ This literature makes a strong case for separating the reward for innovation from consumer prices.

2. Intellectual property along with two-part price discrimination for the reduction of deadweight loss.

The literature on prizes often overlooks the fact that intellectual property rights permit innovators to sell inventions through a type of two-part pricing that is similar in form to prizes and that can lessen (but not eliminate) the deadweight loss from monopoly pricing.²⁰⁸ It is widely accepted that intellectual property rights cause deadweight loss, which firms have an incentive to reduce by offering discounts to consumers who otherwise would exit the market at monopoly prices. The standard economic account of intellectual property recognizes that price discrimination can reduce and, theoretically, even eliminate deadweight loss, but is very difficult to implement in practice.²⁰⁹ One particular type of price discrimination—the two-part tariff—warrants special attention, however. Under a two-part tariff, consumers pay the monopolist an upfront fee in exchange for the right to purchase units of the good at a specified price. The classic example of a two-part pricing scheme is Disneyland, where consumers pay an upfront fee to get into the park, but once inside

Pugatch, Rachel Chu, and David Torstensson, *Assembling the Pharmaceutical R&D Puzzle for Needs in the Developing World* 24–25 (Pugatch Consilium 2012); Adrian Towse, et al, *Drugs and Vaccines for Developing Countries* *27–28 (Office of Health Economics May 21, 2011), online at <http://faculty.fuqua.duke.edu/~dbr1/research/developing-Oxford.pdf> (visited Aug 12, 2014).

²⁰⁶ Arrow, *Allocation of Resources for Invention* at 617 & n 5 (cited in note 4).

²⁰⁷ Weisbrod, *Solving the Drug Dilemma*, Wash Post at A21 (cited in note 15).

²⁰⁸ An exception is Professor John Duffy’s 2004 article on prizes, in which he briefly notes that “monopolists are free to rely on ‘multi-part’ pricing, by which lower charges would be made for incremental units.” Duffy, 71 U Chi L Rev at 45 (cited in note 16). However, Duffy offers no other discussion of multipart pricing other than to say that “[i]f the monopolist can engage in perfect price discrimination, no deadweight loss will occur.” Id at 46. As explained below, eliminating deadweight loss through two-part pricing alone is impossible unless consumer demand for the invention is homogeneous, and it never is. See notes 107–12 and accompanying text.

²⁰⁹ See notes 107–12 and accompanying text.

they have access to the individual rides for free—a price that approximates the marginal cost of taking a ride.²¹⁰ Disney has a monopoly over each of the rides in Disneyland, but with the two-part tariff, consumers who pay the upfront fee enjoy access to those rides at the efficient level. The entrance fee causes deadweight loss as some consumers are priced out of Disneyland, but the consumers inside the park completely avoid the deadweight loss normally associated with monopoly pricing.²¹¹

Although the intellectual property literature rarely mentions this form of price discrimination, two-part tariffs are a common pricing strategy with patented and copyrighted goods. Online music services like Rhapsody charge monthly subscription fees for unlimited, on-demand access to large collections of songs.²¹² Universities pay subscription fees to various online databases so that their faculty and students can enjoy unfettered access to journal articles.²¹³ Consumers pay an upfront fee to their cable company or companies such as Netflix and Amazon for unlimited viewing of the television and movie programming in their bundle.²¹⁴ Some industry patent pools offer firms free or low-cost access to patented technologies in exchange for an upfront fee.²¹⁵ In each case, consumers pay a lump-sum fee in exchange for access to patented or copyrighted goods at prices at or near marginal cost.

The most noteworthy example of two-part tariff pricing for a patented technology is prescription drug insurance. When consumers buy prescription drug insurance, they pay an upfront fee (in the form of an insurance premium) that enables them to purchase drugs at the price of their co-pay. To the extent that co-pays for drugs resemble marginal cost—and they are often

²¹⁰ See Walter Y. Oi, *A Disneyland Dilemma: Two-Part Tariffs for a Mickey Mouse Monopoly*, 85 Q J Econ 77, 77–81 (1971).

²¹¹ See *id.* at 86–88.

²¹² See *Rhapsody—Play Any Song, Anywhere* (Rhapsody International), online at <http://try.rhapsody.com> (visited Aug 12, 2014).

²¹³ See Steven Shavell, *Should Copyright of Academic Works Be Abolished?*, 2 J Legal Analysis 301, 328 (2010) (“Today, universities subscribe to a large number of journals and make their content freely available to many in the university community through library and Internet access.”).

²¹⁴ See Stan J. Liebowitz and Stephen E. Margolis, *Bundles of Joy: The Ubiquity and Efficiency of Bundles in New Technology Markets*, 5 J Competition L & Econ 1, 32–35 (2009).

²¹⁵ See *id.* at 22–24.

fairly close²¹⁶—consumers with insurance enjoy efficient access to prescription drugs.²¹⁷ As a result, the widespread use of prescription drug insurance in the United States dramatically reduces the deadweight loss from drug patents²¹⁸—an area in which scholars often assume that the deadweight loss from patents is greatest.²¹⁹

Although the benefits can be significant, two-part tariffs are not a cure for the deadweight loss caused by intellectual property. For consumers who pay the initial fee, the basic structure of pricing through a two-part tariff is remarkably similar to the two-part pricing under a prize system.²²⁰ However, the people who fail to pay the upfront fee are either excluded from the market or, if they can still purchase the goods individually (like

²¹⁶ See Darius Lakdawalla and Neeraj Sood, *Health Insurance as a Two-Part Pricing Contract*, 102 J Public Econ 1, 9 (2013). Under the modern practice of tiered formularies, however, consumers often face high co-pays for expensive prescription drugs when there are lower-cost alternatives. See Jesse D. Malkin, Dana P. Goldman, and Geoffrey F. Joyce, *The Changing Face of Pharmacy Benefit Design*, 23 Health Affairs 194, 196 (2004).

²¹⁷ See Michael Crew, *Coinsurance and the Welfare Economics of Medical Care*, 59 Am Econ Rev 906, 906 (1969) (“Where monopoly or some restriction of competition exists in the servicing of liability claims, coinsurance may lead to a Pareto optimal situation.”); Martin Gaynor, Deborah Haas-Wilson, and William B. Vogt, *Are Invisible Hands Good Hands? Moral Hazard, Competition, and the Second-Best in Health Care Markets*, 108 J Polit Econ 992, 1001–02 (2000); Lakdawalla and Sood, 102 J Public Econ at 1 (cited in note 216) (“[H]ealth insurance resembles a two-part pricing contract in the sense that consumers pay an upfront fee (premiums) in exchange for lower unit prices (co-payments) in the event of illness,” which “allow[s] a monopolist to sell goods at marginal cost, but to extract consumer surplus in the form of an upfront payment.”). See also Alan M. Garber, Charles I. Jones, and Paul Romer, *Insurance and Incentives for Medical Innovation*, 9 F Health Econ & Pol 1, 17–21 (2006).

²¹⁸ See Lakdawalla and Sood, 102 J Pub Econ at 2 (cited in note 216) (arguing that health insurance can eliminate the deadweight loss from patent protection on pharmaceuticals by allowing consumers to purchase drugs at marginal cost). See also Fisher, *Intellectual Property and Innovation* at *12 (cited in note 16) (“Public or private health-insurance systems can, of course, offset [the potential deadweight loss from high drug prices] by enabling the cost of patented drugs to be passed along either to all taxpayers . . . or to large populations of potential patients.”).

²¹⁹ See note 101. See also Guell and Fischbaum, 73 Milbank Q at 216–20 (cited in note 15).

²²⁰ The close relationship between prizes and two-part tariffs is especially obvious in the case of prescription drugs. Both approaches involve consumers paying an intermediary in exchange for having access to prescription drugs at lower prices, and both rely on that intermediary to pay drug companies to compensate them for the value of their products to consumers. The initial fee in a two-part tariff is similar to the higher taxes that consumers would pay to finance government prize payouts, and once they pay that fee, they would have access to the inventions at a price that is often close to marginal cost, much like a prize system.

people without prescription-drug insurance), they suffer the normal deadweight loss from a single-price monopoly.²²¹

If consumer demand were homogenous, two-part tariffs would result in a first-best outcome: firms would set their upfront fee at the monopoly price, which everyone would pay, and then sell their goods to consumers at marginal cost.²²² Consumer demand is almost never homogenous, of course, and with heterogeneity, monopolists will either set the second part of the tariff above marginal cost, or, more commonly, charge an upfront fee that excludes some consumers from the market.²²³ In practice, therefore, two-part tariffs can only lessen the inefficiencies of monopoly pricing.

3. Government subsidies and price controls for further reductions in deadweight loss.

The inefficiencies of monopoly pricing that persist in a two-part tariff system can be further reduced with other tools already available to the government, such as subsidies and price controls.

a) Government subsidies can reduce deadweight loss in the intellectual property system. The most familiar means of eliminating deadweight loss without eliminating intellectual property is the use of government subsidies. The government can subsidize the purchase price of patented and copyrighted innovations so that consumers' out of pocket costs are much closer to marginal

²²¹ See The Henry J. Kaiser Family Foundation, *Economic Problems Facing Families* *3-4 (Kaiser Public Opinion Apr 2008), online at <http://kaiserfamilyfoundation.files.wordpress.com/2013/01/7773.pdf> (visited Aug 12, 2014). According to figures published by the Kaiser Family Foundation, 15.5 percent of people living in the United States were uninsured in 2010. See The Henry J. Kaiser Family Foundation, *Uninsured Estimates of the Total Population, American Community Survey (ACS)*, State Health Facts (2010), online at <http://kff.org/uninsured/state-indicator/total-population-2> (visited Aug 12, 2014). Many more are likely underinsured.

²²² See Oi, 85 Q J Econ at 81-88 (cited in note 210); Hal R. Varian, *Price Discrimination*, in Richard Schmalensee and Robert D. Willig, eds, 1 *Handbook of Industrial Organization* 598, 601-10 (Elsevier 1989).

²²³ See Varian, *Price Discrimination* at 604-10 (cited in note 222); Tirole, *The Theory of Industrial Organization* at 143-46 (cited in note 5). Monopolists tend to charge a higher upfront fee, rather than set the second part of the tariff above marginal cost. This is because it is generally more profitable to maximize the enjoyment of those who do enter and charge a commensurately greater upfront fee than it is to increase the number of people who enter but limit use by charging more than the marginal rate.

costs.²²⁴ The government has substantial flexibility in structuring subsidies that will reduce deadweight loss without eliminating intellectual property. As Professor Doug Lichtman argued in response to proposals for replacing drug patents with prizes, “the government could significantly reduce the social cost of pharmaceutical patents simply by offering a cash subsidy to any consumer who values a patented drug above its marginal cost but is nonetheless unwilling to pay the monopoly price.”²²⁵

Government subsidies can be particularly effective at reducing the deadweight loss from intellectual property—and are probably more practical—when used in conjunction with a two-part-tariff pricing model. For example, the government can—and, in some cases, already does—subsidize consumers’ purchase of health insurance. Scholars have noted that government-subsidized drug insurance may be a cost-effective means of eliminating deadweight loss attributable to drug patents while maintaining intellectual property.²²⁶ As Professor Arti Rai explains, “subsidies directed at providing insurance for the uninsured could eliminate deadweight loss by giving all individuals the benefit of this price discrimination.”²²⁷ The government can also subsidize consumers’ purchasing power by directly paying the consumer purchasing the subsidized innovation. Consumer tax credits for energy-efficient technologies are a common form of such payments.²²⁸

The government can even subsidize consumers’ purchasing power by directly paying the innovator for each sale of their patented or copyrighted product. The purpose of such subsidies is

²²⁴ See Lichtman, 11 Harv J L & Tech at 124–25 (cited in note 16). But see Barry, 2007 Wis L Rev at 609–19 (cited in note 16) (arguing that consumer subsidies are not a viable alternative to a prize system that eliminates intellectual property rights).

²²⁵ Lichtman, 11 Harv J L & Tech at 124–25 (cited in note 16).

²²⁶ See, for example, DiMasi and Grabowski, 82 Clinical Pharmacology & Therapeutics at 488 (cited in note 15) (“The underconsumption produced by patents for this uninsured population, however, can be remedied by taking the much less radical step of insuring the uninsured (at co-payments or co-insurance rates that approximate marginal production costs), rather than replacing patents and their market exclusivities with prize funds.”).

²²⁷ Rai, 2001 U Ill L Rev at 179 (cited in note 107). Rai continues, “Moreover, as contrasted with buyouts [of drug patents by the government] . . . subsidies specifically directed at providing insurance to the uninsured would require a relatively small commitment of tax revenue.” Id.

²²⁸ See, for example, US Department of Energy, *Tax Credits, Rebates, and Savings*, online at <http://www.energy.gov/taxbreaks.htm> (visited Aug 12, 2014) (listing the various tax credits available for energy-efficient technologies under the American Recovery and Reinvestment Act of 2009).

to induce the patent holder to *voluntarily* lower prices toward marginal cost in order to increase sales and collect additional subsidies from the government. Economists have discussed the possibility of subsidizing public utilities in this way to induce marginal cost pricing since the 1930s.²²⁹

b) *Government subsidies plus price controls can reduce deadweight loss in the intellectual property system.* Another means of eliminating deadweight loss without eliminating intellectual property is for the government to purchase inventions on behalf of consumers and perhaps require consumers to pay a smaller price that resembles marginal cost. In operation, this system involves the government supplementing the price paid by consumers through direct payments to the innovator for each sale of the patented or copyrighted product, along with price controls for both consumers and innovators. Unlike the subsidies just discussed, which are meant to induce *voluntary* marginal cost pricing by the intellectual property holder, price controls impose a *mandatory* price at a rate approximating the government's estimate of marginal cost. And unlike a prize system, the government cannot rely on competition to set a more efficient consumer price. However, if the government can successfully set the consumer price at (or relatively close to) marginal cost, then it can generate efficient consumer pricing while retaining intellectual property.

As discussed in Part II, most developed countries use this approach to provide citizens with access to prescription drugs through nationalized health care, while retaining intellectual property. The government sets consumer prices for drugs at a specified co-pay, and then the pharmaceutical companies are paid based on sales volume at a reimbursement rate negotiated by the government as the only buyer in a monopsony.²³⁰

²²⁹ See, for example, R.H. Coase, *The Marginal Cost Controversy*, 13 *Economica* 169, 169–70 (1946); Mark Armstrong and David E.M. Sappington, *Recent Developments in the Theory of Regulation*, in Mark Armstrong and Rob Porter, eds, 3 *Handbook of Industrial Organization* 1560, 1562–65 (Elsevier 2007). Since subsidies could drive up innovators' profits and possibly provide excessive incentives for innovation, the government might need to levy a lump-sum tax on innovators to offset some of their gains. See Barry, 2007 *Wis L Rev* at 609–14 (cited in note 16). Alternatively, the government may be able to avoid any need for a lump-sum tax if, as Lichtman proposes, the government targets its subsidies at consumer purchases that monopoly pricing would otherwise prevent. See Lichtman, 11 *Harv J L & Tech* at 124–25 (cited in note 16).

²³⁰ See note 184.

Of course, when the government sets both the reimbursement rate and the consumer price, the incentive for innovation is fully determined by the government without regard to consumers' willingness to pay. Thus, with government purchases and price controls, the government mitigates deadweight loss by ignoring what most economists still consider the primary benefit of offering patents—a beacon for setting incentives informed by consumers' willingness to pay. The result is a patent system in which incentives are no better informed by consumer demand than in a prize system.²³¹ Moreover, consumer prices are likely worse informed than in a prize system, which has the benefit of market competition to determine the marginal price to be paid by consumers.

B. Reassessing the Projected Gains from Price Competition in a Prize System

Given these various strategies for avoiding the deadweight loss associated with intellectual property, the potential gains from switching to the prize system will often be much smaller than prize advocates imagine. However, if the prize system can achieve prices closer to marginal cost than is possible under an intellectual property regime, then prizes still enjoy a fundamental advantage over intellectual property.

Prize advocates argue that abolishing intellectual property will always increase the efficiency of consumer prices because doing so allows for greater price competition in the markets for innovations.²³² However, the competition necessary to drive down prices is obstructed when firms possess trade secrets and know-how related to their innovations that give them an advantage over competitors even without intellectual property. A variety of markets are affected by other barriers to entry, such as FDA regulations, that would continue to insulate innovators from significant price competition even after the elimination of patents. Large fixed costs of production and economies of scale can similarly prevent consumer prices from falling to marginal cost. The potential for price competition to reduce consumer

²³¹ Indeed, in the debate whether to replace drug patents with prizes, several scholars have noted that calculating the prize payment is no different from setting the reimbursement rate under a government-run insurance system. See, for example, Love and Hubbard, 82 *Chi Kent L Rev* at 1541 (cited in note 16); Hollis, *An Efficient Reward System for Pharmaceutical Innovation* at *2 (cited in note 15).

²³² See note 116.

prices may also be hindered by market distortions that are introduced in the implementation of a prize system. For example, financing the prize system through government-imposed user fees can reintroduce deadweight loss. Moreover, tying prize payouts to sales volume can create an incentive for innovators to sell their inventions below marginal cost, and the only means of preventing this proposed to date may have the counterproductive effect of increasing marginal cost.

The appeal of relying on competition to set consumer prices is obvious, but as shown below, the competition permitted through the elimination of intellectual property will often leave a significant gap between consumer prices and marginal cost. Depending on the size of that gap, the pricing strategies outlined in Part III.A may result in consumer prices that fall closer to marginal cost than they would under a prize system.

1. Barriers to market entry and price competition other than intellectual property.

The prize system uses competition to push consumer prices closer to marginal cost. Without an intellectual property right, innovators would be unable to use the courts to stop competitors from copying their ideas. In the absence of some other barrier to imitation, competitors could enter the market and sell goods to consumers that are either close or perfect substitutes for the innovation. The resulting price competition would make it difficult for innovators to command any premium in the sale of their products. In a scenario of perfect competition, prices would fall to average production costs, which are generally assumed to be close or equal to marginal cost.²³³ However, perfect competition is rare for reasons that have little to do with the intellectual property system.²³⁴ Indeed, critics of intellectual property are the first to note that eliminating patents and copyrights would not

²³³ See, for example, Kremer, 113 Q J Econ at 1154 (cited in note 10); Shavell and van Ypersele, 44 J L & Econ at 529, 545 (cited in note 10); Stiglitz, 57 Duke L J at 1720 (cited in note 8).

²³⁴ See Scherer, *Industrial Market Structure* at 384 (cited in note 3) (explaining that “real-world markets are almost never purely and perfectly competitive,” and that even without intellectual property, innovations might not be sold at marginal cost because of “natural imitation lags, the advantages of competitive product leadership, and the existence of non-patent barriers to the emergence of a competitive market structure”); Tirole, *The Theory of Industrial Organization* at 8–11 (cited in note 5).

reduce the profits from innovation to zero.²³⁵ The potential welfare gains from eliminating intellectual property in favor of prizes may be limited in a number of circumstances.

When intellectual property is just one of many barriers to entry in a particular market, the prize system may fail to introduce substantial price competition, and the efficiency gains in consumer pricing will be more modest. As a result, the benefits from switching to a prize system depend on the significance of intellectual property *relative* to the other barriers to entry in the market.

Innovators often possess trade secrets and informational advantages related to the use of their inventions even without intellectual property. Despite the purported “disclosure function” of patents, firms frequently retain important information about their patented inventions as trade secrets and know-how.²³⁶ Professor Karl Jorda observes that “[a]s a practical matter, licenses under patents without access[] to associated or collateral know-how are often not enough for commercial use of the patented technology.”²³⁷ If the disclosure of technical information under the prize system is similar to that under patents, most

²³⁵ See, for example, Boldrin and Levine, *Against Intellectual Monopoly* at 61–62 (cited in note 84).

²³⁶ Note, 118 Harv L Rev at 2024–25 (cited in note 130).

²³⁷ Karl F. Jorda, *Intellectual Property Valuation: The Legal Counterpart/Counterpoint*, 8 Arellano L & Pol Rev 31, 33–34 (2007). Jorda continues:

Hence, data and know-how are immensely important. In this regard, let me cite the following persuasive comments:

- “In many cases, particularly in chemical technology, the know-how is the most important part of a technology transfer agreement.” (Homer Blair).
- “Acquire not just the patents but the rights to the know-how. Access to experts and records, lab notebooks, and reports on pilot-scale operations, including data on markets and potential users of the technology are crucial.” (Robert Ebish).
- “It is common practice in industry to seek and obtain patents on that part of a technology that is amenable to patent protection, while maintaining related technological data and other information in confidence. Some regard a patent as little more than an advertisement for the sale of accompanying know-how.” (Peter Rosenberg).
- In technology licensing, “related patent rights generally are mentioned late in the discussion and are perceived to have ‘insignificant’ value relative to the know-how.” (Michael Ward, Honeywell VP Licensing).
- “Trade secrets are a component of almost every technology license . . . (and) can increase the value of a license up to 3 to 10 times the value of the deal if no trade secrets are involved.” (Melvin Jager).

Id.

firms will retain valuable trade secrets and know-how related to their innovations after they receive a prize. As long as firms maintain control over that knowledge, they can use it to set the price of their innovations above marginal cost.

The regulatory barriers to entry in certain industries could present an even greater impediment to price competition. Government agencies like the FDA and the EPA often prohibit firms from selling product innovations without first satisfying stringent safety standards.²³⁸ For manufacturers of vaccines,²³⁹ biologic drugs,²⁴⁰ and diagnostic and medical devices,²⁴¹ the regulatory approval process dramatically increases the costs of copying other firms' innovations. As a result, expiring intellectual property rights often have little effect on prices in these industries.²⁴² In other related industries, however, including small-molecule drugs,²⁴³ agrochemicals,²⁴⁴ and food additives,²⁴⁵ patent expiration can have a dramatic effect on price because competitors are exempt from much of the regulatory approval process.²⁴⁶

²³⁸ See US Congress, Office of Technology Assessment, *Innovation and Commercialization of Emerging Technologies* *64–65 (GPO Sept 1995), online at <http://ota.fas.org/reports/9539.pdf> (visited Aug 12, 2014).

²³⁹ See Eileen Salinsky and Cole Werble, *The Vaccine Industry: Does It Need a Shot in the Arm?* *23 (background paper, National Health Policy Forum, Jan 25, 2006), online at http://www.nhpf.org/library/background-papers/BP_VaccineIndustry_01-25-06.pdf (visited Aug 12, 2014).

²⁴⁰ See Patient Protection and Affordable Care Act §§ 7001–03, Pub L No 111-148, 124 Stat 119, 127–28 (2010).

²⁴¹ See 21 USC § 360e.

²⁴² See Glennerster and Kremer, 23 Reg at 38 (cited in note 41) (noting that, in the vaccine market, “given the technical complexity of manufacturing vaccines and the arduous process of securing regulatory approval, competition might not be intense even if patents were put in the public domain”); Federal Trade Commission, *Emerging Health Care Issues: Follow-On Biologic Drug Competition* iii–iv (June 2009) (concluding that “[t]he substantial costs to obtain FDA approval, plus the substantial fixed costs to develop manufacturing capacity, will likely limit the number of competitors that undertake entry with [follow-on biologic] products” to just “two to three” on average “to compete with a particular pioneer biologic drug”) (emphasis omitted).

²⁴³ See Rebecca S. Eisenberg, *The Role of the FDA in Innovation Policy*, 13 Mich Telecomm & Tech L Rev 345, 356–59 (2007).

²⁴⁴ See CropLife International, *On the Protection of Safety and Efficacy Data for Existing and New Crop Protection Chemicals* *2 (position paper, Jan 15, 2008), online at <http://d1jkwgdw723xjf.cloudfront.net/wp-content/uploads/2014/05/Position-Paper-The-Protection-of-safety-and-efficacy-data-for-existing-and-new-crop-protection-chemicals.pdf> (visited Aug 12, 2014).

²⁴⁵ See Peter Barton Hutt, *Regulation of Food Additives in the United States*, in A. Larry Brannen, et al, eds, *Food Additives* 199, 213–14 (Marcel Dekker 2d ed 2002).

²⁴⁶ See Benjamin N. Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 Tex L Rev 503, 510–11 (2009).

2. Fixed costs of production and economies of scale.

Anytime there are fixed costs and economies of scale in producing an innovation, the prize system cannot bring about marginal cost pricing. In a perfectly competitive market, competitors will enter and drive down prices,²⁴⁷ but only up to the point at which they still expect to recover their overall investment. In addition to the variable costs of producing each unit of the good, these firms may have incurred start-up costs when they entered the market (for example, equipment, facilities, training, and business licenses), and there may be other fixed costs during production (for example, overhead and salaries for nonhourly workers). Since firms must expect a return on these investments, entry does not occur until the price exceeds the average total production costs of the marginal entering firm. Marginal cost pricing, on the other hand, would reflect only the difference in variable costs with the production of each additional unit of the innovation. Whenever there are fixed costs in production or economies of scale, therefore, the prize system cannot achieve marginal cost pricing.

This observation is more pertinent to some technologies than others. There are no real fixed costs associated with online file sharing of music and books, so marginal costs and average total production costs are about the same.²⁴⁸ In contrast, due to the immense fixed costs of producing vaccines and biologic drugs,²⁴⁹ the generic price of those drugs under a prize system would be much higher than their marginal cost. The case for the prize system is stronger for small-molecule drugs, but even

²⁴⁷ It is possible that eliminating intellectual property would spur innovation in production processes, ultimately lowering the marginal costs of production over time. In a market with limited product differentiation and increased price competition, there might be additional pressure on firms to lower their production costs, perhaps resulting in more innovation that, over time, reduces average production costs. See Arrow, *Allocation of Resources for Invention* at 609 (cited in note 4). But see Edmund Kitch, *The Nature and Function of the Patent System*, 20 J L & Econ 265, 275–80 (1977) (arguing that, compared to competition, a monopolist that is able to coordinate the development of an invention will invest optimally in that development effort).

²⁴⁸ Goods that can be reproduced and distributed as digital files—for example, music, films, books, and software—would likely achieve the ideal result of marginal cost pricing in a prize system. There are almost no limits on production capacity in the reproduction and dissemination of digital files, and the variable costs are near zero. Without the intellectual property system (or digital encryption technology), these goods could all be posted on the Internet and downloaded for free. See Fisher, *Intellectual Property and Innovation* at *23–25 (cited in note 16).

²⁴⁹ See note 239.

there, prices would not fall to marginal cost. For most brand name, small-molecule drugs, the cost of goods sold is roughly 20 to 30 percent of their gross sales receipts.²⁵⁰ Many of these costs are fixed, such as building manufacturing facilities and having them certified by regulators.²⁵¹ Generic manufacturers face similar fixed costs in their production process.²⁵² Assuming perfect competition in the absence of intellectual property, prices should fall to the total average cost of generic manufacturers, not their marginal cost of producing each pill. Given the large fixed costs of manufacturing drugs, the generic price for a drug might be noticeably higher than its marginal cost.

3. Reinstating deadweight loss with user fees.

When the government calculates prize payouts based on sales volume, it faces an incentive to save money by imposing a sales tax on innovations, with the effect of reintroducing deadweight loss. Most proposals for prize systems rely on observing sales volume to calculate prizes.²⁵³ Given the close connection between the utilization of an innovation and its social value, it is hard to imagine a comprehensive prize system that does anything else.²⁵⁴ Unfortunately, basing rewards on sales volume gives the government a perverse incentive to suppress utilization as a way to reduce its own liabilities.²⁵⁵ The government could use a variety of means to limit the public's access at

²⁵⁰ See Pradeep Suresh and Prabir K. Basu, *Improving Pharmaceutical Product Development and Manufacturing: Impact on Cost of Drug Development and Cost of Goods Sold of Pharmaceuticals*, 3 *J Pharmaceutical Innovation* 175, 185 (2008).

²⁵¹ See *id.* at 178–82; Prabir Basu, et al, *Analysis of Manufacturing Costs in Pharmaceutical Companies*, 3 *J Pharmaceutical Innovation* 30, 31 (2008).

²⁵² See Basu, et al, 3 *J Pharmaceutical Innovation* at 34–37 (cited in note 251).

²⁵³ See, for example, Chari, Golosov, and Tsyvinski, 147 *J Econ Theory* at 793, 797 (cited in note 15); Fisher, *Promises to Keep* at 224 (cited in note 16); Grinols and Henderson, 25 *Pharmacoeconomics* at 356 (cited in note 15); Hollis and Pogge, *The Health Impact Fund* at 29–31 (cited in note 19); Love and Hubbard, 82 *Chi Kent L Rev* at 1532 (cited in note 16); Shavell and van Ypersele, 44 *J L & Econ* at 540–42 (cited in note 10).

²⁵⁴ In theory, the government could set prize payouts based on predicted utilization rates rather than ex post sales figures. Professor Michael Kremer's proposal for patent buyouts is an example, since he would have the government value patents through an auction that elicits information about expected monopoly profits. See Kremer, 113 *Q J Econ* at 1146–48 (cited in note 10). However, he also acknowledges that the government might need to use observed sales figures to ensure that it does not overpay for patents. See *id.* at 1159–60.

²⁵⁵ See William P. Rogerson, *Economic Incentives and the Defense Procurement Process*, 8 *J Econ Persp* 65, 81 (1994).

marginal cost,²⁵⁶ but the most direct is to impose user fees on innovations to inflate their price, thereby suppressing sales volume while also raising money to help finance the prize system.²⁵⁷ From the public's perspective, these user fees are harmful to the extent that they undermine some (or all) of the efficiency gains from the prize system. Nevertheless, so long as the government is operating under budget constraints and calculates prizes based on sales volume, it will have a strong incentive to suppress the utilization of innovations through a sales tax or similar user fee.

4. Increasing the marginal costs of innovation.

Linking prize payouts to sales volume can, under the right circumstances, make it profitable for firms to sell their inventions at a price below marginal cost (or engage in excessive marketing), since the resulting increase in sales would boost their prize receipts.²⁵⁸ The problem with below-marginal-cost pricing is twofold. When society purchases the invention for persons who value it at less than its marginal cost, the result is a net loss from the public's perspective, calling into question the asserted superiority of prizes over intellectual property at providing optimal access to innovation. Moreover, selling inventions below marginal cost corrupts the reliability of sales volume as a signal of the social value of innovations, undermining one of the most trustworthy measures for setting prize payouts.²⁵⁹

Unfortunately, preventing below-marginal-cost pricing is difficult due to the challenges facing the government in observing

²⁵⁶ Governments with national health insurance systems use a variety of techniques to limit prescription drug use to fit within the system's budgetary constraints, including restrictive formularies, prescribing guidelines, prescribing budgets for physicians or hospitals, and marketing restrictions. See US Department of Commerce, *Pharmaceutical Price Controls in OECD Countries* at *7-9 (cited in note 47).

²⁵⁷ See Sarah Thomson and Elias Mossialos, *Influencing Demand for Drugs through Cost Sharing*, in Elias Mossialos, Monique Mrazek, and Tom Walley, eds, *Regulating Pharmaceuticals in Europe: Striving for Efficiency, Equity, and Quality* 227, 227-44 (Open 2004) (describing the use of co-pays and other cost-sharing mechanisms in OECD countries to reduce government spending on prescription drugs).

²⁵⁸ See Hollis and Pogge, *The Health Impact Fund* at 34 (cited in note 19); Shavell and van Ypersele, 44 *J L & Econ* at 540 n 35 (cited in note 10).

²⁵⁹ See Yu, 76 *U Colo L Rev* at 708 (cited in note 16) (noting that, under a prize system for music in which prizes are based on download counts, "[f]ans are able to abuse the system by repeatedly downloading songs of their favorite artists or by inflating download counts using 'ballot-stuffing' programs or mistaken identities").

marginal costs.²⁶⁰ This is true of most innovations, the majority of which are manufactured and distributed in physical form.²⁶¹ To date, two potential solutions have been proposed to prevent below-marginal-cost pricing in the prize system. First, the government could prohibit an innovator from manufacturing its own invention. Manufacturing of that product would be left to competitors in the market, who lack the incentive to sell below marginal cost.²⁶² Challenges in enforcing such a system would include the need to prevent innovators from indirectly subsidizing consumer purchases or secretly paying other manufacturers to lower their prices. Second, the government could prohibit the innovator from selling its invention at a lower price than its competitors.²⁶³ This proposal is based on the assumption that the price charged by competitors will approximate the true marginal cost and that anything less is likely underpricing to increase sales volume.²⁶⁴ Of course, the government would need to prevent innovators from colluding with a competitor to set consumer prices below marginal cost. However, such enforcement challenges may be the lesser of the concerns with the two solutions proposed to date.

The greater concern is that both solutions create a pernicious risk of inadvertently increasing the marginal cost of a given invention for society. As discussed above, innovators typically have a number of competitive advantages relative to other firms—such as trade secrecy and know-how—that make them the most efficient producer of their inventions. Prohibiting the innovator from manufacturing its invention, or competing on

²⁶⁰ See Jonathan B. Baker and Timothy F. Bresnahan, *Empirical Methods of Identifying and Measuring Market Power*, 61 *Antitrust L J* 3, 5 (1992).

²⁶¹ See Louis Kaplow and Carl Shapiro, *Antitrust*, in Polinski and Shavell, eds, 2 *Handbook of Law and Economics* 1073, 1088 (cited in note 32):

Marginal cost . . . may be more difficult to measure, due both to difficulties in identifying which costs are variable (and over what time period) and to the presence of common costs that may be difficult to allocate appropriately. In part for this reason, the empirical industrial organization literature . . . often treats marginal cost as unobservable.

²⁶² See Shavell and van Ypersele, 44 *J L & Econ* at 540 n 35 (cited in note 10).

²⁶³ See *id.*; Hollis and Pogge, *The Health Impact Fund* at 16 (cited in note 19).

²⁶⁴ See Shavell and van Ypersele, 44 *J L & Econ* at 540 n 35 (cited in note 10) (“The government could prevent such strategic increases in [quantity sold] by forbidding the innovator from selling below the competitive price.”); Hollis and Pogge, *The Health Impact Fund* at 16 (cited in note 19) (proposing that the government set consumer prices to approximate marginal cost, because otherwise an innovator “might give the product away in the hopes of increasing its reward”).

price, will systematically preclude these competitive advantages from being reflected in measurements of marginal cost. Since competitive advantages typically lower marginal costs, a rise in the marginal costs of inventions may be the perverse effect of either of the proposed solutions for preventing below-marginal-cost pricing.

If the government cannot prevent innovators from pricing below marginal cost, the prize literature notes that the government might need to intervene and try to set prices at marginal cost directly.²⁶⁵ However, when the government sets the consumer price directly, it forgoes what is generally considered to be the primary benefit of the prize system—the use of market competition to drive down consumer prices toward marginal cost. The result is a system that benefits from neither the ability of patents to reveal consumers' willingness to pay, nor the ability of prizes to move consumer prices toward marginal cost through market competition.

C. Conclusion

It should not be taken for granted that consumer prices under a prize system would be superior to those resulting from normal monopoly pricing strategies in an intellectual property system. A substantial portion of the deadweight loss associated with patents can be, and sometimes already is, eliminated by market forces and governments working within an intellectual property system, through tools like price discrimination and government subsidies or price controls. Moreover, eliminating patents would yield limited benefit when the introduction of price competition to the market for an innovation is prevented from lowering consumer prices by other forces. A prize system may even make things worse by increasing the marginal cost of certain inventions to the public. In most situations, switching to a prize system would probably reduce overall deadweight loss to some extent, but the magnitude of the welfare gain from eliminating intellectual property is likely much smaller than

²⁶⁵ The only proposal in the prize literature that explicitly calls for the government to set prices at marginal cost appears to be Professors Aidan Hollis and Thomas Pogge's *Health Impact Fund*. Not surprisingly, the proposal dropped the requirement that firms give up their intellectual property rights in exchange for the government payment. Hollis and Pogge, *The Health Impact Fund* at 16 (cited in note 19). In other words, their proposal ceased to be a prize system—at least insofar as prizes are defined as an alternative to intellectual property.

expected in a number of cases. In these cases, the government's tools for working *within* the intellectual property system to reduce deadweight loss may prove more cost-efficient and, in certain circumstances, more effective.

IV. REVISITING THE HOPE OF SUPERIOR INCENTIVES FOR INNOVATION

The other, more recently identified advantage of the prize system is the supposedly superior incentives it offers for innovation. However, even assuming that the government could set a better reward for innovation than that provided by monopoly profits, this observation does not justify eliminating intellectual property in favor of prizes. As explained below, intellectual property rights do not prevent the government from intervening in the market to adjust the incentives for innovation. To the extent that the government can offer superior incentives for innovation in a prize system, it could just as easily offer those same superior incentives without eliminating intellectual property, usually through very similar mechanisms as proposed by prize advocates. Moreover, eliminating intellectual property may remove an important safeguard against suboptimal government rewards—particularly if the government's payments to innovators will occur over time and renegotiation in response to new information about the social value of the invention is desirable.

A. Reasons for the Proposed Superiority of Incentives in a Prize System

As discussed in Part II.D, many prize advocates now argue that the prize system is superior to intellectual property because it gives the government more direct control to adjust incentives to reflect social value.²⁶⁶ To the extent that intellectual property links the incentives for innovation to monopoly profits from consumer sales of inventions in a free market, those incentives are flawed in several distinct ways. The potential profits from many socially valuable inventions will be too low, the profits from developing certain types of socially wasteful and duplicative inventions will be too high, and the profits from many cumulative innovations will be too low because intellectual property rights often improperly divide profits between earlier and later

²⁶⁶ See note 145.

innovators.²⁶⁷ Some prize advocates argue that, given the inadequacies of monopoly profits as an incentive for innovation, the government could easily design superior incentives with prizes, even if it has only limited information about inventions.²⁶⁸

Other prize advocates argue that the prize system would allow the government to provide superior incentives for innovation because it has better information about the social value of inventions than the market does.²⁶⁹ These scholars often stress the potential disconnect between the social value of inventions and consumers' ability to pay for them, arguing that intellectual property creates incentives for innovations that favor the rich over the poor.²⁷⁰ For these scholars, prizes are superior to intellectual property because they permit the decoupling of the reward for innovation from the market forces reflecting consumers' willingness to pay.²⁷¹

²⁶⁷ See text accompanying notes 135–57.

²⁶⁸ See, for example, Shavell and van Ypersele, 44 *J L & Econ* at 545 (cited in note 10).

²⁶⁹ See, for example, William W. Fisher and Talha Syed, *A Prize System as a Partial Solution to the Health Crisis in the Developing World*, in Thomas Pogge, Matthew Rimmer, and Kim Rubenstein, eds, *Incentives for Global Public Health: Patent Law and Access to Essential Medicines* 181, 184 (2010):

The superiority of the government's information concerning the social benefits of particular innovations gives a prize system an equally clear advantage over a patent system, under which research-and-development investments are directed toward lines of innovation that private firms consider most potentially lucrative, not those that are most socially beneficial. Specifically, a government, relying on its superior knowledge, can construct and administer a prize system in ways that correct for all three of the biases . . . that distort (from a social welfare standpoint) the output of new pharmaceutical products under the current patent-based system: the bias toward drugs aimed at ailments that disproportionately afflict the rich; the bias toward "me-too drugs" (the term conventionally used to describe drugs that, when introduced into the market, offer little or no health benefits over extant drugs); and the bias away from vaccines.

²⁷⁰ See, for example, Fisher, *Promises to Keep* at 234 (cited in note 16); Stiglitz, 57 *Duke L J* at 1720–21 (cited in note 8); Kapczynski, 59 *UCLA L Rev* at 978–79 (cited in note 6):

In an IP system, price influences not only who has access to such goods, but also which goods are produced in the first place. As long as the rich and the poor sometimes have different needs, as they demonstrably do, a system based on price will prioritize the needs of the wealthy. Moreover, some information goods may be of such foundational importance to human freedoms and capabilities that all should have them regardless of their preferences. Because price necessarily tracks preferences, it is a particularly problematic way to develop and distribute these kinds of basic information goods.

²⁷¹ See Love and Hubbard, 82 *Chi Kent L Rev* at 1553 (cited in note 16) (referring to "decoupling the rewards for successful R&D investment from the sales of products" through prize-based models).

In both cases, the unstated assumption of prize advocates is that the government must eliminate intellectual property rights in order to adjust the incentives for innovation away from the baseline of monopoly profits. As Professor Kapczynski explains, “[u]nlike patents, prizes make it possible to dissociate incentives from market signals.”²⁷²

These arguments reflect a fundamental misunderstanding of the nature of intellectual property rights. Patents provide firms with the right to exclude others from making, using, and selling their claimed invention.²⁷³ Copyrights provide authors with the right to exclude others from reproducing, adapting, distributing, and publicly displaying their works of authorship.²⁷⁴ These legal entitlements are monopoly rights, but, contrary to the standard assumption in the prize literature, they do not give firms the right to monopoly profits from their inventions.²⁷⁵ The government is free to limit firms’ rights to sell their inventions, control prices, and intervene in the market in countless other ways that will affect the profits from these inventions.

Governments already employ a number of tools to adjust or, in the case of price controls, disregard market signals in setting the incentives for innovation without eliminating intellectual property. Governments can directly tax or subsidize an innovator’s profits,²⁷⁶ give supplement prizes,²⁷⁷ impose a sales tax or offer tax credits on the purchase of innovations,²⁷⁸ institute price controls,²⁷⁹ issue vouchers to consumers with low purchasing power,²⁸⁰ or even purchase innovations directly at a price that

²⁷² Kapczynski, 37 *J L Med & Ethics* at 265 (cited in note 16) (“In fact, the ability to dissociate incentives from the market is both the promise and the peril of a prize scheme.”).

²⁷³ See 35 USC § 271(a).

²⁷⁴ See Gorman and Ginsburg, *Copyright: Cases and Materials* at 38 (cited in note 40).

²⁷⁵ See note 226.

²⁷⁶ See note 229 and accompanying text.

²⁷⁷ For example, the United States now offers supplemental prizes to firms that develop drugs for neglected tropical diseases, giving them a transferable “priority review voucher” that entitles its holder to an expedited FDA review of any drug of its choice. See Henry G. Grabowski, David B. Ridley, and Jeffrey L. Moe, *Encouraging Innovative Treatment of Neglected Diseases through Priority Review Vouchers*, in Karen Eggleston, ed, *Prescribing Cultures and Pharmaceutical Policy in the Asia-Pacific* 347, 347 (Stanford 2009).

²⁷⁸ See notes 226–30 and accompanying text.

²⁷⁹ See notes 230–32 and accompanying text.

²⁸⁰ The most common targeted consumer subsidy may be Medicaid prescription drug insurance, which increases the incentive to develop treatments for disabilities—like schizophrenia—that disproportionately affect people with (or cause them to have) low purchasing power.

alters the innovator's profits.²⁸¹ Indeed, any change in the reward for innovation brought about through a prize system could be descriptively recast as a tax or subsidy targeted at innovators with intellectual property rights.

In light of the government's broad powers to adjust the incentives for innovation while maintaining intellectual property, it is unclear how switching to a prize system improves the design or implementation of the rewards for innovation. Advocates of prizes sometimes cite "more freedom to design incentives efficiently"²⁸² and "the greater flexibility in tailoring that prizes afford" as advantages.²⁸³ Presumably this refers to the fact that eliminating intellectual property would force the government to consider whether the best measure of social value is consumers' willingness to pay.

Eliminating intellectual property in favor of prizes would effectively remove the market signals from consumers' willingness to pay, which might be seen as the default mechanism for setting incentives. However, it is the default mechanism only in the absence of further government involvement to adjust those incentives. As discussed in Part II, governments can and do exercise broad powers to adjust those incentives within the patent system. Eliminating intellectual property creates no new powers, so it is unclear why switching to prizes would motivate the government to implement more radical change than it already could right now but chooses not to. Moreover, the information generated by this default mechanism in an intellectual property system is

²⁸¹ An interesting use of these tools to alter innovators' profits is found in advance market commitments (AMCs). With an AMC, the government layers price subsidies on top of intellectual property rights to supplement the early revenues from an invention in exchange for the innovator's agreement to allow generics into the market for the invention at an earlier date, ultimately achieving near-marginal-cost pricing to the consumer in the short-term and the long run. See Heidi Williams, *Innovation Inducement Prizes: Connecting Research to Policy*, 31 *J Pol Analysis & Mgmt* 752, 758 (2012) (describing AMCs for a vaccine against pneumococcal diseases prevalent in developing countries).

²⁸² Love and Hubbard, 18 *Annals Health L* at 160 (cited in note 19) ("The use of cash prizes to eliminate legal monopolies for products provides a powerful opportunity to address several flaws that plague the current system. In particular, policy makers would have far more freedom to design incentives efficiently.")

²⁸³ Kapczynski, 37 *J L Med & Ethics* at 266 (cited in note 16):

Another benefit is the greater flexibility in tailoring that prizes afford. . . . Were we to rationally design a system for government incentives for medical R&D, we would want to consider the comparative allocations towards projects such as this (especially since such innovations cannot be protected by patents, and therefore are at a substantial comparative disadvantage in the marketplace for R&D). A prize approach would permit such flexibility.

what many prize proposals contemplate generating anyway in order to set incentives without intellectual property.

If prize advocates are correct that the government can offer better incentives for innovation through a prize system, then, almost by definition, the government could implement these same changes without eliminating intellectual property. Unlike reductions in deadweight loss attributable to patents, any superior incentives that can be identified and implemented in a prize system can also be identified and implemented within the intellectual property system in almost exactly the same manner. Prize advocates have failed to show that switching to a prize system generates any new information or mechanism for setting superior incentives that cannot be achieved in an intellectual property system through supplements, subsidies, taxes, government purchases, and other tools available to the government.²⁸⁴ Consequently, the government's ability to improve incentives for innovation is not an affirmative argument in favor of the prize system.

B. The Option Value of Intellectual Property

Ultimately, the primary difference between the incentives for innovation offered by prizes and intellectual property may be that the latter gives innovators leverage in negotiating payment for their inventions, even when they are negotiating with the government. The government can control the profits from innovation under both intellectual property and prize systems, but the leverage provided by intellectual property may act as an important check on suboptimal government rewards. In both systems, the government retains the power to set the total incentive without regard to consumers' willingness to pay. However, in an intellectual property system, the exclusive right to make, use, and sell an invention enables innovators to deny the public access to the good if the incentive offered by the government is too low.²⁸⁵ Of course, an innovator is strongly motivated to accept any reward, no matter how small, because R & D costs are already sunk at that point. However, if firms can deny the public access to their innovations, then they still have some leverage over government officials. If other manufacturers can step in to supply

²⁸⁴ There may be administrative or logistical reasons why it is easier to alter industry profits in the absence of intellectual property rights, but none has been offered.

²⁸⁵ See note 174.

the good, innovators must rely entirely on the government's good graces for their compensation.

The most pressing political economy concern with the prize system is the risk of inadequate prize payouts and expropriation. When innovators earn their profits through a government-funded prize system, they are competing against other interest groups over scarce taxpayer dollars. Innovators are likely to be at a disadvantage in these types of political battles for three reasons. First, by nature, innovators often threaten established interests and therefore create opposition from more powerful interest groups.²⁸⁶ Second, because innovators capture an unusually small portion of the social surplus generated by their activities,²⁸⁷ they have proportionally fewer resources to devote to rent seeking in support of their R & D investments. Third, and most importantly, innovators are particularly vulnerable to expropriation under a prize system because the government determines their prize payout after innovators have invested in R & D and disclosed their inventions to the government. Since innovators' R & D investments are sunk at this stage, the government can take advantage of its position to grossly underpay innovators,²⁸⁸ who may have little choice but to accept the insufficient reward.²⁸⁹ Legislators could then redirect funds that would otherwise incentivize innovation toward lower taxes or other government spending programs, many of which would offer more immediate political gains than payments to innovators meant to encourage R & D spending.²⁹⁰ Eventually, the public would suffer from the reduced output of socially valuable innovation. However, this malfeasance would be largely hidden from voters, since it is nearly impossible to observe the relative absence of

²⁸⁶ See Kevin M. Murphy, Andrei Schleifer, and Robert W. Vishny, *Why Is Rent-Seeking So Costly to Growth?*, 83 *Am Econ Rev* 409, 412–13 (May 1993); Stuart Minor Benjamin and Arti K. Rai, *Fixing Innovation Policy: A Structural Perspective*, 77 *Geo Wash L Rev* 1, 13–14 (2008); William J. Baumol, *Entrepreneurship: Productive, Unproductive, and Destructive*, 98 *J Polit Econ* 893, 900–01 (1990).

²⁸⁷ See notes 72–84, 142–43, and accompanying text.

²⁸⁸ See DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* at 489 (cited in note 15); Scherer, *Industrial Market Structure* at 399 (cited in note 3) (arguing that “there is an inherent conservative bias in the prizes granted by administrative and quasi-judicial bodies”); Tirole, *The Theory of Industrial Organization* at 313 (cited in note 5).

²⁸⁹ See DiMasi and Grabowski, 82 *Clinical Pharmacology & Therapeutics* at 489 (cited in note 15).

²⁹⁰ See Rai, 2001 *U Ill L Rev* at 198 (cited in note 107); Jeffrey S. Banks, Linda R. Cohen, and Roger G. Noll, *The Politics of Commercial R&D Programs*, in Linda R. Cohen and Roger G. Noll, eds, *The Technology Pork Barrel* 53, 55–56, 61–63 (Brookings 1991).

new innovations.²⁹¹ Consequently, the risk of expropriation in a prize system could be a significant deterrent to private-sector investment in R & D unless there are political checks to prevent underpayment.

Some prize advocates argue that the government could avoid the inadequate-funding and expropriation problems by allocating a fixed amount of money to a prize agency for payments to innovators and by requiring the agency to disburse all of that money.²⁹² This approach could prevent agency officials from deciding to systematically underreward innovators. However, it would not prevent legislators from underrewarding innovators by inadequately funding the prize agency. The government has a long history of underfunding its R & D programs, and government support for R & D has been declining as a percentage of GDP since the mid-1960s.²⁹³ The risk that the government will allocate too little money for innovation is even greater under a prize system compared to government-funded R & D because, with prizes, innovators have already sunk their R & D investments when the government calculates their reward, which makes innovators susceptible to expropriation. Consequently, commentators are right to fear that the government would offer inadequate incentives for innovation under a prize system, even if the government has good information about the social value of inventions.

Most prize advocates ultimately propose that the prize system be optional to avoid the expropriation problem.²⁹⁴ In an

²⁹¹ See Benjamin N. Roin, *Solving the Problem of New Uses*, 2014 Mich St L Rev *28 (forthcoming), online at <http://dash.harvard.edu/bitstream/handle/1/11189865/Solving%20the%20Problem%20of%20New%20Uses%20.pdf?sequence=1> (visited Aug 12, 2014).

²⁹² See, for example, Abramowicz, 56 Vand L Rev at 125 (cited in note 16):

Congress can eliminate the problem of systematic errors by capping the amount that the agency may spend. If an agency, for example, can spend \$1 billion, then industry will not be able to capture the agency and receive undeserved funds simply by inducing the agency to make favorable assessments, because the agency would not be able to spend any more than the congressional appropriation. . . . At the same time, Congress can prevent undercompensation by requiring that an agency spend whatever it has been appropriated.

See also Hollis and Pogge, *The Health Impact Fund* at 43–46, 49–50 (cited in note 19).

²⁹³ See Roin, 2014 Mich St L Rev at *28–29 (forthcoming) (cited in note 291) (describing this long-term trend and the underlying political economy problems that are likely responsible for it).

²⁹⁴ See, for example, Abramowicz, 56 Vand L Rev at 226 (cited in note 16); Barry, 2007 Wis L Rev at 619–21 (cited in note 16); Kremer, 113 Q J Econ at 1139 (cited in note 10); Mandel, 24 Temple J Sci Tech & Envir L at 64–69 (cited in note 16); Shavell and van Ypersele,

optional-prize system, the innovator is given a choice between a prize and an intellectual property right, allowing the firm to decline any prize that is less than what the innovator expects to earn through a monopoly. This choice can protect innovators against unduly conservative prizes offered by the government.²⁹⁵

The check on inadequate government rewards provided by intellectual property is similar to the imagined operation of an optional-prize system, in which the innovator has the choice of accepting either a prize or a patent for its invention. As discussed in Part I, an optional-prize system deters suboptimal government rewards by giving the innovator a choice between a patent and a prize, thereby allowing the innovator to decline any prize that is less than what it believes the public is willing to pay.²⁹⁶ Governments achieve a similar effect by granting an intellectual property right that will not be consulted in determining the social value and incentives for an invention. Here also, suboptimal government rewards are checked by the innovator's right to decline to sell for anything less than what it believes the public would be willing to pay. This is true even if the government imposes price controls or prohibits sales by the patent holder to anyone but itself. So long as the innovator has an intellectual property right, it can decline to sell and prevent others from selling the invention.²⁹⁷ The power to deny the public access gives the patent holder a platform to challenge a suboptimal

44 J L & Econ at 544 (cited in note 10); Hollis and Pogge, *The Health Impact Fund* at 6 (cited in note 19).

²⁹⁵ See Shavell and van Ypersele, 44 J L & Econ at 544 (cited in note 10):

The optional reward system . . . has the practical, political advantage that industry should not object to it, as it can only raise firms' profits. Moreover, the fear that the government would act suboptimally, and give unduly conservative rewards, would be less of an issue under an optional reward scheme because innovators can always obtain intellectual property rights. Indeed, just because of innovators' option, the government's temptation to pay too little might be checked under an optional reward system.

See also Kremer, 113 Q J Econ at 1139 (cited in note 10) ("As a safeguard against confiscation of inventions, patent holders could choose whether to sell their patents."); Barry, 2007 Wis L Rev at 635–38 (cited in note 16). However, optional-prize systems are less effective when the government can exercise control over the market for the innovation, as is generally true for innovations related to health care. The Soviet Union's prize system was technically optional in nature, but because the government controlled the market and the patentability standards, innovators reportedly had little choice but to accept whatever prize they were offered. See William van Caenegem, *Inventions in Russia: From Public Good to Private Property*, 4 Austl IP J 232, 233 (1993).

²⁹⁶ See note 295 and accompanying text.

²⁹⁷ See note 295 and accompanying text.

award and motivate the public to lobby the government for a higher reward if it wants access.²⁹⁸

Countries that couple nationalized health care and drug patents provide an example of how this check against suboptimal government rewards can be achieved by granting intellectual property that will not be used in determining incentives. As explained in Part II, these governments continue to grant drug patents but set the incentives for innovation through a combination of price controls and reimbursement payments without ever introducing artificial scarcity to reveal consumers' willingness to pay.²⁹⁹ The government, as the only buyer of the drug, effectively sets the incentives when it agrees on reimbursement rates with the drug company. However, the drug company always has recourse to decline to sell if the rate offered by the government is too low. If the drug company makes a compelling case to the public as to the benefit of the drug, the drug company can effectively motivate the public to lobby the government to increase the reimbursement rate commensurate with the value assigned by the public.³⁰⁰ The process repeats itself every few years since the contracts are generally set for finite terms to permit renegotiation as drug performance and alternative treatments become known.³⁰¹

Ultimately, the check against suboptimal government rewards provided by intellectual property may be superior to the check that is provided by an optional-prize system under most circumstances, since intellectual property allows for the renegotiation of rewards as new information becomes available regarding an invention's true value. Intellectual property offers a continuing check on suboptimal rewards for the life of the monopoly right, whereas the optional-prize system offers the check only at the initial decision between patent and prize.³⁰² When a continuing check on suboptimal rewards (and the renegotiations it makes possible) is important, society may prefer to grant intellectual property rights (though not intending to use them in determining incentives) instead of switching to either an optional- or

²⁹⁸ Of course, the innovator would be strongly incentivized to accept the proposed reward because its R & D investments would be sunk at that time.

²⁹⁹ See note 183 and accompanying text.

³⁰⁰ See notes 183, 231, and accompanying text.

³⁰¹ See note 183 and accompanying text.

³⁰² In an optional-prize system, after the decision to accept a prize is made, the innovator loses all leverage to deny the public access because the innovator has no power to stop other firms from selling the invention.

mandatory-prize system. This would be the case even if we assume that the government would set equally optimal incentives for innovation without intellectual property.

Accordingly, the loss of a safeguard against suboptimal government rewards for innovation can justify not switching from intellectual property to prizes, notwithstanding that equivalent incentives for innovation *could* be set without intellectual property. By providing innovators with intellectual property rights, the government limits its own ability to expropriate socially valuable innovations. Although an optional-prize system provides a similar check, intellectual property rights are superior if the government wants its payments to reflect changes in the estimated social value of the invention over time, or if it wants innovators to have ongoing incentives to increase the value of their inventions. *This* is the reason overlooked in existing scholarship for not switching to prizes even if the government can set prize payouts that are no worse than intellectual property at promoting innovation. If the anticipated reduction in deadweight loss from eliminating patents is not substantial—which will often be true if the government is (or can) subsidizing consumer purchases—then switching to prizes may be the wrong choice because it means forgoing a safeguard against suboptimal incentives for innovation.

C. Conclusion

Replacing patents with prizes does not offer any superior incentives for innovation that are unavailable to the government through existing tools such as subsidies, taxes, and government purchases. Intellectual property provides the government with one measure of social value—consumers' willingness to pay—which it retains full discretion to disregard in setting the incentives for innovation. Eliminating intellectual property removes that source of information (thereby preventing its use as a default measure of social value). However, it does not offer any new mechanism or information for setting superior incentives that can be accessed only by eliminating patents. Ironically, replacing patents with prizes may offer inferior incentives for innovation by eliminating a previously overlooked check on suboptimal government rewards provided by intellectual property. Thus, unlike reductions in deadweight loss from patents, improved incentives for innovation are not an advantage of a prize system that weighs in favor of eliminating intellectual property; indeed, this factor may weigh against it.

V. REVISION OF THE UNIFYING THEME

A key premise in the prize literature is that, if the government could offer prizes that provide the same (or better) incentives for innovation as intellectual property, then it should use prizes because they avoid the deadweight loss from monopoly pricing.³⁰³ A growing number of scholars also argue that prizes are better than intellectual property because the government would set prize payouts to provide superior incentives for innovation.³⁰⁴ Much of the academic literature on prizes focuses on the singular question whether the government can determine prize payouts for innovations that are no worse than intellectual property at promoting innovation—assuming that if the answer is yes, the government should eliminate intellectual property.³⁰⁵

This Article shows that this well-established framework for comparing intellectual property with prizes is flawed. Assuming that prize advocates are correct in their claims about the benefits of replacing intellectual property with prizes, most or all of those gains frequently can be accomplished through analogous policy interventions *without* eliminating intellectual property. The promised reductions in deadweight loss from switching to prizes will often be lower than anticipated because those comparisons have ignored reductions in deadweight loss already achievable without eliminating patents through price discrimination and subsidies. The promised reductions will also be less than anticipated because the comparisons have ignored forces that often prevent consumer prices (and therefore deadweight loss) from falling when intellectual property is eliminated. The ability of the prize system to offer superior incentives for innovation will not bear out because it is based on a false comparison with a patent system devoid of tools such as subsidies, taxes, and government purchases, which are already used by governments to freely adjust incentives. While eliminating intellectual property may make it easier to conceptualize incentives divorced from consumers' willingness to pay, it provides no additional information or mechanism that is unavailable to the government without eliminating patents.

³⁰³ See note 116 and accompanying text.

³⁰⁴ See note 132 and accompanying text.

³⁰⁵ Indeed, recent scholarship on the prize system focuses almost exclusively on the question of how the government could establish appropriate rewards. See, for example, Abramowicz, 56 Vand L Rev at 128–58 (cited in note 16); Barry, 2007 Wis L Rev at 630–35 (cited in note 16); Love and Hubbard, 82 Chi Kent L Rev at 1528–34 (cited in note 16).

These insights suggest that there is much less at stake in the choice between intellectual property and prizes than currently assumed in the prize literature. The benefit of avoiding deadweight loss needs to be measured as the amount of incremental gains achieved by eliminating patents, which may be relatively small given the various tools available to the government for mitigating deadweight loss within the intellectual property system. Moreover, because those same tools also allow the government to adjust the incentives for innovation, many of the insights in the prize literature about how to improve those incentives could be implemented without a radical (and politically controversial) change to the intellectual property system.

Perhaps more importantly, this Article argues that the existing scholarship has overlooked a potentially large loss that would come from eliminating patents in favor of prizes, even when the patent is not needed to set equally optimal incentives for innovation at the outset. As discussed in Part III, the government has the option of maintaining intellectual property but setting the incentives for innovation without consulting the patent, just as in a prize system. In this scenario, the only difference currently identified in the prize scholarship is that the prize system, unlike the intellectual property system, can reduce deadweight loss through price competition (and, some argue, provide superior incentives). The difference that has been overlooked until now is that the intellectual property system in this scenario, unlike the prize system, allows the government to adjust its payments to innovators over time to reflect new information about the social value of inventions, while still maintaining a check against expropriation. The loss of that check must be weighed against the potential gains (if any) of eliminating patents through reductions in deadweight loss. This disadvantage to eliminating intellectual property may explain why governments have continued granting drug patents even when they directly control the incentives for innovation.

The arguments outlined in Parts III and IV demonstrate that the current framework for comparing intellectual property with prizes is incomplete. Once prize advocates overcome the initial hurdle of showing that the government can set the initial payment for inventions that provide equal or superior incentives for innovation as intellectual property, those advocates must address two additional questions to make the case for eliminating intellectual property. First, they must address whether

intellectual property is necessary for checking inadequate government rewards. Second, they must evaluate the incremental gains achieved by eliminating intellectual property in moving consumer prices closer to marginal cost. The following questions will be relevant to these inquiries.

A. Do Innovators Need an Ongoing Check against Suboptimal Rewards?

The benefits of switching to prizes will be reduced to the extent that society values an ongoing safeguard against suboptimal government rewards. In many cases, the government will want to offer continuing payments that can be changed over time rather than a lump sum or fixed payment. Reasons for this might be that estimates of the invention's value may change significantly over time, or that the government wants to provide continuing incentives for investment by the innovator to increase the social value of the invention. When that is the case, eliminating intellectual property is problematic, because the innovator potentially needs an ongoing monopoly right to prevent the government from providing inadequate rewards in subsequent renegotiations. These concerns are more pressing if government officials would be pressured to divert money away from innovators in favor of other programs without the public losing access to the invention. On the other hand, these concerns may be outweighed if innovators will be able to extract excessive rents from the government in the course of renegotiations. In that case, this safeguard against unduly conservative rewards may be a liability, making prizes the better system.

B. Is Marginal Cost Reasonably Observable?

The gains from eliminating intellectual property in favor of prizes will be less when an invention's marginal price is readily identifiable to the government without price competition. One of the key benefits of the prize system is its ability to inform consumer prices by allowing firms to compete on price. When that competition is not necessary to reveal marginal price, the government could intervene directly by using price controls, reimbursement payments, or subsidies for consumer purchases. When the government can observe marginal costs, it can use these tools to achieve efficient pricing without abolishing intellectual property. Examples of goods for which marginal cost can be easily observed include nearly all inventions that can be

reproduced and distributed as digital files—for example, music, films, books, and software.³⁰⁶ In these cases, in which the consumer-price-discovery function of prizes is not needed, the benefits of eliminating patents in favor of prizes will be smaller.

C. Will Eliminating Intellectual Property Bring Consumer Prices Close to Marginal Cost?

The gains from replacing intellectual property with prizes will also be less when the introduction of price competition in the market for an invention is prevented from lowering consumer prices by other forces. Regulatory barriers to entry, trade secrets, and know-how all continue after the elimination of intellectual property, insulating the innovator from price competition that would lower consumer prices. Large fixed costs of production and economies of scale can similarly prevent consumer prices from falling to marginal costs. In these cases, the government may be able to set prices closer to marginal cost than can be achieved through increased price competition attributable to the elimination of intellectual property.

The market for medical treatments provides an example of a scenario in which the price competition made possible by eliminating intellectual property will be hindered in lowering consumer prices by other forces. The large fixed costs of manufacturing drugs, including building facilities and obtaining the necessary certifications, will cause the generic price of drugs to remain noticeably higher than marginal cost.³⁰⁷ Likewise, in the market for vaccines and biologic drugs, in which the regulatory barriers to entry will block most competition, price controls or subsidies might be the only way to offer access to the public at close to marginal cost.³⁰⁸ When price competition cannot succeed in lowering consumer prices to marginal cost, switching to a prize system may not dramatically increase the public's access to drugs.

D. Can the Government Police Below-Marginal-Cost Pricing?

The benefits from switching to prizes will be reduced when the government has difficulty measuring and policing innovators that inflate their sales figures or sell their goods below marginal

³⁰⁶ See note 248 and accompanying text.

³⁰⁷ See notes 251–53 and accompanying text.

³⁰⁸ See notes 229–32 and accompanying text.

cost. Innovators will have an incentive to do both when prize payouts are based on sales volume, as is the case with most prize proposals.³⁰⁹ Accordingly, the government cannot rely on the innovator self-reporting sales volume or marginal cost.

However, the government is not necessarily well-suited to provide the necessary monitoring and enforcement of innovators. In many cases, no regulatory infrastructure exists for the government to monitor consumers' usage,³¹⁰ or manufacturers' distribution and production,³¹¹ of an invention.³¹² In other cases, the government would have to take on additional enforcement functions that are currently filled by market participants. The patent system relies on inventors to monitor the usage of their own creations and uses an adversarial process to resolve any disputes about whether one firm is actually using another's patented invention.³¹³ In the prize system, in which the government is paying the prize, other firms will have less reason to police and dispute the exaggerated reports of a competitor.

The pharmaceutical industry is an example of an industry in which the government already has a regulatory structure in place that could be used to monitor sales volume and marginal cost of prescription drugs.³¹⁴ The administrative costs of the

³⁰⁹ See notes 165–69 and accompanying text.

³¹⁰ See Kapczynski and Syed, 122 *Yale L J* at 1926–27 (cited in note 14).

³¹¹ Marginal cost is notoriously difficult to measure for inventions that are manufactured and distributed in physical form, as is the case with most inventions. See notes 260–62 and accompanying text.

³¹² For example, if the government wanted to know the sales figures for inventions like light-emitting diodes (LED lights) or compression algorithms that reduce the size of digital files, it is unclear what regulatory infrastructure could be co-opted, and a new oversight regime may be the most cost-effective option. Of course, in some cases, the government might be able to directly monitor consumers (or at least a representative group of consumers) to determine how often people are using an invention, as Professor William Fisher proposed for the implementation of a prize system for music and films. See Fisher, *Promises to Keep* at 223–29 (cited in note 16).

³¹³ See Kieff, 85 *Minn L Rev* at 712–17 (cited in note 11) (discussing the screening function that patents perform in determining which inventors should be rewarded and what the size of their reward should be).

³¹⁴ In this regard, the pharmaceutical industry is unusual in that the government strictly oversees the channels through which prescription drugs are distributed and sold. See generally Richard R. Abood, *Pharmacy Practice and the Law* (Jones & Bartlett 7th ed 2012) (discussing the various federal and state laws in the United States that regulate the dispensing of medication and pharmacy practice). Due to this existing regulatory structure, the prize literature usually assumes that the government could measure drug sales with reasonable accuracy. See, for example, Grinols and Henderson, 25 *Pharmacoeconomics* at 356 (cited in note 15); Fisher and Syed, *Prizes* at *15 (cited in note 16); Hollis and Pogge, *The Health Impact Fund* at 29 (cited in note 19); Love and Hubbard, 82 *Chi Kent L Rev* at 1539 (cited in note 16).

infrastructure may be significant, but likely are not overwhelming.³¹⁵ The greater concern in this case would be the need for the government to undertake enforcement roles that are currently filled by market participants. Under a prize system in which payouts are based on sales volume for drugs, the government would need to take on the insurance companies' role of discouraging excessive prescribing. Drug companies use a variety of marketing tools to promote the use of their drugs, some of which can result in excessive prescribing.³¹⁶ Insurance companies have a number of seemingly successful techniques to discourage physicians from prescribing patented drugs when they are not the most cost-effective treatment.³¹⁷ While the government already does some policing of excessive prescribing,³¹⁸ there is evidence suggesting that government efforts have resulted in substantial distortionary effects³¹⁹ that private insurance companies would be incentivized to avoid.

E. Is Marginal Cost the Socially Optimal Consumer Price?

Finally, the gains from switching to a prize system will be less when the invention is expected to be offered at something other than marginal cost. There are a number of reasons why society may prefer consumer prices to differ from marginal cost. Many of them are illustrated in prescription drug insurance that sets co-pays (that is, consumer prices) at a price other than marginal cost. For example, consumers may prefer to pay less than marginal cost to offset the loss from an adverse health event, or more than marginal cost to discourage unnecessary consumption for moral hazard reasons. Given the various cross-price elasticities between drugs, diagnostics, medical devices, and medical

³¹⁵ See Abood, *Pharmacy Practice* at 285–92 (cited in note 314).

³¹⁶ See Angell, *The Truth about the Drug Companies* at 126–30 (cited in note 194).

³¹⁷ See Jaume Puig-Junoy and Iván Moreno-Torres, *Impact of Pharmaceutical Prior Authorisation Policies: A Systematic Review of the Literature*, 25 *Pharmacoeconomics* 637, 638–39 (2007); Stuart O. Schweitzer, *Pharmaceutical Economics and Policy* 82–97 (Oxford 2d ed 2007) (discussing the marketing practices of pharmaceutical companies and how managed care organizations have used formularies and other tools to control physician prescribing practices).

³¹⁸ For example, the government employs techniques similar to those used by insurance companies to control physicians prescribing under Medicare. See Peter B. Bach, *Limits on Medicare's Ability to Control Rising Spending on Cancer Drugs*, 360 *New Eng J Med* 626, 626–27, 629 (2009).

³¹⁹ See Mark Duggan and Fiona M. Scott Morton, *The Distortionary Effects of Government Procurement: Evidence from Medicaid Prescription Drug Purchasing*, 121 *Q J Econ* 1, 23–24 (2006).

services, optimal co-pays will frequently differ from marginal cost.³²⁰ When the optimal consumer price is something other than marginal cost, the greater precision in setting consumer prices that is made possible by the prize system will be less relevant. In these cases, eliminating patents in favor of prizes may offer little gain to society.

CONCLUSION

The consensus view is that if the government can set prizes that offer equivalent incentives for innovation as intellectual property, it should grant prizes instead of intellectual property because the public would receive the same benefits of innovation without the deadweight loss from higher consumer prices. This can no longer be taken for granted. Assuming that the government can set equally good incentives for innovation without patents, it might want to eliminate intellectual property rights, but it might also want to issue those rights with supplemental prizes and price controls or consumer subsidies. The comparison between the two approaches depends on the projected gains that can be achieved from reductions in deadweight loss. The comparison also depends on the value to society of a perpetual safeguard against suboptimal government incentives and the capacity for periodic renegotiation that it makes possible.

³²⁰ See Dana Goldman and Tomas J. Philipson, *Integrated Insurance Design in the Presence of Multiple Medical Technologies*, 97 *Am Econ Rev* 427, 430 (2007).