Technological Progress and Well-Being

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Under the utilitarian justification for the patent system, patents advance overall well-being by promoting technological progress. As patents incentivize innovation through the grant of market exclusivity, market demand has a leading role in directing innovation. The reliance on market demand reflects a choice of preference satisfaction as the criterion of well-being underlying the patent system. Accordingly, the concept of technological progress that the patent system is set to promote is rather simplistic. It includes those future goods that current market participants would value the most, or in other words: new stuff that sells.

This Article deviates from this conventional account of technological progress that governs the field. It criticizes the reliance on preference satisfaction and the ensuing equation between market value and social value. Drawing on philosophical literature and empirical studies in economics and psychology, this Article reveals the shortcomings of the preference satisfaction criterion of well-being, and demonstrates that an innovative product's high-market demand does not guarantee that it will significantly enhance overall well-being. Ultimately, by incentivizing the development of certain innovations with a relatively low social value, the patent system might divert resources away from other, more beneficial, activities.

To better align incentives with social value, this Article contends that innovation law and policy should be predicated on an objective criterion of well-being rather than on preference satisfaction. By holding that certain things are intrinsically valuable for people, an objective criterion

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allows a shift away from a view of technological progress as an end in itself to a view of technological progress as a means to enable better lives. This new perspective entails a more significant role for the state in directing innovation. On a prescriptive level, the proposed approach mandates assigning greater weight to various schemes of direct government funding of innovation, including prizes and grants, as well as certain revisions within patent law itself.

INTRODUCTION

The primary justification for the patent system is utilitarian: the need to promote technological progress.[1] As patents induce investment in

1. For sources noting the utilitarian nature of the patent system, see, for example, Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1597 (2003); Robert P. Merges, *Rent Control in the Patent District: Observations on the Grady-Alexander Thesis*, 78 VA. L. REV. 359, 359 (1992); Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 554 (2012); Maureen A. O'Rourke, *Toward a Doctrine of Fair Use in Patent Law*, 100 COLUM. L. REV. 1177, 1181–82 (2000). This concept is embedded in the United States Constitution, which empowers Congress "to promote the Progress of Science and useful Arts." U.S. CONST. art. I, § 8, cl. 8; *see also infra* note 19 and accompanying text.

research and development ("R&D") by securing market exclusivity, market demand appears to have a leading role in driving technological innovation in society.[2] Indeed, in the economic and legal literature comparing the patent system with alternative policy tools for incentivizing innovation—such as grants and prizes—the reliance of the patent system on the market is commonly conceived as one of its greatest virtues.[3] As opposed to government actors, the patent system is viewed as a neutral platform—a "decentralized decision-making device"—which utilizes private information dispersed among individuals to guide potential innovators toward the most desired avenues for investment.[4] Accordingly, under the current legal regime, once the patent system is established, the state is presumed to have a very limited role in directing innovative activity. The apparent neutrality of a market-based platform allows policy makers and scholars to avoid dealing with fundamental questions: Why is technological progress desirable to society? How does it promote human welfare? Is this equally true with respect to different types of innovation? Under the prevailing approach, technological progress is generally viewed as good per se, and "the more, the better."

To be sure, such a perception of technological progress is anything but neutral. It represents political ideologies of economic liberalism, capitalism, and consumerism, under which constant innovation serves as means for maintaining perpetual growth and satisfying consumers' ever-evolving desires for new products and services.[5] Clearly, not all people share this general worldview and the modernist notion of progress it entails.[6] In fact, the ideal of perpetual growth has attracted, in other

2. For a more detailed account of the mechanism by which patents are said to induce R&D, see *infra* notes 21–23 and accompanying text.

3. *See infra* text accompanying notes 40–44.

4. Brian D. Wright, *The Economics of Invention Incentives: Patents, Prizes, and Research Contracts*, 73 AM. ECON. REV. 691, 695 (1983). *See also* Peter Lee, *Social Innovation*, 92 WASH. U. L. REV. 1, 6 (2014) ("Among its other virtues, the patent system is often extolled as a neutral platform in which the market—rather than a government entity—determines the allocation of resources for technological development.").

5. *See also infra* text accompanying notes 34–35.

6. For critical accounts of this modernist notion of progress, see, for example, Margaret Chon, *Postmodern "Progress": Reconsidering the Copyright and Patent Power*, 43 DEPAUL L. REV. 97, 100 (1993) (rejecting the view of progress as a "liberating upward trajectory" and advancing a postmodern view of progress); Estelle Derclaye, *Eudemonic Intellectual Property: Patents and Related Rights as Engines of Happiness, Peace, and Sustainability*, 14 VAND. J. ENT. & TECH. L. 495, 508–19 (2012) (arguing that the progress ideology is parochial); Simone A. Rose, *The Supreme Court and Patents: Moving Toward a Postmodern Vision of 'Progress'?*, 23 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1197, 1233–38 (advancing a postmodern perception of progress).

contexts, a great deal of criticism by economists and environmentalists.[7] Yet, in continuing to address technological innovation as an unequivocal end—without questioning its merits—the discourse in the intellectual property ("IP") arena is still governed, to a considerable extent, by this traditional conception. Notably, the current design of innovation law does not only reflect a certain ideology—it also has practical implications in terms of resource allocation for R&D. As highlighted by various scholars, a market-based platform for incentivizing innovation may fail to provide an adequate incentive to produce certain valuable innovations in a manner that could be problematic both from a distributive and utilitarian perspective.[8]

This Article seeks to contribute to the critical analysis of the patent system's allocative function,[9] by focusing on an aspect of the current legal regime that has been largely ignored in the literature: the embracement of preference satisfaction as the criterion of well-being underlying the system. In general, under a utilitarian approach, the state's role is to advance overall human well-being.[10] Yet, there is no single answer to the question of what constitutes human well-being. The question of which criterion of well-being the state should adopt is extensively debated by philosophers and, in recent years, by legal theorists.[11] Nevertheless, in the context of innovation law and policy, the

7. *See, e.g.*, James Boyle, *Enclosing the Genome?: What the Squabbles over Genetic Patents Could Teach Us*, *in* PERSPECTIVES ON PROPERTIES OF THE HUMAN GENOME PROJECT 97, 109–10 (F. Scott Kieff ed., 2003) (outlining the main critiques of perpetual growth).

8. *See infra* text accompanying notes 45–63.

9. By using the term "allocative function," this Article refers to the effect of the patent system on the manner by which resources for R&D are allocated. To maximize utility, the patent system should ideally direct resources toward inventions with the most social value; yet, in reality, as suggested above and further explored in this Article, this is far from being the case. While the term "allocative function" is not often used in patent literature, it is commonly used in other contexts while referring to the manner by which a given institution allocates or directs the use of scarce resources. Harold Demsetz, most famously, has used this term in describing how property rights provide incentives to use resources productively. Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 350 (1967).

10. *See, e.g.*, Matthew Adler & Eric A. Posner, *Happiness Research and Cost-Benefit Analysis*, 37 J. LEGAL STUD. 253, 255–56 (2008) (discussing the moral framework of utilitarianism); William W. Fisher & Talha Syed, *Global Justice in Healthcare: Developing Drugs for the Developing World*, 40 U.C. DAVIS L. REV. 581, 602 (2007) (noting how utilitarianism "urges lawmakers to choose the course of action that is most likely to produce the highest net social value").

11. For relevant discussions, see generally MATTHEW D. ADLER, WELL-BEING AND FAIR DISTRIBUTION: BEYOND COST-BENEFIT ANALYSIS (2012); JOHN BRONSTEEN ET AL., HAPPINESS AND THE LAW (2015) [hereinafter BRONSTEEN ET AL., HAPPINESS & THE LAW]; LAW AND HAPPINESS (Eric A. Posner & Cass R. Sunstein eds., 2010); Matthew D. Adler & Eric A. Posner, *Implementing Cost-Benefit Analysis When Preferences are Distorted*, 29 J. LEGAL STUD. 1105 (2000); John Bronsteen et al., *Welfare as Happiness*, 98 GEO. L.J. 1583 (2010) [hereinafter

question is seldom even asked, and the law-and-economics approach, which equates well-being with preference satisfaction, prevails.[12] Under such perception of well-being, the concept of technological progress that the state ought to promote is rather simplistic—it includes those future goods that current market participants would value the most, or, in other words, "new stuff that sells."[13]

This Article challenges the reliance on preference satisfaction and the ensuing equation between market value and social value. While drawing on philosophical literature that deliberates the meaning of well-being, it demonstrates the failure of preference satisfaction to serve as a meaningful definition of well-being. Preferences, particularly consumer preferences, might be misinformed or distorted for a variety of reasons. Numerous studies in economics and psychology show that individual consumers cannot be trusted to make choices that advance their own well-being. If this is the case, then aggregate market demand clearly cannot serve as a good indicator of social value, and, correspondingly, a market-based platform cannot be trusted to produce optimal incentives for R&D. More specifically, as demonstrated in this Article, there are good reasons to suspect that the patent system provides an overincentive to develop, produce, and disseminate certain innovations with a relatively low social

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Bronsteen et al., *Happiness*]; John Bronsteen et al., *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 DUKE L.J. 1603 (2013) [hereinafter Bronsteen et al., *Well-Being Analysis*]; Daphna Lewinsohn-Zamir, *The Objectivity of Well-Being and the Objectives of Property Law*, 78 N.Y.U. L. REV. 1669 (2003).

12. *See, e.g.*, James Boyle, *Cultural Environmentalism and Beyond*, 70 L. & CONTEMP. PROBS. 5, 12 (2007) (noting that "[w]hen correctives are offered to this perspective, they tend to be offered from outside the efficiency calculus . . . rather than as criticisms of the definition of efficiency or innovation itself"); Boyle, *supra* note 7, at 110–11 (criticizing the narrow outlook characterizing IP scholarship). For a discussion of the prevalent approach, see also *infra* Part I. For notable exceptions, see Derclaye, *supra* note 6 (advancing a eudemonic perception of IP rights); Estelle Derclaye, *What Can Intellectual Property Law Learn from Happiness Research?*, *in* METHODS AND PERSPECTIVES IN INTELLECTUAL PROPERTY 177 (Graeme B. Dinwoodie ed., 2013) (considering a potential role for happiness studies in the field of intellectual property); William W. Fisher III, *The Implications for Law of User Innovation*, 94 MINN. L. REV. 1417, 1463–72 (2010) (employing a "human flourishing" approach in support of legal protection for user innovation); *see generally* Fisher & Syed, *supra* note 10 (exploring various possible justifications for allocating resources to research developing countries' diseases, including a utilitarian justification that uses a quasi-objective measure for well-being); Arti K. Rai, *The Ends of Intellectual Property: Health as a Case Study*, 30 L. & CONTEMP. PROBS. 125 (2007) (identifying potential metrics for welfare that may be used in the context of government funding of innovation in the specific context of public health); Brett M. Frischmann, *Capabilities, Spillovers, and Intellectual Progress: Toward a Human Flourishing Theory for Intellectual Property* (Cardozo Legal Stud. Res. Paper No. 442, 2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2500196 (considering a capabilities approach as an alternative approach to evaluating IP law in lieu of the current utilitarian framework).

13. Boyle, *supra* note 12, at 12; Boyle, *supra* note 7, at 115.

value—for example, various electronic gadgets or other luxury products. This, in turn, might come at the expense of investing in other, more beneficial, endeavors. Among other things, it may further divert resources away from those areas that have already been identified in the literature as susceptible for underinvestment.[14] To reduce some of these distortive effects, certain policy measures are warranted. Yet, as a basis for such policy reforms, this Article first attempts to formulate a new conceptual framework that relies on an alternative criterion of well-being.

After surveying different criteria of well-being offered in the philosophical literature, this Article recommends adopting an objective well-being approach. Under such an approach, certain qualities are intrinsically valuable for people and their fulfillment promotes their well-being. Thus, well-being is not reduced to the satisfaction of preferences, but rather determined by objective external standards. Embracing an objective criterion of well-being as a foundation to the utilitarian end to promote technological progress facilitates a shift away from a view of technological progress as an end in itself to a view of technological progress as a means to enable better lives. Under such a perspective, the state can no longer treat innovation in a so-called "neutral way." Different innovative projects may have different social values, and priorities should be set accordingly. Once an objective criterion of well-being is adopted, it becomes apparent that a market-based platform cannot yield optimal incentives to innovate. Thus, an objective approach entails a more significant role for the state in directing innovative activity.

On a prescriptive level, an objective approach to innovation law mandates assigning a greater weight to alternative institutional mechanisms for incentivizing innovation, including grants and prizes. The major difficulty commonly associated with such schemes relates to the government's need to make funding decisions without sufficient information regarding the costs and benefits of R&D. Yet, once the deficiencies of the preference satisfaction criterion are recognized and an objective perspective is embraced, the informational advantage of the IP system seems overstated. Thus, this Article's insights bolster the arguments already made by various economists and legal scholars in support of a greater role for alternative mechanisms within the innovation ecosystem, while shedding a new light on the function that such mechanisms should play in reducing the patent system's distortive effects. At the same time—to the extent the state already employs such schemes—an objectivist innovation agenda developed in accordance with the guidelines set forth in this Article might facilitate a more

14. *See supra* note 8 and accompanying text.

systematic and consistent framework for decision making. Together with the recommendation to accord greater weight to nonpatent mechanisms, this Article also considers the need to fine-tune the patent system itself in various manners.

The main contribution of this Article to existing scholarship is in identifying and criticizing the use of preference satisfaction as the criterion of well-being underlying innovation law and policy. As noted above, other scholars have importantly identified various types of innovations that are underincentivized as a result of the patent system's reliance on the market.[15] General criticism of the notion of progress underlying patent law can also be found in the literature.[16] Yet, this Article takes an extra step in challenging the conventional wisdom by highlighting the shortcomings of the preference satisfaction criterion and exploring the potential of employing an alternative perspective within the utilitarian approach governing innovation law.[17] Shifting the focus away from the practical impacts of a market-based approach for incentivizing innovation toward the theoretical basis undergirding such resort to the market, places the discussion within the wider context of the philosophical and legal literature that debates the proper criterion of well-being the state should employ. By using the insights of such literature—as well as interdisciplinary studies investigating consumption patterns and the relationship between technology and happiness—this Article provides a new basis for the critical discussion of innovation law and policy and enables the exposure of additional distortive effects and shortcomings of the current legal regime, which so far have been insufficiently studied. In offering an alternative theory of well-being in lieu of the prevailing preferences theory, this Article supplies a framework that seeks to serve as the basis for various policy measures designed to better align incentives to innovate with social value.

This Article proceeds as follows: Part I explores the utilitarian justification for the patent system, outlines the main critiques of the patent system's allocative function, and identifies preference satisfaction as the criterion of well-being currently underlying the patent system. Part II offers a systematic analysis of the preference satisfaction criterion while

15. *See supra* note 8 and accompanying text.

16. *See supra* note 6; *see also* Brett Frischmann & Mark P. McKenna, *Intergenerational Progress*, 2011 WIS. L. REV. 123 (2011) (advocating a view of progress that is committed to intergenerational justice).

17. While a handful of previous works have explored the possibility of using alternative measures of welfare in certain contexts, see *supra* note 12, the literature lacks a comprehensive evaluation of the various possible criteria of well-being that may be employed by the state as a basis for innovation policy.

highlighting its shortcomings. Part III embarks on a quest for an alternative criterion of well-being and ultimately proposes a shift to an objective welfare perspective. Part IV considers the normative implications of the proposed new approach. Finally, Part V addresses some of the potential criticisms against the thesis advanced in this Article.

I. PATENT LAW AND PREFERENCE SATISFACTION

Under the prevailing utilitarian framework, the role of the patent system is to advance overall well-being by promoting technological progress.[18] This notion is embedded in the IP Clause of the United States Constitution, which empowers Congress "[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."[19] Over the years, various theories have attempted to demonstrate how the patent system attains this overarching goal.[20]

The main theory endorsed by courts and commentators alike is the "incentive-to-invent theory," which focuses on the role of the patent system in providing incentives to engage in R&D.[21] The concern underlying this theory is that, in a world without patents, information would be underproduced due to its "public good" nature.[22] Without

18. *See supra* note 1 and accompanying text. Alongside the utilitarian account of the patent system, a number of other theories have been offered over the years to provide alternative justifications for the patent system, including the labor theory and the personality theory. The role of such theories in explaining current patent law and providing a basis for policy recommendations has been largely marginal. *But see generally* ROBERT P. MERGES, JUSTIFYING INTELLECTUAL PROPERTY (2011) (arguing that while efficiency is an important midlevel principle for IP, the real normative foundations are Lockean appropriation, Kantian individualism, and Rawlsian distributive justice).

19. U.S. CONST. art. I, § 8, cl. 8. While the term "Science" is generally understood as referring to knowledge, the term "useful Arts" used by the Framers is commonly equated with the modern-day term "technology." *See, e.g.*, Alan L. Durham, "*Useful Arts*" *in the Information Age*, 1999 BYU L. REV. 1419, 1437 (1999) (noting that courts and scholars have suggested "technological arts" as the modern-day equivalent of the term "useful arts"); Karl B. Lutz, *Patents and Science: A Clarification of the Patent Clause of the U.S. Constitution*, 18 GEO. WASH. L. REV. 50, 54 (1948) ("The term 'useful arts,' as used in the Constitution and in the titles of the patent statutes is best represented in modern language by the word 'technology.'").

20. *See generally* A. Samuel Oddi, *Un-Unified Economic Theories of Patents—The Not Quite-Holy Grail*, 71 NOTRE DAME L. REV. 256 (1996) (describing many of the economic justifications for the patent system offered over the years).

21. For sources describing the incentive-to-invent theory, see, for example, Wendy J. Gordon, *Intellectual Property*, *in* THE OXFORD HANDBOOK OF LEGAL STUDIES 617, 632 (Peter Cane & Mark Tushnet eds., 2003); Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEGAL STUD. 247, 247 (1994); Yusing Ko, *An Economic Analysis of Biotechnology Patent Protection*, 102 YALE L.J. 777, 791–92 (1992).

22. *See, e.g.*, Burk & Lemley, *supra* note 1, at 1580 (referring to "the public goods nature of

patents, once the information underlying a new invention reaches the market, competition by free riders could drive down prices and make it impossible for the inventor to recoup his or her R&D costs and make a reasonable profit. By providing legal exclusivity for a limited period, patents overcome this market failure and provide the missing incentive to engage in inventive activity.[23]

Additional theories offered to justify the patent system under the general utilitarian framework focus on other incentives, including the incentive to disclose,[24] engage in post-inventive activity,[25] and design around.[26] While these theories differ in the specific roles they attribute to the patent system in attaining technological progress, they are all predicated on the premise that such progress is the patent system's ultimate objective.

Accordingly, academic and public discourse in the patent arena generally focuses on the means to further technological development in the most efficient manner, while dealing extensively with the patent system's effects on the *level* of innovation, but only infrequently debating the *type* of innovation patents should optimally produce.[27] Patent

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inventions that are expensive to produce but easy to appropriate"); O'Rourke, *supra* note 1, at 1182 (noting the public goods problem inherent in the production of information).

23. More accurately, as recently highlighted by Peter Lee, patents do not *create* incentives to invent, but rather *enable* market incentives by resolving the market failure described above. Lee, *supra* note 4, at 45.

24. The incentive-to-disclose theory focuses on the role that patents purportedly play in promoting disclosure of information underlying new inventions. For sources describing the incentive-to-disclose theory, see, for example, Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1028–29 (1989); Gordon, *supra* note 21, at 632; Ouellette, *supra* note 1, at 571–81; Julie S. Turner, *The Nonmanufacturing Patent Owner: Toward a Theory of Efficient Infringement*, 86 CALIF. L. REV. 179, 189–90 (1998).

25. Such post-inventive activity includes further refinement of the invention and its commercialization. One of the most prominent theories, focusing on post-inventive activity, is the prospect theory, formulated by Kitch, which highlights the advantages of granting ownership to the inventor in the technological prospect derived from her invention. Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J. L. & ECON. 265 (1977). *See generally* F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697 (2001) (highlighting the role of patents in incentivizing commercialization). For a novel treatment of the need to provide incentives to commercialize inventions, see generally Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341 (2010). For an argument that there is no need for patent rights to encourage ex post activity, see Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 129–31 (2004).

26. The incentive-to-design-around theory highlights the importance of encouraging competitors to invent noninfringing substitutes to patented technologies. *See generally* Gordon, *supra* note 21, at 632.

27. *See* Cynthia M. Ho, *Drugged Out: How Cognitive Bias Hurts Drug Innovation*, 51 SAN DIEGO L. REV. 419, 468 (2014) (noting, in the specific context of pharmaceutical innovation, the

scholarship mostly questions the need for the foregoing incentives[28] and assesses the patent system's efficacy in securing them.[29] It also highlights the costs associated with the patent system—including the deadweight loss resulting from noncompetitive pricing of patented inventions,[30] the waste caused by the rent-seeking behavior of inventors engaged in a race to the patent office,[31] and the potential chilling effect of patents on follow-on innovation.[32]

Yet, the basic premise invoked by the conventional utilitarian account—the pivotal mandate to promote technological progress—generally goes unchallenged. Indeed, technological progress is often conceived as an end in itself.[33] This almost axiomatic regard for the need to advance technological development is tightly linked to the general ideologies of economic liberalism, capitalism, and consumerism—which consider material advancement as the key to a good and happy life.[34] According to such a world view, as is prevalent in Western society,

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dearth of discussion regarding the *type* of innovation patents seem to produce). *But see* James Love & Tim Hubbard, *The Big Idea: Prizes to Stimulate R&D for New Medicines*, 82 CHI.-KENT L. REV. 1519 (2007) (discussing the direction of pharmaceutical innovation); *see also infra* text accompanying notes 45–63.

28. *See, e.g.*, Eisenberg, *supra* note 24, at 1026 (discussing market forces that may enable an inventor to enjoy a period of exclusivity even without a patent); Gordon, *supra* note 21, at 632 (noting reputational advantages as something that might reduce the need to provide incentives to invent through the patent system); Katherine J. Strandburg, *Users as Innovators: Implications for Patent Doctrine*, 79 U. COLO. L. REV. 467, 485 (2008) (noting that under certain circumstances, user innovators do not need patent protection to motivate them).

29. *See, e.g.*, Amy Kapczynski & Talha Syed, *The Continuum of Excludability and the Limits of Patents*, 122 YALE L.J. 1900, 1905–06 (2013) (highlighting the inadequacy of patent rights in incentivizing the production of information goods that are more difficult to exclude than others); see *also infra* text accompanying notes 56–60.

30. For sources discussing this cost of patents, see, for example, Dam, *supra* note 21, at 248–51; Kitch, *supra* note 25, at 266–67; Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 871–79 (1990).

31. For sources describing this potential waste, see, for example, Michelle Armond, *Introducing the Defense of Independent Invention to Motions for Preliminary Injunctions in Patent Infringement Lawsuits*, 91 CALIF. L. REV. 116, 142–43 (2003); Dam, *supra* note 21, at 251–52; Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 VA. L. REV. 305, 308 (1992).

32. For sources discussing the potential chilling effect of patents on follow-on innovation, see, for example, Merges & Nelson, *supra* note 30; Ofer Tur-Sinai, *Cumulative Innovation in Patent Law: Making Sense of Incentives*, 50 IDEA 723 (2010).

33. *See* Derclaye, *supra* note 6, at 513 (noting that "while the philosophers of the Enlightenment first saw the development of new technology as a means to a better condition, gradually their followers saw it as progress itself; thus new technology became an end instead of a means to an end").

34. *See* Chon, *supra* note 6 (discussing the link between the traditional "modernist" conception of progress and material growth); Derclaye, *supra* note 6, at 511–14 (reviewing the history of the idea of progress and its connection with capitalist ideology).

technological innovation is clearly warranted as an engine of economic growth and as a means to satisfying consumers' constant demand for new products and services.[35] This modernist outlook entails a noninterventionist approach to innovation law. Under such an approach, while the state has an important role in promoting innovation, its role in setting the direction of innovative activity is very limited. The state does not need to delve into the merits of specific technological advancements, nor does it need to engage in setting priorities for R&D projects on the basis of their social value.

Most importantly, the way innovation law is currently structured removes any pressing need to deal with these type of inquiries. The patent system is considered the primary policy tool for promoting technological progress.[36] While under nonpatent incentive schemes—such as grants and prizes—government officials must decide which innovative projects to fund and how much to reward them, under the patent system, the market is entrusted with the duty to perform such functions.[37] As explained above, the patent system provides incentives through granting exclusive rights designed to enable the inventor to appropriate a larger share of his or her invention's market value.[38] By design, then, the system assigns the market a major role in directing innovation. Roughly speaking, the higher the market demand is likely to be for a future technology, the stronger the incentive the patent system provides to develop it.[39]

Indeed, in the economic and legal literature comparing the patent system with alternative institutional arrangements for incentivizing innovation, the main alleged benefit of patents is the "posited relationship between rights to exclude and the use of private information about the value of inventions."[40] As suggested by economist Harold Demsetz,

35. *See supra* note 34.

36. Burk & Lemley, *supra* note 1, at 1576; Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 319 (2013). *See also* Ho, *supra* note 27, at 429 (noting patents' prominent role in innovation policy); Amy Kapczynski, *The Cost of Price: Why and How to Get Beyond Intellectual Property Internalism*, 59 UCLA L. REV. 970, 975 (2012) (same).

37. *See, e.g.*, Hemel & Ouellette, *supra* note 36, at 327 (comparing patents to government-set rewards). For a general discussion of alternative incentive mechanisms, see *infra* Part IV.A.

38. *See supra* note 23 and accompanying text.

39. Undoubtedly, future demand for goods not yet in existence can only be roughly estimated based on market demand for existing products and services. The statement in the text is also oversimplified in light of patents' inability to ensure a perfect correlation between an invention's market value and the patentee's return on investment. *See infra* text accompanying notes 56–60.

40. Kapczynski & Syed, *supra* note 29, at 1911–12. *See also* Howard F. Chang, *Patent Scope, Antitrust Policy, and Cumulative Innovation*, 26 RAND J. ECON. 34, 50 n.31 (1995) (noting that

patents are superior to other strategies in producing "knowledge at efficient rates."[41] Market prices reflect a staggering amount of private information, dispersed among individuals, about the costs and benefits of R&D investments. In relying on the invisible hand of the market, the patent system utilizes such data to signal "the desired directions of investment" and "the quantities of resources that should be committed to invention."[42] Government actors, on the other hand, generally lack such private information that generates market prices,[43] which is the reason government-led strategies are often considered less efficient in allocating innovation resources than the patent system.[44]

Nonetheless, the allocative function of the patent system has been criticized by various scholars over the years.[45] To begin, a market-based platform for incentivizing innovation is inherently biased toward inventions that generate value in consumer markets and fails to provide adequate incentives for the production of nonmarket goods.[46] In other contexts, the inability of the relevant consumers to pay for various

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"the regulatory authorities lack information that innovators possess, such as knowledge about the demand for inventions," and therefore, the patent system is superior in ensuring that "the monopoly profit extracted from the market is correlated with the social surplus created by the invention"); Hemel & Ouellette, *supra* note 36, at 327 ("Patents' ability to take advantage of private information is well recognized in the innovation-policy literature.").

41. Harold Demsetz, *Information and Efficiency: Another Viewpoint*, 12 J.L. & ECON. 1, 13 (1969).

42. *Id.* at 12.

43. *See, e.g.*, Daniel F. Spulber, *Public Prizes Versus Market Prices: Should Contests Replace Patents*, 97 J. PAT. & TRADEMARK OFF. SOC'Y 690, 732 (2015) (noting that "central planners necessarily lack the detailed private information of inventors, innovators, producers, and consumers that generate prices in the market for inventions").

44. *See, e.g.*, Nancy Gallini & Suzanne Scotchmer, *Intellectual Property: When Is It the Best Incentive System?*, *in* 2 INNOVATION POLICY AND THE ECONOMY 51, 54–55 (Adam B. Jaffe et al. eds., 2002) (arguing that one of the patent system's "obvious virtues" is that it enables a firm to rely on their superior knowledge regarding the costs and benefits of R&D investments in order "to screen investments").

45. For the meaning of the term "allocative function," see *supra* note 9.

46. *See* Lewinsohn-Zamir, *supra* note 11, at 1687 n.85 (noting that people may have preferences for things that are not traded in markets). In connection with the patent system, see BRETT M. FRISCHMANN, INFRASTRUCTURE: THE SOCIAL VALUE OF SHARED RESOURCES 109 (2012) (discussing the predictable bias of IP systems for "intellectual goods that generate the most appropriable value in consumer markets," and noting that "[a]s a result, various socially desirable intellectual goods . . . remain underproduced"); Kapczynski & Syed, *supra* note 29, at 1905 (summarizing the argument that patent systems fail to create goods whose value is difficult to appropriate in consumer markets). *See also* Carol M. Rose, *Scientific Innovation and Environmental Protection: Some Ethical Considerations*, 32 ENVTL. L. 755, 764 (2002) (noting, in the environmental context, the lack of incentive to engage in the production of knowledge where there is no "end-product" that can be turned into property). For the specific case of basic research, see *infra* note 61 and accompanying text.

innovative products and services might dilute the signal of social value produced by the market. This might have important distributive implications by undersupplying production for the poor,[47] particularly when the rich and the poor have different needs for information goods.[48] This problem is evident, for example, in the global health field: because of the poor's limited ability to pay, very few medicines are developed for diseases that primarily affect the poor but have little or no impact on the rich.[49] The link between incentives to innovate and one's ability to pay might also be problematic from a utilitarian perspective.[50] By failing to capture the welfare-enhancing effect of a certain information good (e.g., a life-saving medicine) on the poor, the signal produced by the market might fall short of reflecting the aggregate social value of such good.[51] Another instance where market demand might fail to reflect social value is when the innovation at hand has significant positive externalities.[52] This would be the situation, for example, with respect to certain infrastructural intellectual goods, including general-purpose technologies.[53] A similar concern exists in cumulative innovation settings, where the social value of an existing invention is comprised not

47. *See, e.g.*, Kapczynski, *supra* note 36, at 996–99 (highlighting the concern that using IP to generate innovation will undersupply production for the poor); Lee, *supra* note 4, at 69 (maintaining that the patent system fails to generate social innovations that address the "substantive needs of underprivileged populations"). In a similar fashion, a market-based approach may also result in underproducing innovation catering to the needs of a small group of individuals, notwithstanding their ability-to-pay. Consider, for instance, the case of orphan drugs. *See infra* note 202.

48. Kapczynski, *supra* note 36, at 999.

49. Fisher & Syed, *supra* note 10, at 613; Hemel & Ouellette, *supra* note 36, at 328; Kapczynski, *supra* note 36, at 999 n.109; Maxwell R. Morgan, *Medicines for the Developing World: Promoting Access and Innovation in the Post-TRIPS Environment*, 64 U. TORONTO FAC. L. REV. 45, 48 (2006); Rai, *supra* note 12, at 130.

50. *See* Fisher & Syed, *supra* note 10, at 618 (maintaining that there is a utilitarian case for redirecting R&D resources toward diseases that disproportionately affect the developing world).

51. Notably, the distortive effect on incentives resulting from the poor's limited ability-to-pay will manifest itself not only when the relevant good is needed exclusively by the poor (in which case, such good may not be produced at all), but also when the rich and the poor share the same need. In the latter case, while some resources might be allocated to producing the relevant good, allocation may nevertheless be suboptimal. *See* Kapczynski, *supra* note 36, at 1000 (noting that in such cases, "relevant information may be produced . . . more slowly or in a smaller supply").

52. For the definition of positive externalities, see FRISCHMANN, *supra* note 46, at 37–38 (defining positive externalities as "benefits . . . realized by one person as a result of another person's activity without payment" and noting that "[t]oo few . . . resources may be allocated to activities that generate positive . . . externalities because those persons deciding whether and how to allocate resources fail to account for the full range of benefits").

53. *Id.* at 254 (noting that general-purpose technologies and other types of infrastructural intellectual goods benefit society "primarily by facilitating a wide range of downstream productive activities"). Examples of general-purpose technologies are the steam engine, electricity, and the computer.

only of its stand-alone value, but also of its potential value as an inventive input.[54] Finally, a gap between social value and market demand might exist when the innovative product serves public-good ends, as in the case of certain innovations related to the environment or to national security.[55]

Even assuming that market demand reflects social value in an accurate manner, scholars have noted that patent rights cannot always be trusted to provide signals regarding expected private returns from innovation that correlate with market value. Patents, by definition, yield less than full appropriability (i.e., the ability to capture profits generated by the innovation) because of their limited scope and duration.[56] Rewards for innovation under a patent regime are also likely to underrepresent market value due to transaction costs that hinder potential licensing deals.[57] In addition, as recently highlighted by Amy Kapczynski and Talha Syed, patents might suboptimally track market value due to the fact that some information goods are simply more difficult to exclude than others.[58] While no one proposes that it would be efficient to allow an inventor to internalize the entire social value of his or her invention,[59] the patent system should at least guarantee an award high enough to cover R&D costs—including a premium for the inherent risk associated with R&D

54. *See, e.g.*, Peter S. Menell & Suzanne Scotchmer, *Intellectual Property Law*, *in* 2 HANDBOOK OF LAW AND ECONOMICS 1471, 1499 (A. Mitchell Polinsky & Steven Shavell eds., 2007) (noting the problem of cumulative innovation, in which "the most important social benefit of an innovation may be the boost given to later innovators, and this may make the benefits harder to appropriate"); SUZANNE SCOTCHMER, INNOVATION AND INCENTIVES 127 (2004) [hereinafter SCOTCHMER, INNOVATION] (recognizing the three important "boosts" that innovations can give to later innovators); Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. ECON. PERSP. 29, 31 (1991) [hereinafter Scotchmer, *Giants*] (recognizing that "[p]art of the first innovation's social value is the boost it gives to later innovators").

55. *See, e.g.*, FRISCHMANN, *supra* note 46, at 265 (highlighting the concern that market demand would fail to accurately reflect social demand in such cases); Brett Frischmann, *Innovation and Institutions: Rethinking the Economics of U.S. Science and Technology Policy*, 24 VT. L. REV. 347, 373–74 (2000) (noting that in these instances, the government must subsidize or control demand through procurement).

56. Kapczynsky & Syed, *supra* note 29, at 1905, 1943.

57. *See, e.g.*, Frischmann, *supra* note 55, at 363 ("IP may provide sufficient exclusion of competitors but not lead to appropriation because licensing transaction costs are too high . . . ."); Kapczynsky, *supra* note 36, at 988 ("[T]ransactions over information . . . are likely to be particularly costly.").

58. *See generally* Kapczynsky & Syed, *supra* note 29.

59. *See* Gordon, *supra* note 21, at 622 ("[N]o one would suggest that IP should internalize *all* the benefits that flow from an intangible."); Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1041 (2005) (maintaining that there is no need to permit inventors to capture the full social value of their invention). *See also* FRISCHMANN, *supra* note 46, at 39 (noting that the patent system is "designed to enable some internalization of what would otherwise be external benefits and to promote some productive activities that generate externalities").

and a reasonable return on fixed-cost investment—whenever the social value of the invention exceeds its costs.[60] But the patent system cannot even guarantee such a result.

Basic scientific research exemplifies a context where various of the above-mentioned considerations play a role in undercutting the ability of patents to produce incentives to innovate, despite the potentially high social value of the endeavor. The "yield" from basic research, in terms of commercial applications, is too uncertain and remote to be adequately incentivized by private markets.[61] Basic research can also be characterized as "intellectual infrastructure," as it produces significant spillovers and its main value is facilitating various downstream uses.[62] In addition, the output of basic research might be highly nonexcludable.[63] In light of the foregoing, it is easy to understand why basic research is commonly funded by governments outside the patent system.

This Article adds another important layer to the critique of the patent system's allocative function by focusing on the criterion of well-being upon which the system is founded. The patent system's reliance on market exclusivity as the means to incentivize innovation reflects an *implicit choice* of the preference satisfaction criterion of well-being. More specifically, the patent system is predicated on actual preferences—ones that are revealed through individuals' market choices.[64] As a general matter, under an actual preferences theory, an individual's well-

60. For the need to provide a certain premium for the general risk associated with R&D, see Chang, *supra* note 40, at 49 n.28; Scotchmer, *Giants*, *supra* note 54, at 30 n.4.

61. As stated by Richard Nelson, "[i]t seems clear that, were the field of basic research left exclusively to private firms operating independently of each other and selling in competitive markets, profit incentives would not draw so large a quantity of resources to basic research as is socially desirable." Richard R. Nelson, *The Simple Economics of Basic Scientific Research*, 67 J. POL. ECON. 297, 304 (1959). *See also* Katherine J. Strandburg, *Curiosity-Driven Research and University Technology Transfer*, *in* 16 ADVANCES IN THE STUDY OF ENTREPRENEURSHIP, INNOVATION, AND ECONOMIC GROWTH: UNIVERSITY ENTREPRENEURSHIP AND TECHNOLOGY 93, 94 (Gary D. Libecap, ed., 2005) (stating that "the purpose of basic scientific research is to provide inputs for technological progress in the very long term, in which the potential value of any particular scientific inquiry is largely unpredictable," and hence, "it is widely agreed that the commercial market will fail to invest adequately in such research"); Kapczynski & Syed, *supra* note 29, at 1951 ("[B]asic research is too "upstream" to be funded by the private sector, meaning that its practical dividends are too uncertain and far off in time to be adequately supported by market incentives.").

62. FRISCHMANN, *supra* note 46, at 253.

63. Kapczynski & Syed, *supra* note 29, at 1951.

64. In theory, actual preferences could also be viewed as external to the act of choice. Lewinsohn-Zamir, supra note 11, at 1687 n.85; Amartya K. Sen, *Rational Fools: A Critique of the Behavioral Foundations of Economic Theory*, 6 PHIL. & PUB. AFF. 317, 323–24 (1977) (discussing the possibility that preferences would exist outside the realm of choices). *See also* Eyal Zamir, *The Efficiency of Paternalism*, 84 VA. L. REV. 228, 242 (1998) (discussing the notion of second-order preferences).

being is advanced to the extent that his or her actual preferences and desires are fulfilled.[65] The patent system's reliance on preferences when producing the signal guiding innovative activity reflects a perception that the value of technological innovation lies predominantly in its ability to sell, and thereby satisfy consumer preferences.

Basing innovation law on the preference satisfaction criterion of well-being can be viewed as a *choice*—as this criterion is just one out of a few possible criteria for measuring well-being. While economic theory generally perceives well-being in terms of the satisfaction of actual preferences,[66] it is not "the only game in town."[67] Other main theories of well-being include: ideal preferences theories, which focus on the maximization of hypothetical (rather than actual) preferences that people would have in certain specified, ideal conditions; hedonistic theories, which view well-being in terms of mental states and stress the importance of positive mental states and avoiding negative mental states for human welfare; and objective theories, which hold that certain qualities—including physical and mental health, social relationships, and the experience of pleasure and satisfaction—are intrinsically valuable for people and thus promote their welfare.[68]

Though basing innovation law on the preference satisfaction criterion of well-being is a *choice*, it is an *implicit* choice, as it is not the result of a deliberate decision made by policy makers.[69] Yet, it is precisely the absence of such a discussion—in the face of a legal regime that relies predominantly on market exclusivity in providing incentives to innovate—that indicates the endorsement of a preference satisfaction theory of well-being. In fact, an explicit association of market value with social value can be found in literature comparing patents with other institutional approaches for innovation funding. The prevailing opinion in such comparative accounts is that "[b]ecause they link the magnitude

65. Lewinsohn-Zamir, *supra* note 11, at 1677; Zamir, *supra* note 64, at 234–35.

66. *See, e.g.*, Boyle, *supra* note 7, at 110 ("For those who practice the economics of the Chicago school, current revealed consumer preferences . . . have an almost totemic power."); Lewinsohn-Zamir, *supra* note 11, at 1686–88 (observing the prevalence of preference theories of well-being—particularly, actual preference theories—among writers in the law-and-economics movement).

67. Lewinsohn-Zamir, *supra* note 11, at 1673.

68. *See, e.g.*, *id.* at 1690 (noting the three main categories of theories of well-being); ADLER, *supra* note 11, at 156–59 (same); Zamir, *supra* note 64, at 234–35 (same). For a detailed discussion of alternative criteria of well-being, see *infra* Part III.

69. Not only policy debates, but also patent scholarship, lack sufficient discussion regarding the relative virtues and shortcomings of the preference satisfaction criterion as compared to alternative criteria of well-being. *See supra* note 17. To a large extent, the absence of such a discussion can be attributed to the general prevalence of actual preferences theories in legal scholarship. *See supra* note 66 and accompanying text.

and direction of innovation incentives to *market prices* . . . patents may be a better mechanism than reliance on government funding for ensuring that all truly *valuable* information goods—and only truly *valuable* information goods—are generated."[70] Hence, market demand is generally perceived as the ultimate indicator for social value in patent scholarship. As summed up by leading innovation scholars Peter Menell and Suzanne Scotchmer, "intellectual property rewards reflect the social value of the contribution, since the profit is determined by demand."[71]

Part II seeks to challenge the embracement of preference satisfaction as the basis for innovation policy and the associated equation between market value and social value. It is important to note that the observations made in this Article are substantively different than the critical arguments previously made (and explored above) regarding the allocative function of the patent system. Existing critical accounts focus on manners by which markets fail to signal information regarding actual preferences or on how patents suboptimally track market value; yet, they do not challenge the underlying assumption that satisfying an individual's preferences is tantamount to the advancement of that individual's well-being. This Article casts doubt on this fundamental assumption by exploring the deficiencies of the preference satisfaction criterion of well-being, which further weakens the ability to rely on consumer preferences revealed in the market for technological products as the decisive factor guiding the direction of innovation. Notably, while existing critical accounts focus on ways by which the patent system fails to incentivize socially valuable innovation, Part II demonstrates that the patent system might, at the same time, provide an overincentive to invest resources in R&D in certain cases where the technology at hand is not likely to advance human welfare in any significant manner, notwithstanding its expected market success.

II. THE SHORTCOMINGS OF THE PREFERENCE SATISFACTION CRITERION

A. Theoretical and Empirical Observation

Preference theories of well-being essentially hold that a person's well-being is determined by the extent to which his or her preferences are

70. Kapczynski & Syed, *supra* note 29, at 1904 (presenting the common justification for patents in the literature) (emphases added).

71. *See* Menell & Scotchmer, *supra* note 54, at 1499 (qualifying the statement to the context of stand-alone inventions or creations). *See also* Kapczynski, *supra* note 36, at 974–75 (presenting the widely accepted assumption in IP scholarship that "[p]rice links the production of information to consumer demand, and, by extension, to social welfare").

satisfied, regardless of the content of such preferences.[72] Such theories generally assume that individuals are the best judges of their own interests, and hence, preference satisfaction would generally lead to the enhancement of human welfare.[73] The prevalence of preference theories among economists and legal scholars can be attributed primarily to their alleged antipaternalistic nature and simplicity.[74] Yet, the preference satisfaction criterion also has grave deficiencies, many of which have been noted over the years.

The primary objection to the preference satisfaction criterion of well-being is that people often make choices in a manner that fails to advance their own welfare.[75] As stated by Matthew Adler, "people can certainly choose options that have no personal benefit or are personally detrimental."[76] From a motivational perspective, it is unlikely that all preferences of human beings are driven by welfare-productive reasons.[77] Even when a person's preferences are generally directed toward what he or she perceives as being beneficial for himself or herself, various reasons might cause such preferences to be distorted.[78] For instance, people can

72. Lewinsohn-Zamir, *supra* note 11, at 1677; Zamir, *supra* note 64, at 234–35. It should be stressed that the critical analysis of the preference satisfaction criterion in this Part focuses primarily on actual preferences. For a discussion of ideal preferences theories, see *infra* text accompanying notes 146–160.

73. Bradley A. Harsch, *Consumerism and Environmental Policy: Moving Past Consumer Culture*, 26 ECOLOGY L.Q. 543, 546 (1999).

74. *See* JAMES GRIFFIN, WELL-BEING: ITS MEANING, MEASUREMENT AND MORAL IMPORTANCE 10 (1986) ("[The actual-desire account] is an influential account. Economists have been drawn to it because actual desires are often revealed in choices and 'revealed preferences' are observable and hence a respectable subject for empirical science . . . . And both philosophers and social scientists have been powerfully drawn to it because it leaves no room for paternalism . . . ."); Lewinsohn-Zamir, *supra* note 11, at 1688 ("Preference theories have the allure of both antipaternalism and simplicity."). Lewinsohn-Zamir argues that both attributes are false. *Id.* at 1689–90.

75. *See, e.g.*, Lewinsohn-Zamir, *supra* note 11, at 1678 (noting that "people may often desire what is bad for them"). Clearly, this type of objection presupposes the existence of an alternative criterion of well-being, which enables the formation of external judgments regarding the connection between preference satisfaction and welfare promotion. Other possible criteria of well-being have been noted above, *supra* text accompanying note 68, and will be discussed in detail in *infra* Part III. While this Article ultimately recommends the adoption of an objective criterion of well-being as the basis for innovation law and policy, at this stage of the analysis there is no need to embrace a specific alternative account of well-being to demonstrate the weaknesses of the preference satisfaction criterion.

76. Matthew D. Adler, *Beyond Efficiency and Procedure: A Welfarist Theory of Regulation*, 28 FLA. ST. U.L. REV. 241, 263 (2000).

77. *Id.* (noting that "it is implausible that *all* reasons motivating preferences are welfare-productive").

78. For use of the term "distorted preferences" in this context, see Adler & Posner, *supra* note 11, at 1107.

be mistaken about their own well-being.[79] Such a mistake can be the result of misinformation,[80] or the effect of a careless logical analysis.[81] The process of forming one's preferences might also be flawed in various manners as a consequence of the inherent limits on cognitive abilities.[82] In addition, not all preferences are the result of an organized thought process—where all relevant information regarding the matter at hand is taken into account and integrated with background information, commitments, values, and goals.[83] Preferences may be unreflective,[84] or even based on whims.[85] Likewise, preferences are sometimes founded on prejudice; misshaped by various unjust features of the status quo (e.g.,

79. *See, e.g.*, ADLER, *supra* note 11, at 170 (noting that most philosophers of well-being are prepared to endorse this notion). *See also* GRIFFIN, *supra* note 74, at 10 (observing that "notoriously, we mistake our own interests"), 12 (providing examples for mistakes of fact that lead to faulty choices of means aimed to serve our long-term goals); Bronsteen et al., *Happiness*, *supra* note 11, at 1586 ("Preference satisfaction is plagued by the fact that people make mistakes, often preferring and choosing things that fail to make them happy."); Lewinsohn-Zamir, *supra* note 11, at 1679 n.45 ("[P]eople may be mistaken about their own interests and desire things that will not promote their welfare."); Zamir, *supra* note 64, at 237 ("A person's belief that a certain course of action will yield the greatest happiness for herself may be misconceived.").

80. *See* Adler, *supra* note 76, at 264 (noting that one "problem with the straight preference-based view of well-being is that preferences can be uninformed, unreflective, nonautonmous, or otherwise nonideal"); Adler & Posner, *supra* note 11, at 1114 (referencing an example where a person prefers one outcome, but if that person had more information, he or she would have preferred another outcome—).

81. *See* John C. Harsanyi, *Morality and the Theory of Rational Behavior*, *in* UTILITARIANISM AND BEYOND 39, 55 (Amartya Sen & Bernard Williams, eds., 1982) (noting that preferences may be based on erroneous factual beliefs, careless logical analysis, or strong emotions that greatly hinder rational choice).

82. *See* Zamir, *supra* note 64, at 238 (noting that common experience and scientific studies attesting to human fallibility and the existence of significant limits on people's cognitive abilities show that people may be mistaken as to what course of action will maximize their well-being). The following documented systematic errors, for example, may affect the formation of preferences: misjudgment of the probability that a future risk will be realized; inability to make a correct cost-benefit analysis when the data is complex; dependence of decisions on the manner in which data is presented; consideration of irrelevant factors; ignorance of relevant information; undervaluation of future benefits and costs in comparison to present ones; ignorance of the incompleteness of data and the limitations of judgmental skills leading to overconfidence in evaluations and predictions; and failure to rationally analyze relevant information or examine alternatives. For a comprehensive list of limits on people's cognitive abilities (including the foregoing), see *id.* at 251–52. For a general account of bounded rationality, see generally Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979); Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCI. 1124 (1974). *See also infra* note 100 and accompanying text.

83. *See* Adler, *supra* note 76, at 264 (recognizing the problem with one's preferences absent such integration).

84. *Id.*

85. Lewinsohn-Zamir, *supra* note 11, at 1678.

the absence of basic education[86]); or based on a lack of self-respect or self-esteem.[87] For these and other reasons, the fulfillment of a person's preferences will not always advance his or her well-being, and in some cases, might even reduce it.[88]

These general observations are certainly applicable in the specific context of consumer preferences, which might be distorted in any of the possible ways described above.[89] It is also important to recognize that individual preferences are not formed in a vacuum—preferences in a market setting are known to be largely affected by social influence that consumers exert on one another.[90] As demonstrated by a series of interdisciplinary works in complexity and network science, the market success of a product depends greatly on the structure of the social network in which it is diffusing.[91] As a result, an individual's decision to purchase a product might not always rely on such product's intrinsic qualities.[92] Furthermore, advertising and marketing may also have a significant impact on the formulation of preferences for market products and services.[93] Notably—to the extent consumers are unable to independently obtain full information about the benefits and costs associated with products—firms may supply less accurate information, causing consumers to purchase goods that might be harmful or simply unnecessary.[94] In fact, certain marketing techniques and strategies are

86. Adler & Posner, *supra* note 11, at 1114. *See also* GRIFFIN, *supra* note 74, at 12 ("Sometimes desires are defective because we have not got enough, or the right, concepts.").

87. Lewinsohn-Zamir, *supra* note 11, at 1672, 1678. *See also* Adler, *supra* note 76, at 264 (referring to the related category of "nonautonomous" preferences).

88. *See* GRIFFIN, *supra* note 74, at 10 ("It is depressingly common that when even some of our strongest and most central desires are fulfilled, we are no better, even worse, off."); Lewinsohn-Zamir, *supra* note 11, at 1672 (noting that a "fulfillment of a person's subjective, actual preferences might result in a reduction—rather than an advancement—of that person's well-being").

89. For instance, the systematic errors described in *supra* note 82 may undoubtedly affect the formation of consumer preferences.

90. *See* Michal Shur-Ofry, *IP and the Lens of Complexity*, 54 IDEA 55, 64 (2013) (discussing the impact of network dynamics on success).

91. *Id.* at 66 (noting that "extraordinary success can be random").

92. *See also infra* text accompanying notes 125–128 (discussing "positional preferences").

93. *See, e.g.*, Fisher & Syed, *supra* note 10, at 677 (discussing the effectiveness of advertising campaigns in the specific context of pharmaceutical products); Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CALIF. L. REV. 805, 822–23 (1988) (discussing the impact of marketing efforts on the economic success of commercialized technologies). Notably, to the extent patents allow firms to reap supracompetitive profits, this may enable and motivate them to invest more in lobbing and promoting their patented products while crowding out other solutions.

94. *See, e.g.*, Ariel Katz, *Pharmaceutical Lemons: Innovation and Regulation in the Drug Industry*, 14 MICH. TELECOMM. & TECH. L. REV. 1, 7–8 (2007) (noting the concern that some firms would overstate positive features and understate negative ones in promoting and labeling their

intentionally designed by businesses to exploit and manipulate consumers' cognitive limitations and biases.[95] Thus, in addition to the general factors described above that might account for distorted preferences, in the context of preferences revealed through individuals' market choices, additional elements might further weaken the ability to define well-being in terms of preference satisfaction.

Sure enough, some of the effects described in the preceding paragraph can be addressed by certain policy measures outside innovation law—for example, a stricter regulation of advertising and mandatory labeling. By the same token, when it comes to individuals' cognitive biases, it may be possible to employ various de-biasing techniques to steer people in more rational directions.[96] Yet, regulation is far from a perfect solution, and the effectiveness of debiasing techniques, in particular, has proven to be limited.[97] Because it is not clear to what extent such measures can significantly mitigate deviations from rationality, one cannot ignore the effect of such deviations on the manner by which individuals form their preferences in the marketplace—which ultimately makes the reliance on preference satisfaction even more troublesome.

All the observations made above with respect to consumer preferences may surely be relevant with respect to preferences for technological products and services. A preference for a technological good might be based on misinformation, misconception, prejudice, or whim.[98] A person might, for example, on a whim, decide to purchase a smartphone as a replacement for his old mobile phone, without deliberating over the impact that such a decision could have on various aspects of his well-being. While making his decision, he may be affected by similar

products). Interestingly, information asymmetry between producers and consumers may be particularly acute with respect to innovative technological products, due to their rapid evolution and inherent complexity.

95. *See, e.g.*, EYAL ZAMIR, LAW, PSYCHOLOGY, AND MORALITY: THE ROLE OF LOSS AVERSION 55–66 (2015) (describing how suppliers might exploit consumer loss aversion).

96. *See generally* Christine Jolls, *Behavioral Law and Economics*, *in* BEHAVIORAL ECONOMICS AND ITS APPLICATIONS 115 (Peter Diamond & Hannu Vartiainen eds., 2007); Christine Jolls & Cass R. Sunstein, *Debiasing Through Law*, 35 J. LEGAL STUD. 199 (2006).

97. *See, e.g.*, Jeremy A. Blumenthal, *Emotional Paternalism*, 35 FLA. ST. U. L. REV. 1, 40 (2007) (noting that "many debiasing efforts can in fact be counterproductive, due to overcorrection, rebound effects, or other concerns").

98. *See, e.g.*, Fisher & Syed, *supra* note 10, at 677 (discussing specific circumstances that may render consumers' decisions in the context of pharmaceutical products uninformed, including asymmetric knowledge between firms and consumers regarding the benefits and risks of drugs); James Surowiecki, *Technology and Happiness: Why More Gadgets Don't Necessarily Increase Our Well-Being*, 108 TECH. REV. 72, 74 (2005) ("[M]any decisions about new technologies are based on little or no concrete evidence and involve guessing about the future."). *See also supra* notes 93–94.

decisions made by other individuals in his surroundings as well as the seller's massive marketing efforts. It is possible that had he been fully informed about certain negative implications entailed in using the new device—including, for the sake of the argument, increased exposure to radiation, a heightened risk of distraction while driving, and less quality time with loved ones as a result of intensive use of the device—and made a reflective decision that took into account such long-term impacts, he might have preferred to avoid the purchase. Ultimately, satisfying such an individual's desire to purchase the product would not necessarily result in an improvement of his well-being as expected in advance.

This example serves to demonstrate another general deficiency of the preference satisfaction criterion for well-being: the inherent unavoidable gap between ex ante expectations and ex post experiences.[99] Preferences necessarily address a future state of affairs and people often cannot predict their actual experience once such a state is realized. Beyond the basic inherent difficulty of foreseeing the future, a person's ability to make predictions about choices that would maximize one's well-being is further limited due to said cognitive biases.[100] Generally, individuals are incapable of assessing the long-term impact of their particular choices on their well-being.[101] Notably, this might still be the case, even if people formed their preferences after well-informed and careful deliberation of all possible alternatives and their consequences.[102] Thus, an individual might develop a preference based on an *expectation* that its fulfillment will improve his or her life, while his or her actual *experience* after the satisfaction of such preference may very well be disappointing.[103] In the

99. Lewinsohn-Zamir, *supra* note 11, at 1678.

100. *See, e.g.*, Bronsteen et al., *Happiness*, *supra* note 11, at 1601, 1629 (stating that "when people are asked to make predictions about the effects of future experiences on their well-being, they tend to suffer from a number of cognitive and emotional biases"); Daniel Kahneman & Richard H. Thaler, *Anomalies: Utility Maximization and Experienced Utility*, 20 J. ECON. PERSP. 221, 222 (2006) (noting that people often make systematic errors in predicting their future experience of outcomes); Zamir, *supra* note 64, at 237–38 ("[P]eople do not necessarily know better than anyone else what would maximize their own happiness."). *See also supra* note 82 and accompanying text.

101. *See, e.g.*, Bronsteen et al., *Happiness*, *supra* note 11, at 1622 (stating that "there is every indication that when individuals 'care about and strive for' things, they often mistakenly believe that these things will make them happy"); Melanie Rudd et al., *Getting the Most Out of Giving: Concretely Framing a Proposal Goal Maximizes Happiness* 3 (Stan. Graduate Sch. of Bus., Working Paper No. 2129, 2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2424103 (noting that "although people often think they know what leads to happiness, their predictions about what will make them happy are often inaccurate"). *See also infra* note 123 and accompanying text (regarding the documented failure of individuals to predict hedonic adaptation effects).

102. Lewinsohn-Zamir, *supra* note 11, at 1682 n.58.

103. *Id.* at 1678. If this is the case, then the fulfillment of desires cannot be guaranteed to advance well-being, and correspondingly, preference satisfaction cannot serve as a meaningful

particular context of consumption, while an individual purchasing a product can generally be assumed to act pursuant to an expectation that the action will improve his or her well-being—this often ends up far from being true.

Indeed, an increasing amount of scientific literature attests to the lack of correlation between consumption and an individual's positive sense of well-being.[104] Various studies have found that increased wealth in a given society is generally not accompanied by an increased level of happiness among its members.[105] Likewise, once consumption is no longer needed to satisfy basic needs—such as adequate shelter, clothing, and basic nutrition—increased consumption generally does not make people more content.[106] These general observations are certainly valid with respect to technological products. While technological innovation has undoubtedly reduced human discomfort and suffering—for example, by advancing the state of medicine[107]—there is no evidence that the fulfillment of consumers' preferences for various technological products and services generally make them happier, or otherwise increase their sense of well-being.[108]

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criterion of well-being. *See also* Bronsteen et al., *Happiness*, *supra* note 11, at 1622 ("Were individuals able to predict their own future mental states accurately, their preferences might change quite dramatically.").

104. *See, e.g.*, Katya Assaf, *Buying Goods and Doing Good: Trademarks and Social Competition*, 67 ALA. L. REV. 979, 987–88 (2016) (noting that there is hardly any evidence that intensive consumption makes people happier); Robert H. Frank, *The Frame of Reference as a Public Good*, 107 ECON. J. 1832, 1832, 1836 (1997) (stating that for a broad spectrum of goods, evidence suggests that beyond some point, consuming more goods does not produce any lasting increment in people's sense of well-being).

105. For a review of studies attesting to a lack of correlation between wealth and a sense of well-being, see David G. Myers, *The Funds, Friends, and Faith of Happy People*, 55 AM. PSYCHOLOGIST 56, 61 (2000) (noting, for example, that in Britain, "sharp increases in the percentages of households with cars, central heating, and telephones have not been accompanied by increased happiness"). *See also* Yew-Kwang Ng, *From Preference to Happiness: Towards a More Complete Welfare Economics*, 20 SOC. CHOICE & WELFARE 307, 313 (2003) ("Studies by psychologists and sociologists show that, both within a country and across nations, the happiness level of people increases with the income level, but only slightly.").

106. *See* Liselot Hudders & Mario Pandelaere, *The Silver Lining of Materialism: The Impact of Luxury Consumption on Subjective Well-Being*, 13 J. HAPPINESS STUD. 411, 413 (2012) (summarizing the results of such studies). *See also supra* note 104.

107. *See, e.g.*, Nicholas Rescher, *Technological Progress and Human Happiness*, *in* UNPOPULAR ESSAYS ON TECHNOLOGICAL PROGRESS 3, 5 (1980) (providing, with medicine, the examples of waste disposal and sanitation and temperature control as areas where science and technology have contributed to the reduction of human life's negative aspects).

108. *Cf.* Derclaye, *supra* note 6, at 523 (noting that "while technological progress can eliminate some human discomfort and suffering, that is, the negative aspects of human life, it does not necessarily follow that it also provides positive aspects or, in sum, happiness"). Note that for the purposes of this Article, there is no need to embrace a general criticism of the "technological life."

Beyond the general factors discussed above that may account for faulty choices in various cases,[109] one possible explanation for the lack of correlation between consumption and well-being might be that material rewards alone are not sufficient to make a person happy. Once a person's basic needs are met, there are other aspects of life that might be more influential on that person's sense of well-being[110]—such as close relationships with friends, a satisfying family life, and time to reflect and pursue diverse interests.[111] If time was an unlimited resource, the pursuit of materialistic goals would not necessarily conflict with the ability to develop such other aspects of life. But time is a scarce resource, and hence the efforts required to generate enough income to allow one to acquire material goods might come at the expense of the ability to advance other, potentially more vital, aspects of the good life.[112]

As for certain technological products and services—such as various types of electronic gadgets—it might also be the case that the use of the technology itself would come at the expense of other, potentially more beneficial, activities—such as spending time with loved ones, being outdoors, or sleeping more.[113] This hypothesis is reinforced by recent studies showing that certain technological products and services—such as mobile phones and social networking platforms—are addictive in nature, which makes it even more likely that their availability would decrease the time left to engage in other activities.[114]

It is sufficient to show that the mere satisfaction of a preference for a technological product would not necessarily advance well-being.

109. *See, e.g.*, *supra* text accompanying note 98.

110. Hudders & Pandelaere, *supra* note 106, at 415.

111. Mihaly Csikszentmihalyi, *If We Are So Rich, Why Aren't We Happy?*, 54 AM. PSYCHOLOGIST 821, 823 (1999). *See also* Assaf, *supra* note 104, at 989 (listing leisure, personal development, and socializing with family and friends as significant factors of well-being); Frank, *supra* note 104, at 1838–39 (discussing the increase in happiness levels that results from deeper social relationships); Myers, *supra* note 105, at 62–65 (exploring, in addition, the potential association between religious faith and happiness).

112. *See, e.g.*, Assaf, *supra* note 104, at 988–89 (noting the concern that overinvestment of time and energy in pursuing material possessions will undermine opportunities to pursue immaterial objects); Csikszentmihalyi, *supra* note 111, at 823 (noting the difficulty to reconcile the conflicting demands of such goals due to the scarcity of time); Hudders & Pandelaere, *supra* note 106, at 429 (observing that activities outside the realm of consumption may be more rewarding, but materialists may not initiate the pursuit of such activities and, as a result, fail to learn how rewarding these can be). Notably, as there is no market for such immaterial aspects of life, no commercial entities are investing in promoting them.

113. On the other hand, one can plausibly point out at many technological innovations that have saved human time.

114. *See, e.g.*, Andrew Hough, *Student* '*Addiction*' *to Technology* '*Similar to Drug Cravings*'*, Study Finds*, TELEGRAPH (Apr. 8, 2011), http://www.telegraph.co.uk/technology/news/8436831/Student-addiction-to-technology-similar-

Another likely reason for the little discernible effect of consumption on an individual's sense of well-being might stem from the human capacity to adapt to changing conditions.[115] As stated by psychologist Mihaly Csikszentmihalyi: "If people strive for a certain level of affluence thinking that it will make them happy, they find that on reaching it, they become very quickly habituated, and at that point they start hankering for the next level of income, property, or good health."[116] Hence, even if the consumption of a new product provides immediate gratification and increases one's sense of well-being in the short term—this impact is likely to be temporary and dissipate quickly.[117] This may put the consumer on a "hedonic treadmill."[118] Once a person accustoms himself or herself to the newly acquired possession, the initial pleasure derived from the acquisition diminishes, and a desire for another possession soon re-emerges.[119] Ultimately, "when expectations outstrip actual

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to-drug-cravings-study-finds.html (describing withdrawal symptoms experienced by college students when deprived of their technology gadgets); Jyoti Ranjan Muduli, Addiction to Technological Gadgets and Its Impact on Health and Lifestyle: A Study on College Students (2014) (unpublished M.A. thesis, National Institute of Technology), http://ethesis.nitrkl.ac.in/5544/1/e-thesis_19.pdf (examining the use and impact on mental health of technology gadgets among youths). As documented in these studies, an addiction to technology may have other negative implications on users' mental health beyond the lost-time effect. On a related note, some technologies, by their very nature, substitutes various valuable aspects of human life. Digital connection, for example, is said to gradually take precedence over direct human contact, and some argue that this reduces social skills to our detriment. *See, e.g.*, Katherine Bindley, *When Children Text All Day, What Happens To Their Social Skills*, HUFFINGTON POST (Dec. 9, 2011, 1:22 PM), http://www.huffingtonpost.com/2011/12/09/children-texting-technology-social-skills_n_1137570.html (discussing the impact technology gadgets have on young peoples' ability to engage in conversation).

115. *See, e.g.*, Myers, *supra* note 105, at 60 ("Good and bad events do temporarily influence our moods and people will often seize on such short-run influences to explain their happiness. Yet, in very little time the emotional impact of significant events and circumstances dissipates.").

116. Csikszentmihalyi, *supra* note 111, at 823. *See also* Myers, *supra* note 105, at 60 ("Thanks to our capacity to adapt, yesterday's luxuries can soon become today's necessities and tomorrow's relics.").

117. *See, e.g.*, Csikszentmihalyi, *supra* note 111, at 823 (mentioning the "escalation of expectations" as a reason why material rewards, which people regard so highly, do not necessarily provide the happiness expected from them).

118. *See, e.g.*, Assaf, *supra* note 104, at 988 ("[M]aterialistic values associated with consumerism capture individuals in a so-called hedonic trap, which is hard to escape."); J. Ian Norris & Jeff T. Larsen, *Wanting More Than You Have and Its Consequences for Well-Being*, 12 J. HAPPINESS STUD. 877, 878 (2011) ("[T]he acquisition of material goods places us on a hedonic treadmill. To the extent that our wants outpace our haves, we might become less happy, even as our haves accumulate.").

119. *See* Hudders & Pandelaere, *supra* note 106, at 429 (noting that the temporary satisfaction of material wants may increase the probability that such wants reemerge after a short while); Ng, *supra* note 105, at 315 ("[H]igher consumption makes us adapted to the higher level and makes us needing even higher consumption to remain at the same welfare level.").

attainments, even significantly growing attainments, the result is a net decrease in satisfaction."[120] This phenomenon of "hedonic adaptation" is certainly applicable to technological products and services. People instantaneously adapt to available technologies, and, subsequently, a desire for the next generation quickly takes over.[121] The perceived obsolescence of technological consumer goods is bolstered by product marketing and advertising designed to convince consumers to repeatedly buy new and improved versions of the same product to avoid being left behind.[122]

Most importantly for this Article's purposes, researchers noted the inherent difficulty faced by consumers to anticipate the extent and pace of their adaptation to different goods and experiences—which might deepen the wedge between preferences and well-being.[123] In fact, such documented failure of individuals to predict hedonic adaptation effects might create a bias in favor of consumption that provides an initial thrill—a strong short-term effect that is easy to forecast, while disregarding its likely quick dissipation—even though other choices might prove better in the long run.[124]

One final explanation for the failure of consumption to serve as a

120. Rescher, *supra* note 107, at 14. Sure enough, some consumers may derive a direct benefit from the process of exploring new products. Yet, for other consumers this very process may cause frustration and diminish their overall sense of well-being. Regardless, with respect to any given acquisition, a gap may exist between expectations and actual attainments, and this in itself is problematic in terms of the ability to rely on preferences, as discussed below. *See infra* text accompanying notes 123–124.

121. *See, e.g.*, Norris & Larsen, *supra* note 118, at 878 (providing the example that a "desire for a better television will create a *have-want* discrepancy . . . that will only be resolved after the desired television has been acquired. However, the new television will not lead to any lasting sort of happiness if we shortly come to want an even better television"); Surowiecki, *supra* note 98, at 74–75 ("[N]o matter how dramatic a new innovation is, no matter how much easier it makes our lives, it is very easy to take it for granted. You can see this principle at work in the world of technology every day, as things that once seemed miraculous soon become mandate and, worse, frustrating when they don't work perfectly.").

122. *See, e.g.*, Norris & Larsen, *supra* note 118, at 878 (illustrating this general phenomenon with respect to cellular phones).

123. BRONSTEEN ET AL., HAPPINESS & THE LAW, *supra* note 11, at 20. *See also* Bronsteen et al., *Happiness*, *supra* note 11, at 1600–01 ("Although hedonic adaptation's effects are substantial, studies show that people do a poor job of remembering and anticipating adaptation. Accordingly, they tend to be unsuccessful at predicting certain aspects of an event's hedonic impact."); Frank, *supra* note 104, at 1839 (noting that "adaptation is inherently difficult to anticipate").

124. *See, e.g.*, Frank, *supra* note 104, at 1839 (comparing one's subjective well-being after buying a new car and spending more time with friends). Notably, the quick diminishing of the positive effect of consumption on an individual's sense of well-being does not characterize immaterial rewards, such as meaningful relationships. "As relationships continue over time, the satisfaction they provide tends to increase rather than diminish." *Id.*

lasting source of happiness—contrary to consumer expectations—is the dependence of individual preferences on one's position relative to others. In contrast to what is generally assumed under neoclassical economics, considerable evidence from psychological and behavioral economics literature indicates that an individual's sense of well-being depends heavily on this individual's relative position.[125] As noted by economist Robert Frank: "The things we feel we 'need' depend on the kinds of things that others have, and our needs thus grow when we find ourselves in the presence of others who have more than we do."[126]

The importance of relative consumption in individual valuations is greater in some domains than it is in others, and goods for which relative position matters most are often termed "positional goods."[127] This category includes, among other things, luxury goods—such as expensive food and clothing—and various gadgets and appliances. When it comes to positional goods, an individual may form a preference to acquire a new product, while expecting that such a step would have a positive effect on his or her well-being. Yet, once others in his or her surroundings have purchased a similar product, this positive effect might be quickly diminished.[128] Also for this reason, there is likely to be a gap between what one expects ex ante and what one experiences ex post in connection with certain decisions regarding consumption.

B. Distorted Incentives

For all the reasons discussed above, "while pursuing the 'good life' through consumption, people actually stroll away from genuine

125. *See, e.g.*, Csikszentmihalyi, *supra* note 111, at 823 ("When resources are unevenly distributed, people evaluate their possessions not in terms of what they need to live in comfort, but in comparison with those who have the most."); Robert H. Frank, *Positional Externalities Cause Large and Preventable Welfare Losses*, 95(2) AM. ECON. REV. 137, 137 (2005) ("In traditional economic models, individual utility depends only on absolute consumption."); Robert H. Frank & Cass R. Sunstein, *Cost-Benefit Analysis and Relative Position*, 68 U. CHI. L. REV. 323, 374 (2001) (explaining that people care about relative position not only because of envy or status anxiety, "but because the position of others sets a general frame of reference within which economic and social activity takes place"); Richard H. McAdams, *Relative Preferences*, 102 YALE L.J. 1, 3 (1992) (noting that neoclassical economics has neglected the fact that people desire relative position).

126. Frank, *supra* note 104, at 1840.

127. Frank, *supra* note 125, at 137 (defining positional goods as ones for which the link between context and evaluation is strongest).

128. *See, e.g.*, Assaf, *supra* note 104, at 989 ("[A]n individual may choose to work longer hours in order to buy a better car. Yet, once her acquaintances purchase similar cars, the relative advantage from the new car largely disappears."); McAdams, *supra* note 125, at 4 ("[P]arallel investments by consumers can entirely nullify any positional advantage either hoped to gain by making the investment.").

happiness."[129] Hence, defining well-being in terms of preference satisfaction is highly problematic.[130] This bears significant implications on the allocative function of the patent system. If individual consumers cannot be trusted to make choices that increase their own well-being, then aggregate market demand clearly cannot serve as a good indicator for social value. Predicated on actual preferences, the patent system incentivizes the development of certain products and services that might enjoy market success, but cannot be assumed to have more than a negligible contribution to the well-being of individual consumers—and ultimately, to aggregate social welfare. This might be the case, for example, with respect to certain types of home appliances, cosmetic products, or electronic gadgets, as well as processes used in the production of such goods and other associated technologies.[131] Thus, the foregoing analysis regarding the deficiencies of preferences ultimately provides another strong reason, in addition to those already identified in the literature, for doubting the ability of a market-based platform to direct innovation in a socially optimal manner.[132]

There is one other point worth highlighting associated with the concern that the patent system may produce distorted incentives.[133] While satisfying the choices of an individual might further his or her personal well-being (however defined), it could also simultaneously harm other people or the collective, and thus would not necessarily increase

129. Assaf, *supra* note 104, at 988 (making this observation in a different context).

130. *See supra* note 75 (regarding the need to assume the existence of some other criterion of well-being in order to form such type of judgment). Notably, happiness (or the experience of pleasure) is not only an essential feature of a hedonistic account of well-being, but is also typically viewed as one of the qualities comprising the "good life" under an objective criterion of well-being. *See supra* text accompanying note 68. Thus, in light of the foregoing findings regarding the lack of correlation between consumption and happiness, it seems that satisfaction of desires cannot be trusted to increase well-being in a meaningful way under either of such alternative accounts. *See also infra* note 210.

131. As to the indirect effect of market demand on the incentive to develop technologies used in the production process of consumer goods, see Spulber, *supra* note 43, at 726 ("Because technology is an input to production, producers' demand for the technology is a derived demand—it depends on the demand for the producers' final products. Increases in the prices of inventions can reflect increases in consumer demand for products that are produced using the inventions or whose design is based on the inventions."). *See also* FRISCHMANN, *supra* note 46, at 63 (using the term "derived demand" in referring to societal demand for infrastructure resources (i.e., "inputs that satisfy demand derived from demand for the outputs")).

132. For existing critical accounts of the patent system's allocative function, see *supra* text accompanying notes 45–63.

133. It should be noted that the discussion in this paragraph, which concerns the relation between individual well-being and collective well-being, is not directly related to the criticism of the preference satisfaction criterion of well-being. In essence, the market failure described herein could pose a challenge under any account of well-being.

aggregate social welfare. To the extent that such harmful effects on others go uncompensated, they are not likely to be a factor in the original individual's decision; hence, they might be referred to as negative externalities.[134]

One potential negative externality of consumption relates to its environmental impact. It is widely accepted that greenhouse gases emitted by humans are the primary driver for climate change; therefore, many believe that consumption of material goods must be reduced or, at the very least, channeled toward products with a relatively low environmental footprint.[135] Unfortunately, for various reasons, consumers cannot be expected to fully internalize environmental concerns when making market choices.[136] A discussion of the possible manners by which the legal system may strive to reduce market inefficiencies caused by negative externalities (including in the environmental context) is outside the scope of this Article's analysis. But the important insight for purposes of this Article is that the existence of such externalities might result in an inflated level of demand for products with a relatively low net social value (considering their environmental impact), and further weaken the ability to rely on a market-based platform as a mechanism that guides innovation in a manner that maximizes utility.[137]

Altogether, predicated on market demand, the patent system might thus incentivize the development, production, and dissemination of various goods that—regardless of their commercial success—might not significantly enhance human well-being.[138] In some cases, the system

134. For a definition of negative externalities, see, for example, FRISCHMANN, *supra* note 46, at 37.

135. *See generally* NAOMI KLEIN, THIS CHANGES EVERYTHING: CAPITALISM VS. THE CLIMATE (2014) (discussing the connection between capitalism and climate change); ANNIE LEONARD, THE STORY OF STUFF: HOW OUR OBSESSION WITH STUFF IS TRASHING THE PLANET, OUR COMMUNITIES, AND OUR HEALTH—AND A VISION FOR CHANGE (2010) (discussing the impact of excessive consumerism on the environment).

136. Among other things, this is a situation where the observed discrepancy between consumer preferences and citizen preferences may come into play. *See generally* Daphna Lewinsohn-Zamir, *Consumer Preferences, Citizen Preferences, and the Provision of Public Goods*, 108 YALE L.J. 377 (1998) (discussing alternative explanations for this discrepancy).

137. *Cf.* Frank, *supra* note 104, at 1843 ("Most economists accept the proposition that market allocations may be suboptimal when production is accompanied by the discharge of environmental pollutants.").

138. Alongside the overconsumption of certain types of products, individual preferences may also diverge from individual welfare in a manner that leads to under-consumption of certain products, due to similar factors, including misinformation and the tendency to discount future costs and benefits. *Cf.* FRISCHMANN, *supra* note 46, at 45 (making a similar argument regarding merit goods, such as education and health care, which are likely to be underprovided by the market). This

could even generate an incentive to develop technologies with a negative social value, considering all relevant factors.[139] Yet, even if one assumes that all technological innovations have a net positive value, an inflated incentive to invest in technologies with a relatively low social value is sufficiently unfortunate. The main problem associated with such an overincentive relates to opportunity costs. R&D is often resource intensive, and because resources are scarce, allocation matters. Assuming that finding a cure for Alzheimer's disease is more socially valuable than developing a new type of a cosmetic product for male hair loss, then overincentivizing the latter might draw valuable resources away from the former to society's detriment.[140]

The potential for excessive investment in inventive activity has been identified by various scholars as one of the potential costs of the patent system.[141] Economist Arnold Plant, who affords the most elaborate treatment to this matter, highlighted the possibility that the patent system would not only divert resources from noninventive productive activities to industrial R&D, but also divert resources from various inventive activities that are not covered by the patent system into attempts to make patentable inventions.[142]

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could be the case, for example, with respect to certain eco-friendly products, which may come with a greater up-front cost or involve changing habits, although they entail significant long-term benefits.

139. In addition to the potential environmental impact, there are numerous potentially harmful effects of technological innovation that are not discussed in this Article. *See, e.g.*, Burk & Lemley, *supra* note 1, at 1588 (listing different types of costs that innovation may have in specific domains); Surowiecki, *supra* note 98, at 75 (discussing various potential negative impacts of modern technologies on humans, including loss of privacy and isolation from "the real world"). *See also supra* note 114 and accompanying text (noting the addictive nature of certain technologies).

140. For discussion regarding the lack of drugs that effectively treat conditions such as Alzheimer's disease, see, for example, Ho, *supra* note 27, at 429.

141. *See, e.g.*, RICHARD A POSNER, ECONOMIC ANALYSIS OF LAW 39 (4th ed. 1992) (noting that the costs of the patent system include "inducing potentially excessive investment in inventing").

142. Arnold Plant, *The Economic Theory Concerning Patents for Inventions*, 1 ECONOMICA 30, 37, 41 (1934). *See also* Strandburg, *supra* note 61, at 94, 108 (discussing the possibility that university patenting "might skew the choices of research topics toward more applied projects, threatening the socially beneficial production of the curiosity-driven research demand function"); Dirk Czarnitzki et al., *Heterogeneity of Patenting Activity and Its Implications for Scientific Research* (Ctr. for European Econ. Research, Paper No. 07-028, 2007), http://www.econstor.eu/bitstream/10419/24591/1/dp07028.pdf (arguing that the effort to generate patents distracts scientists from their other more fundamentally orientated research tasks). For a different type of distortion in the patterns of research and development that may result from the patent system, see Joseph E. Stiglitz, *Economic Foundations of Intellectual Property Rights*, 57 DUKE L.J. 1693, 1712 (2008) (pointing out that patents may lead to investment of resources directed at circumventing monopolies (e.g., by designing around) or strengthening monopolies (e.g., by making interoperability more difficult)). *Cf.* Glynn S. Lunney, Jr., *Fair Use and Market Failure:*

This insight is highly relevant in the context discussed herein, as it reinforces the importance of basing innovation policy on a sound criterion of well-being and designing the legal regime in a manner that optimizes production pursuant to such criterion. By incentivizing innovation, the system inevitably draws resources away from other productive activities. To the extent the system incentivizes certain types of innovations with a relatively low social value, it might fail to serve its utilitarian function of maximizing social welfare, in light of the potentially higher value of foregone activities. Such activities may include both noninventive uses of productive resources and the development of new innovative technologies with a greater potential to promote social welfare.

The opportunity cost of the patent system might be particularly noticeable in the domains that have already been identified as susceptible for systematic underinvestment, as a result of various factors including, *inter alia*: the inherent inability of a market-based platform to incentivize production of non-market goods, the dependence of one's willingness to pay for goods with one's ability to pay, and the fact that some types of information goods are more difficult to exclude than others.[143] All in all, the resulting system could potentially provide distorted incentives to innovate in directions that fail to advance societal welfare to the maximum possible extent. To reduce some of these distortive effects, certain policy reforms might be warranted. Yet, to better align incentives to innovate with social value, we must first formulate a new conceptual framework that relies on an alternative criterion of well-being. Part III embarks on a quest for such an alternative criterion.

III. A PROPOSED SHIFT TO AN OBJECTIVE CRITERION OF WELL-BEING

A. Available Criteria of Well-Being

As briefly mentioned above, the philosophical literature distinguishes between various possible accounts of well-being.[144]

Sony Revisited, 82 B.U. L. REV. 975, 977 n.8 (2002) ("[C]opyright's incentive effect does not create more works out of thin air, as it were, but in fact draws resources away from other productive activities.").

143. *See supra* text accompanying notes 45–63 (noting the criticisms of the patent system's allocative function). One example for a category of innovations that is most likely underincentivized by the patent system, for a combination of the aforementioned reasons, is "social innovation," a term recently used by Peter Lee in referring to various innovations in fields like cognitive behavioral therapy, microfinance, and strategies to reduce hospital-based infections. Lee, *supra* note 4, at 43–47.

144. *See supra* text accompanying note 68.

1. Preference Theories

Preference theories of well-being, in general, hold that a person's well-being is determined by the extent to which his or her preferences are fulfilled.[145] Due to the widely recognized deficiencies of an account that relies on actual preferences, many of which have been highlighted above, philosophers have offered more sophisticated versions of preference theories. One proposed solution is to shift from actual preferences to ideal preferences. An ideal preferences theory seeks to advance preferences that a person would have if he or "she were thoroughly, clearly, and calmly deliberating all possible alternatives and their consequences with full, relevant information and no reasoning errors."[146]

While successful in correcting certain mistaken preferences—particularly ones that are based on factual or logical errors—an ideal preferences theory cannot remedy all deficiencies of actual preferences.[147] For one thing, as an ideal preferences theory focuses on the hypothetical desires of *real* human beings, it is doubtful whether it can remedy choices based on flawed motivations.[148] An ideal preferences theory also does not purport to alter various features of an individual's personality—which might affect his or her preferences. For instance, a person who suffers from a lack of self-respect or self-esteem may make choices that would not be viewed by other people as advancing his or her own well-being—even following a clear and calm deliberation of relevant information.[149] Similarly, economist and philosopher Amartya Sen discusses the "circumstantial contingency of desires" (i.e., the possibility that certain features of the status quo would shape an individual's preferences).[150] Sen focuses, in particular, on individuals whose deprivations—due to various types of oppressive circumstances—might be so great that they "have learned to keep their desires in line with their respective predicaments," and concludes that the "purification procedures" entailed by an ideal preferences theory cannot eliminate this

145. *See supra* text accompanying note 72.

146. Lewinsohn-Zamir, *supra* note 11, at 1680. *See also* ADLER, *supra* note 11, at 160 (explaining that idealized preferences are what a person "would be disposed to choose where she to have more information, be in a calm and deliberate state, and so forth").

147. Lewinsohn-Zamir, *supra* note 11, at 1680–81. *See also* ADLER, *supra* note 11, at 171 ("A substantial number of philosophers suggest that defining well-being in terms of procedurally idealized preferences is insufficient to capture the critical force of well-being.").

148. *See, e.g.*, Lewinsohn-Zamir, *supra* note 11, at 1680–81 (doubting the capability of an ideal preferences theory to remedy malicious and racist preferences).

149. *Id.*

150. Amartya K. Sen, *Well-Being, Agency and Freedom: The Dewey Lectures 1984*, 82 J. PHIL. 169, 191 (1985).

problem.[151] For these reasons, distorted preferences that do not promote individuals' welfare might persist even under an ideal preferences theory.[152] Furthermore, the "idealization" process cannot cure the inherent inadequacy of the preference satisfaction criterion resulting from the prospectivity of desires.[153] Even a fully informed individual, who is carefully evaluating his or her options, might desire certain things that would eventually fail to meet his or her expectations.[154] In the particular context of consumer preferences, it is also not clear whether the ideal conditions would save a hypothetical consumer from being trapped in a "hedonic treadmill," which could make him or her biased in favor of acquisitions that provide strong short-run gratification.[155] Likewise, a hypothetical consumer could also be affected by his or her "relative position" while forming his or her preferences.[156]

Thus, the shift from actual preferences to ideal preferences can provide only a partial solution to the problems associated with the preference satisfaction criterion of well-being. Though some of those problems could potentially be addressed while formulating the ideal preferences theory's contours,[157] the more demanding we are in defining the ideal conditions under which preferences are formed, the closer we get to an objective theory of well-being.[158] In fact, to answer the question of what

151. *Id.* *See also* ADLER, *supra* note 11, at 172 ("An individual's history and socialization might be such that she has adapted to a life which seems to furnish relatively little well-being, and yet which she prefers—even with good information, reasoning calmly, having formally coherent preferences, and so forth."); Lewinsohn-Zamir, *supra* note 11, at 1681 (noting, with respect to individuals with great deprivations, that "[e]ven with adequate information and time for reflection, their own desires might remain very modest").

152. Lewinsohn-Zamir, *supra* note 11, at 1681. *See also* JAMES GRIFFIN, VALUE JUDGEMENT: IMPROVING OUR ETHICAL BELIEFS 22 (1997) ("[A] particularly irrational desire—say, one planted deep when one was young—might well survive criticism by facts and logic, and its mere endurance is less than it takes for its fulfillment to make one better off."); GRIFFIN, *supra* note 74, at 11 ("[I]t is doubtless true that if I fully appreciated the nature of all possible objects of desire, I should change much of what I wanted.").

153. *See supra* note 102 and accompnanying text.

154. *See* Lewinsohn-Zamir, *supra* note 11, at 1682 n.58 ("Even if we arrive at our preferences after knowledgeable and careful deliberation of all possible alternatives and their consequences, we may still be disappointed when we actually experience the satisfaction of our preferences in the future.").

155. *See supra* text accompanying notes 115–124.

156. *See supra* text accompanying notes 125–128.

157. *See generally* Lewinsohn-Zamir, *supra* note 11, at 1680 (noting that ideal preference theories may differ greatly in the content of their ideal conditions).

158. *Id.* at 1694–95 (explaining that to sufficiently correct the problems associated with preferences, one cannot avoid employing a certain degree of objectivity in the move from actual to ideal preferences). *See also* ADLER, *supra* note 11, at 159 (noting that "one plausible understanding of 'objective goods' is that these are the items which individuals, under ideal conditions, converge

one would desire under ideal conditions, it is hard to avoid resorting to a certain "consensus" regarding objectively valuable objects that individuals, under ideal conditions, would presumably come to value. Yet, as illuminated by Sen, "if this is what we are going to do, we could just as easily have started from the objective criterion itself, and 'founded' it on the consensus of values on well-being, rather than having the imaginary exercise of *counterfactual desiring*."[159] Clearly, the stronger the conditions imposed under an ideal preferences theory—in order to correct the faults in individuals' actual preferences—the more the alleged "anti-paternalistic" aspect of preference theories, which constitutes their main appeal compared to an objective welfare approach, is compromised. For all these reasons, this Article does not prescribe embracing an ideal preferences theory as a basis for innovation policy.[160]

2. Hedonistic Theories

A different family of well-being theories are hedonistic theories, often referred to as "mental state" theories. Such theories assert that well-being is determined by the occurrence of certain (positive) kinds of mental states and the nonoccurrence of other (negative) kinds of mental states.[161] Jeremy Bentham, for instance, famously conceived well-being as the occurrence of pleasure and the avoidance of pain.[162] There are also various other, more sophisticated, versions of mental state theories.[163] In

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in self-interestedly preferring").

159. Sen, *supra* note 150, at 191–92 (noting that while "we can *pretend* to answer" the question of what a hypothetical person would desire under ideal conditions, "this is [an] imaginary [exercise] anyway," and thus—"we need not live in the fear of being proved wrong"). Notably, as idealized preferences are not the real desires of the affected subjects, it is not clear how their advancement could be trusted to promote welfare, unless such preferences attest to the inherent value of the chosen outcomes. Yet, if this is the case, then attempting to target value in a more direct manner seems preferable to the fictitious inquiry entailed by an ideal preferences theory. *See also infra* text accompanying notes 180–183.

160. Yet, interestingly, the principal policy measures that this Article ultimately recommends as means to advance an objectivist welfare perspective might also be deemed helpful by those who adhere to an ideal preferences theory. One way to advance this perspective is to accord a greater weight to nonpatent mechanisms for incentivizing innovation. *See infra* Part IV.A. As consumer demand for patented technologies necessarily reflects actual preferences rather than ideal preferences, such measure can certainly be useful in advancing an innovation agenda based on an ideal preferences criterion as well, although the chosen criterion might impact the specific metrics used in formulating and implementing innovation policy within the framework of such schemes. *See also infra* note 198.

161. ADLER, *supra* note 11, at 162–63; Lewinsohn-Zamir, *supra* note 11, at 1675.

162. For a description of Bentham's conception of well-being, see, for example, ADLER, *supra* note 11, at 162–63; Lewinsohn-Zamir, *supra* note 11, at 1675–76.

163. Lewinsohn-Zamir, *supra* note 11, at 1676; *see* Matthew D. Adler, *Happiness Surveys and Public Policy: What's the Use?*, 62 DUKE L.J. 1509, 1524 (2013) (describing a richer account,

recent years, there has been a growing interest within economics and psychology in the study of subjective well-being ("SWB"). Scholars in the field employ survey data to measure individuals' SWB—a composite measure of well-being, generally said to include a cognitive aspect of one's satisfaction with life and an affective aspect measured as the frequency of one's pleasant and unpleasant emotional experiences.[164] Based on such studies, some legal scholars have argued that law and policy should focus on helping individuals maximize SWB.[165]

The main shortcoming of an approach that equates human welfare with subjective experiences of positive feelings is the potential gap between the way a person feels and actual reality.[166] Correspondingly, many readers would probably share the intuition that "there is more to well-being than how our lives feel from the inside."[167] In this Article's context, while various past technological advancements have undoubtedly served an important role in minimizing human pain and suffering—and increasing opportunities to experience pleasure[168]—it seems rather simplistic to portray technology's contribution to human kind in hedonic terms only. Thus, while recognizing the importance of hedonic states as a major constituent of well-being,[169] this Article does not advocate embracing a mental-state criterion of well-being as the sole factor directing innovation. A more comprehensive concept—which views well-being as a combination of various factors, of which happiness only forms a part—seems more adequate.[170]

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under which "an individual's well-being depends not only upon her pains and pleasures, but also upon her attainment of high quality nonhedonic mental states (for example, having good memories, cognitions, or perceptions) and her avoidance of low-quality nonhedonic mental states").

164. For sources discussing "subjective well-being," see, for example, ADLER, *supra* note 11, at 165; Frank, *supra* note 104, at 1832; Hudders & Pandelaere, *supra* note 106, at 413.

165. For a prominent account of this approach, see generally BRONSTEEN ET AL., HAPPINESS & THE LAW, *supra* note 11; Bronsteen et al., *Happiness*, *supra* note 11; Bronsteen et al., *Well-Being Analysis*, *supra* note 11. *But see* Adler, *supra* note 163 (expressing skepticism as to the ability to rely on the results of surveys employed by SWB scholars).

166. *See, e.g.*, Lewinsohn-Zamir, *supra* note 11, at 1677 ("Well-being is determined not only by what we feel, but also by what we are and what we do in reality.").

167. *Id. See also* Derclaye, *supra* note 12, at 198 (maintaining that "happiness should not be the only goal of government"); Harsanyi, *supra* note 81, at 54 ("It is by no means obvious that all we do we do only in order to attain pleasure and to avoid pain.").

168. See *supra* note 107 and accompanying text.

169. *See, e.g.*, *infra* note 200 and accompanying text (supporting the use of studies regarding the impact of technology on SWB as an input for innovation policy under the proposed objective approach).

170. Notably, the principal policy measures recommended in this Article, *see infra* Part IV, may be found useful in advancing a hedonistic approach as well, although the adoption of such perspective would necessitate assigning a greater weight to SWB studies in formulating and

3. Objective Theories

This leads us to the final main theoretical approach: objective well-being. The objective approach conceives well-being as the fulfillment of a nonexhaustive list of qualities, which are *intrinsically* valuable for people ("objective list").[171] Under such an account, well-being is not reduced to mental states or to the satisfaction of preferences, but rather determined by objective external standards.

Overall, there is considerable agreement among various contemporary philosophers regarding the content of the objective list that the state should promote.[172] For instance, one value that is widely regarded by objective theorists as a basic constituent of well-being is autonomy and liberty, which include the ability to determine "one's own course in life and the freedom to act according to one's choices."[173] To attain autonomy and liberty one must, as a basic condition, be in a state of physical and mental health, which requires, among other things: adequate levels of nutrition, health, and sanitation; freedom from anxiety and pain; and sufficient material goods, such as shelter and household property.[174] Other qualities often incorporated in objective lists include: understanding or knowledge about oneself and about the world, accomplishment (of worthwhile goals), deep and meaningful social relationships, experiencing pleasure and satisfaction in different aspects of life, and being able to enjoy beauty or nature.[175]

Notably, the "goods" on the list are defined in a very broad manner, allowing sufficient flexibility and pluralism rather than prescribing a rigid, identical set of goods for everyone.[176] For example, various

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implementing innovation policy.

171. ADLER, *supra* note 11, at 165. *See also* GRIFFIN, *supra* note 74, at 40–55 (providing a general description of objective accounts of well-being); Lewinsohn-Zamir, *supra* note 11 (advancing an objective-welfare approach to property law).

172. *See* Lewinsohn-Zamir, *supra* note 11, at 1702 ("Although no unanimously agreed-upon list exists, there is considerable overlap between the various objective theories of well-being."). *Cf.* Fisher, *supra* note 12, at 1468 (noting that the sets of conditions commended by various visions of the "good life" are not identical, but "the overlap between them is striking"). As a specific example for an objective account of well-being, consider John Finnis's list, which includes life, knowledge, play, aesthetic experience, sociability, practical reasonableness, and religion. JOHN FINNIS, NATURAL LAW AND NATURAL RIGHTS 85–90 (1980). For other examples of objective lists offered by various contemporary philosophers, see ADLER, *supra* note 11, at 166–67. Amartya Sen's work on welfare is also often considered to rely on an objectivist conception. *See, e.g.*, ADLER, *supra* note 11, at 169; Bronsteen et al., *Happiness*, *supra* note 11, at 1602–03.

173. Lewinsohn-Zamir, *supra* note 11, at 1703–04.

174. *Id.* at 1704.

175. *Id.* at 1704–05.

176. *Id.* at 1706–07. *See also* GRIFFIN, *supra* note 74, at 54 (discussing the flexibility embedded

individuals can attain the value of accomplishment in very different ways.[177] In addition, it should be stressed that even under an objective theory, preferences and mental states are not entirely irrelevant.[178] As mentioned above, the value of autonomy and liberty is widely acknowledged as an objective good—which means that a person's desires regarding his or her own well-being matter a great deal—whereas pleasure is also commonly recognized as an important element of well-being. In other words, an objective theory still ties an individual's well-being to his or her own life experiences. But pleasures and desires are only part of the picture under an objective account—which ultimately assumes the ability to judge well-being by an external standard that is not necessarily dependent on a person's subjective preferences or experiences. Indeed, this feature of an objective theory forms the basis for the main argument against it. In constraining the role of subjective judgment—and implying that others might sometimes be better judges of another person's well-being—an objective theory of well-being could be said to invite less neutrality from the state in promoting people's welfare in a manner that might amount to excessive paternalism. After exploring the potential of adopting an objective theory of well-being as a basis for innovation law, this potential criticism shall be addressed.[179]

B. An Objectivist Theory of Technological Innovation

Due to the inadequacy of preferences and mental states to serve as satisfactory definitions of well-being, an objective criterion seems to be the most appropriate one for the state to employ in directing technological innovation. In the specific context of innovation policy, beyond the general advantages of such a comprehensive and holistic criterion over rival criteria, an objective criterion reinstates a concept of technological progress as a means to achieve valuable ends, rather than as an end in itself.[180] This might actually fit the basic intuition shared by many members of the public regarding technology. When asked how technology improves human life, people are likely to point to specific aspects in which technology enables them to live a better life—for

in an objective account).

177. Lewinsohn-Zamir, *supra* note 11, at 1707.

178. ADLER, *supra* note 11, at 167. *See also* Bronsteen et al., *Happiness*, *supra* note 11, at 1603 n.86 ("All objective accounts of welfare retain a substantial role for subjective experience."); Lewinsohn-Zamir, *supra* note 11, at 1701 ("Objective-theory advocates do not argue that people's preferences or pleasures are unimportant in assessing their well-being.").

179. *See infra* Part V.

180. *See supra* note 33 and accompanying text.

example, by advancing the state of medicine or by enabling cross-global communication. This point relates to a general notion associated with preferences (either actual or ideal) that has not yet been discussed. As pointed out by Daphna Lewinsohn-Zamir, equating "the good with the satisfaction of our wishes implies that the act of desiring confers value on the object of desire."[181] Yet, this is false. People want something because it is valuable to them for some external reason that generally precedes their desire.[182] When someone purchases a technological product, he or she does it because this product presumably has some value to him or her; but the mere decision to buy the product does not explain the *source* of the value. While preferences might serve as evidence for value, they do not always signal value in an accurate manner, as demonstrated above. Therefore, it is important to look beyond preferences and try to identify valuable technologies in a more direct manner. Embracing an objective theory of well-being as a foundation for innovation law would provide a theoretical framework where this exact type of inquiry could take place.[183]

On a conceptual level, embracing an objective criterion of well-being as a foundation to innovation policy means that one can no longer treat technological innovation in a so-called neutral way. Different innovative directions have different social values—and, hence, there is a need to find agreeable ways to evaluate such relative values, set an order of priorities, and provide incentives to innovate accordingly. As a starting point, it is important to agree on a list of "objective goods."[184] As explained above, the objective constituents of well-being can be widely agreed upon.[185] Hence, this initial stage in formulating an objective theory of valuable technologies should not pose great difficulty.[186]

Assuming the content of the "objective list" could be agreed upon, the system then ought to be designed in a manner that channels resources—

181. Lewinsohn-Zamir, *supra* note 11, at 1684.

182. *Id. See also* GRIFFIN, *supra* note 74, at 17 ("What makes us desire the things we desire, when informed, is something about them—*their* features or properties.").

183. Notably, this Article does not explore the potential role of IP rights as a means to attain "objective goods" from the inventor's perspective. While this is an interesting question that can have significant implications on the proper design of IP rights, *cf*. Fisher, *supra* note 12, the analysis herein stays within the traditional framework, which conceives IP rights as an instrument to produce utility (for others) and does not concern itself with the well-being of inventors and creators as such.

184. Whereas the values on an objective list, in and of themselves, cannot yield particular policy prescriptions, such list may still serve an important role as the overarching framework for formulating an objectivist innovation agenda. Subsequently, this Article shall discuss certain tools that can assist policy makers in making more nuanced decisions within such general framework.

185. *See supra* text accompanying note 172.

186. Adequate development of an objective account of well-being is clearly beyond the scope of an article on patent law.

to the maximum possible extent—toward innovations that have the greatest potential to enable individuals to attain such qualities. The challenge is to identify these welfare-enhancing technologies. At first glance, the fundamental values comprising an objective list might seem overly flexible and inclusive to allow such inquiry. While analyzing any innovative product or service, one could plausibly point out a potential link to one of the values on the list. Yet, in certain cases, it seems that direct value judgments could be made with a reasonable degree of conviction. Some types of technological advances in particular are clearly more "objectively" valuable than others in terms of their abilities to enable realization of the welfare-enhancing values on the list, and thus should arguably be assigned a higher priority under an objective approach.

This would be the case, for instance, in regard to certain advances in medical technology—which allow people suffering from illnesses to live healthier (and sometimes longer) lives, and thus enable them to preserve *autonomy and liberty*, while making it easier for them to attain other goods on the list as well.[187] As another case in point, consider innovations designed to assist people with disabilities. New research in robotics might result in solutions that would make disabled persons' lives much easier in a variety of ways.[188] Similarly, recent developments in the field of artificial vision already produce, and may continue to yield, a variety of solutions assisting the visually impaired.[189] Such technologies could facilitate ongoing enhancement of affected individuals' daily lives and significantly increase their chances to obtain various "objective goods"—including, for example, the values of *understanding*, *accomplishment*, and experiencing *pleasure*. Likewise, innovations aimed at reducing hazardous substances from consumer products—for instance, nontoxic cleaning materials—affect the health of individual

187. Clearly, some advances in the field may need to be assigned a much higher priority than others. For example, one cannot compare the utility involved in a new drug that treats an emerging global infectious disease to the one associated with a drug that is designed to alleviate the symptoms of seasonal allergy sufferers, particularly if the latter is a reformulation of existing drugs with only minor benefits in drug delivery and no increased therapeutic potential. For an argument that the current legal regime encourages pharmaceutical firms to focus on incremental innovations, rather than on breakthrough drugs, see Ho, *supra* note 27, at 12; Love & Hubbard, *supra* note 27, at 1520, 1523.

188. For example, a robotic wheelchair guided by the user's head movements might be able to assist elderly and disabled patients with limited hand functionality. For a detailed description of this project and various other examples, see *NIH Funds Robots to Assist People with Disabilities*, NAT. INSTS. OF HEALTH (Dec. 8, 2014), http://www.nih.gov/news/health/dec2014/nibib-08.htm.

189. *See, e.g.*, ORCAM, www.orcam.com (last visited Oct. 22, 2016) (describing a visual aid innovation that improves the lives of those that are seeing impaired).

users, and thus enable them to live better lives, while simultaneously benefitting the general state of the environment. As a general matter, innovations aimed at mitigating climate change—or otherwise improving the state of the environment—must be highly prioritized while setting an objectivist agenda for R&D, in light of their potential significant impact on the well-being of numerous individuals.

These examples of innovation categories that might have a particularly high potential to enable better lives are certainly not meant to be exhaustive. Most importantly, some of these innovations are not adequately incentivized under a system predicated on preference satisfaction, and hence the shift to an objective theory might have important practical implications.[190]

At the same time, certain innovative directions that receive strong encouragement under the current market-based approach should presumably be assigned a relatively low priority under an objective approach. This might be the case regarding certain types of luxury products—for example, newly improved versions of electronic gadgets—that could potentially face a highly inflated demand due to hedonic adaptation, relative preferences, and other factors discussed above. While the acquisition of such goods might offer an immediate sense of gratification and their use could allow people to perform some new functions and possibly make life more comfortable in various manners, they evidently fail to provide any lasting increase in well-being, and the link between them and the ability to attain the welfare-enhancing values on an objective list is arguably weaker. Thus, under an objective approach, the state might need to provide lower incentives to invest in the development of such products.[191]

Beyond prioritizing certain innovative directions relative to other endeavors, an innovation agenda predicated on an objectivist approach might also comprise some more general considerations. For example, in addition to the need to encourage the development of designated "green technologies," there might be a need to recognize environmental impact as a general factor to be weighed in connection with the state's decisions regarding innovation funding.[192] Another consideration that could play

190. This is the case, for example, with medications for diseases that primarily affect the poor. *See supra* note 49 and accompanying text (describing the underincentive to develop such medications under a market-based approach).

191. Notably, even under the approach advanced by this Article, incentives to invest in such endeavors may still exist and consumers may certainly opt to purchase the ensuing products and services. *See also infra* text accompanying note 273.

192. For a potential venue for such a consideration, see *infra* note 237 and accompanying text.

a role in setting an objective innovation agenda is the potential for a certain technology to serve as a basis for follow-on innovation. As noted above, the social value of an invention is often comprised not only of its stand-alone value, but also of its contribution to subsequent developments.[193] The potential to serve as a platform for future innovation exists—to some extent—with respect to any type of innovation. Yet, some inventions clearly have greater capacity to spur follow-on research and development. This is the case, for example, with respect to basic technologies that can serve as the foundation for a variety of applications in multiple technological fields.[194] A similar capacity is shared by "research tools," which are customarily defined as "products or processes used in research to investigate subjects other than the tools themselves."[195] When a prospective technology of this type is considered, the state should arguably be more generous in securing funding for its development in light of the difficulty to foresee the potential welfare-enhancing downstream developments relying on such technology.[196]

The directions identified above demonstrate certain potential applications of an objective welfare approach to innovation policy. Needless to say, forming direct value judgments regarding the ability of various technological advances to promote social welfare is not always an easy (or even feasible) task; and the values involved in comparisons between different potential R&D projects might often not be commensurable. Thus, it is important to attempt to develop some specific guidelines and decision-making procedures that could assist policy makers in formulating and implementing an objectivist innovation agenda in a consistent and coherent manner.

Among other things, it seems that assessing the input from a wide variety of sources could be useful in acertaining the social value of different technologies and prioritizing between potential R&D projects.

193. *Supra* note 54 and accompanying text.

194. *See, e.g.*, SCOTCHMER, INNOVATION, *supra* note 54, at 127–29, 132 (providing laser technology as an example for such basic technology); Carmen Matutes et al., *Optimal Patent Design and the Diffusion of Innovations*, 27 RAND J. ECON. 60, 60–61 (1996) (surveying other examples of basic technologies with a variety of applications).

195. Henrik Holzapfel & Joshua D. Sarnoff, *A Cross-Atlantic Dialog on Experimental Use and Research Tools*, 48 IDEA 123, 124–25 (2007–2008).

196. At the same time, while incentivizing the development of such technologies, the state should attempt preserving wide access to follow-on inventors. This concern supports incentivizing upstream research via nonpatent institutions. To the extent incentives are provided via the patent system, relevant patent doctrines should be harnessed to secure access. For a proposed policy reform designed to ensure such a result, see generally Tur-Sinai, *supra* note 32.

Such sources could include historical studies regarding observed impacts of various past technologies on human welfare as well as empirical (and other) studies exploring the effects that various contemporary technologies might have on individual users' well-being.[197] Studies of individual preferences could also be valuable as an indication for directions worth pursuing, though they should not have a decisive role under an objective theory of well-being.[198] In addition, as *pleasure* is a widely recognized component of human flourishing under an objective account of well-being,[199] data regarding the impact of various technologies on happiness or other components of SWB could be utilized as well.[200] Finally, it might be possible—with the assistance of experts in particular fields of technology—to identify specific indicators of social value that could be used to assess and compare different potential endeavors within such given fields.[201]

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197. See, for example, the studies referred to in *supra* note 114. For other works investigating the impact of current-day technologies on individual and social welfare, see generally TECHNOLOGY AND PSYCHOLOGICAL WELL-BEING (Yair Amichai-Hamburger, ed., 2009); THE GOOD LIFE IN A TECHNOLOGICAL AGE (Philip Brey et al. eds., 2012).

198. A method frequently used to estimate people's preferences for non-market goods is contingent valuation ("CV") surveys that ask people how much they would be willing to pay to receive the associated benefits. *See, e.g.*, Bronsteen et al., *Happiness*, *supra* note 11, at 1629 (discussing CV surveys). While various problems that apply to market preferences could attach to responses elicited by CV surveys as well (including, for example, the potential for mistakes resulting from the inherent prospectivity of preferences), individuals participating in such surveys may be less subject to the potentially distortive impact of certain factors present in the marketplace. At any event, studies indicating consumer preferences should not be accorded a conclusive weight under an objective welfare approach but rather be used in tandem with other indicators of social value. Arguably, if the chosen criterion of well-being were ideal preferences, then this measure would need to be assigned a greater weight.

199. *See supra* text accompanying note 175.

200. *See* ADLER, *supra* note 11, at 297 (noting that "happiness surveys could be used at the predictive stage: in predicting what outcome (or, more precisely, probability distribution over outcomes) a given policy is associated with"). As the scientific interest in the study of SWB grows, various new methods to measure happiness are being developed and employed by economists and psychologists. *See, e.g.*, Bronsteen et al., *Happiness*, *supra* note 11, at 1596, 1630 (arguing that by using such methods, governments could "measure and quantify the likely hedonic effects of potential projects and policies"). One of these particularly promising methods is the moment-by-moment experience sampling method. For further discussion of this method, see *id.* at 1596–97; Derclaye, *supra* note 12, at 183.

201. As an example, consider a bill proposed in 2005 for the creation of a fund to reward innovators who develop new pharmaceuticals. Under the bill, the size of the reward would be based upon evidence of certain parameters, including, *inter alia*: (1) the number of patients who benefit from the drug, (2) the incremental therapeutic benefit of the drug compared to existing drugs available to treat the same condition, and (3) the degree to which the drug addresses priority health care needs (as defined in the bill). The Medical Innovation Prize Fund Act of 2005, H.R. 417, 109th Cong. (2005). For a further discussion, see Hubbard & Love, *supra* note 27, at 1532–34. The bill was never enacted.

As a general matter—due to the dynamic nature of science and technology—the inquiry underlying an objective welfare approach to innovation policy must be of an ongoing nature, and constant fine tuning of policy measures might be warranted to produce satisfactory results. Notably, while formulating an objectivist innovation agenda, there might be differences between various countries that face different problems and have diverse needs and priorities.[202] Sure enough, individuals might receive a chance to be involved and impact a country's innovation agenda via participation in the political process, where their citizen preferences, rather than consumer preferences, come into play.[203]

The foregoing proposed guidelines are certainly not meant to be exhaustive,[204] and the challenges associated with developing and implementing an objective approach to innovation are largely left open for further exploration by scholars and policy makers. Despite the challenging nature of the inquiry, giving up on the attempt to formulate alternative measures of worth altogether could be highly unfortunate. A continued deliberation on the matter—fostered by this Article's proposed conceptual change—might yield creative solutions to the challenges involved in assessing the social value of technology.

To illustrate, one context from which one could potentially draw insights in developing measures for valuing innovations is the field of

202. Notably, in setting priorities among various innovative endeavors under an objective approach, the state could also choose to take into account certain non-utilitarian considerations, including distributive justice concerns. In fact, policy measures designed to maximize well-being according to an objective criterion may often address distributive concerns as well. *See* Lewinsohn-Zamir, *supra* note 11, at 1708–09. For an example of a context where the considerations under an objective-welfare perspective and a distributive-justice perspective may converge, at least to an extent, consider the Orphan Drug Act, Pub. L. No. 97–414, 96 Stat. 2049 (1983) (codified as amended in scattered sections of 21 U.S.C. and 42 U.S.C.). Orphan drugs are drugs that treat rare diseases. Because so few individuals are affected by such diseases, such drugs may only generate small revenues in comparison to R&D costs, which is why the state employs a special scheme in an attempt to secure incentives for their development. *See also supra* note 47. While generally justified in terms of distributive justice, the Orphan Drugs Act can also be explained in utilitarian terms once we shift to an objective criterion that recognizes the particularly high value of such drugs for the lives of affected individuals. *Cf.* Arti K. Rai, *Pharmacogenetic Interventions, Orphan Drugs, and Distributive Justice: The Role of Cost-Benefit Analysis*, 19 SOC. PHIL. & POL'Y FOUND. 246, 254–55 (2002) (employing a cost-benefit analysis and demonstrating that orphan drugs may, at times, produce health benefits that commensurate with their costs). At any event, the increased role of the state in directing innovation under an objective approach may allow factoring in distributive justice considerations more easily.

203. *See generally* Lewinsohn-Zamir, *supra* note 136 (discussing the distinction between citizen preferences and consumer preferences).

204. For additional proposals that focus more on the procedural aspects of the decision-making process, see generally *infra* Part IV. For instance, employing peer review under a grants scheme may enhance the ability to identify the most promising proposals. *See infra* note 231.

public health—where certain tractable metrics for welfare have been developed and implemented in making policy decisions. One such measure is the "quality-adjusted life year" ("QALY").[205] Under a QALY-based approach, a medical intervention is evaluated according to the additional life years it yields multiplied by a factor representing quality of life, which can range from zero (0) (representing a health state no better than death) to one (1) (representing perfect health).[206] Many Western countries use QALYs as a tool to evaluate the cost effectiveness of medical interventions to determine which ones should be covered under their national healthcare systems.[207] The QALY measure could potentially be used in connection with innovation policy as well, in facilitating a comparison between various R&D projects that address diverse medical conditions.[208] Similar metrics for welfare that consider other factors beyond health could potentially be developed in the future to assist policy makers in evaluating and prioritizing among various technological advances in other fields as well.[209]

Notwithstanding the early stage of the inquiry, Part IV of this Article explores certain normative implications that the shift to an objective criterion of well-being might entail.

IV. NORMATIVE IMPLICATIONS

As a general matter, an objective welfare perspective calls for a more interventionist approach.[210] To ensure better alignment between social values and incentives to innovate, the state should assume a greater role, not only in setting the agenda for innovative activity, but also in implementing such an agenda. This Part discusses two principal directions that might facilitate such increased involvement of the state in directing innovation: (1) according greater weight to alternative

205. For another similar measure, see Fischer & Syed, *supra* note 10, at 613–18 (discussing the World Health Organization's Disability Adjusted Life Years measure used to assess impact of diseases in the global health context).

206. *See, e.g.*, Jennifer D. Cape et al., *Introduction to Cost-Effectiveness Analysis for Clinicians*, 90 U. TORONTO MED. J. 103, 104 (2013).

207. Rai, *supra* note 12, at 127.

208. *See also infra* note 240 and accompanying text.

209. The World Health Organization's Quality of Life ("WHOQOL") index may serve as an example for a more comprehensive index, although it is doubtful whether it can be implemented on a policy level. For discussion, see Rai, *supra* note 12, at 126–27.

210. The analysis in *supra* Part II demonstrated that consumption does not necessarily advance happiness. Thus, a market-based platform cannot even be trusted to produce a signal that optimizes production under a hedonic account. The market mechanism is surely not sensitive enough to accommodate other concerns and promote other values encompassed in the more holistic definition of well-being entailed by an objective approach. *See also supra* note 130.

institutions designed to incentivize innovation; and (2) fine tuning the patent system itself.

To some extent, an objective well-being perspective for valuing technologies might constitute an existing feature of the system. The state already employs various mechanisms to incentivize innovation alongside the patent system.[211] When providing direct funding for different innovative projects, the government undoubtedly relies, to some extent, on the potential objective value of the innovations at hand.[212] In such instances, the objective theory of well-being might serve an important interpretive role by offering a general normative framework within which various policies and decisions could be grounded. Yet, the explicit embracement of objective standards of well-being as the basis for innovation policy mandates implementing such directions in a manner that is much more systematic, consistent, and encompassing.

A. Greater Reliance on Alternative Institutional Mechanisms

Patents are not the only available mechanisms to stimulate innovation.[213] One alternative is *prizes* (i.e., monetary rewards provided to the first person to deliver a specified invention).[214] Similar to patents, the reward under a prizes scheme is provided ex post (i.e., upon successful completion of the project).[215] Though prize administrators commonly fix the reward in advance,[216] various scholars have advocated for the use of sales data—or other proxies of the invention's actual impact—in setting the size of the prize.[217] Another alternative used to

211. *See, e.g.*, Hemel & Ouellette, *supra* note 36, at 316 (noting that the "federal government currently uses prizes, patents, grants, and tax credits to incentivize the invention and commercialization of new technologies").

212. This may be particularly true in respect of medical innovations, where calculations of disease burden are often used for purposes of a cost-benefit analysis. *See, e.g.*, Rai, *supra* note 202, at 258, 261.

213. For a discussion of alternative mechanisms, see generally Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115 (2003); Frischmann, *supra* note 55; Gallini & Scotchmer, *supra* note 44; Hemel & Ouellette, *supra* note 36; Steven Shavell & Tanguy van Ypersele, *Rewards Versus Intellectual Property Rights*, 44 J.L. & ECON. 525 (2001); Wright, *supra* note 4.

214. For sources discussing prizes as an incentive mechanism, see, for example, Gallini & Scotchmer, *supra* note 44, at 53; Hemel & Ouellette, *supra* note 36, at 311; Kapczynski & Syed, *supra* note 29, at 1904.

215. Hemel & Ouellette, *supra* note 36, at 308.

216. *Id.* at 318.

217. *See, e.g.*, Abramowicz, *supra* note 213, at 176–77 (discussing the advantages of basing rewards on sales); Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 Q. J. ECON. 1137 (1998) (proposing an ex post patent buyout mechanism that uses an auction in order to elicit information regarding the value of the invention); Shavell & van Ypersele, *supra*

incentivize production of information goods is *grants* or other forms of direct government funding via, for instance, cooperation agreements or procurement.[218] As a final example, the government can stimulate innovation by offering refundable *tax credits* for R&D.[219] Despite its robust use in practice,[220] this mechanism has largely been neglected in the literature that investigates innovation-funding schemes.[221]

While economists and legal scholars generally conceive patents as the primary means for promoting innovation,[222] in recent years there has been a reemerging scholarly interest in the foregoing alternative mechanisms.[223] As further explained below, the deficiencies of the preference satisfaction criterion of well-being support the need to afford a greater role to nonpatent incentive schemes within the innovation ecosystem. At the same time, the more the government uses such schemes in practice, the more vital it is to adopt a conceptual framework on which such practices can be based, and to continue the attempt to develop rigorous objective metrics for assessing the social value of technologies that would assist policy makers in their decision making.

The main virtue generally attributed to the foregoing funding mechanisms is their potential to finance innovation while avoiding the deadweight loss resulting from noncompetitive pricing of patented inventions.[224] Yet, one of the major difficulties associated with such

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note 213, at 541 (proposing the use of sales data by the government).

218. Under this category, the literature also typically addresses direct spending on research carried out by government agencies. *See, e.g.*, Frischmann, *supra* note 55, at 387–88; Hemel & Ouellette, *supra* note 36, at 320–21; Kapczynski & Syed, *supra* note 29, at 1904. For a survey of different forms of direct governmental funding of innovation, see generally Danielle Conway-Jones, *Research and Development Deliverables Under Government Contracts, Grants, Cooperative Agreements and CRADAs: University Roles, Government Responsibilities and Contractor Rights*, 9 COMPUTER L. REV. & TECH. J. 181 (2004–2005).

219. Hemel & Ouellette, *supra* note 36, at 309.

220. *Id.* at 306 (noting that "the United States and other industrialized economies dole out tens of billions of dollars' worth of tax credits each year for research and development").

221. For a recent thorough analysis of this mechanism, see *id*. *See also* Shawn P. Mahaffy, *The Case for Tax: A Comparative Approach to Innovation Policy*, 123 YALE L.J. 812 (2013). Another mechanism used by the state, particularly in the field of pharmaceuticals, is regulatory protection, primarily by means of data exclusivity. For a discussion, see, for example, Ho, *supra* note 27, at 495–99. The United States Congress has previously used data exclusivity to incentivize desired innovation in specific areas, such as drugs for children and antibiotics. *Id.* at 493 n.335.

222. *See supra* text accompanying note 36.

223. *See, e.g.*, Hemel & Ouellette, *supra* note 36, at 305 (describing this trend). One other possible approach to encourage production of knowledge that has recently gained much scholarly attention is common-based production. For simplicity reasons, this Article shall not discuss this approach.

224. *See, e.g.*, *id.* at 381 ("Prizes and grants also avoid the deadweight losses associated with patent monopolies."); Gallini & Scotchmer, *supra* note 44, at 54 ("Monopoly pricing is equivalent

mechanisms is the need for the government to allocate funding without access to information regarding the "costs and benefits of R&D investments."[225] As noted above, the common approach in the literature considers patents superior to other mechanisms in their ability to use private information to direct innovation.[226] In addition, direct government funding of innovation might involve the risks of politicization, regulatory capture, and mismanagement.[227]

But the informational advantage of the patent system over government-set awards might be overstated. The government certainly has a greater role under non-IP schemes; yet, decision makers have ample opportunity to retrieve input from researchers and industry players throughout the process. For instance, under a prizes scheme, the government generally sets innovation targets, but it does not dictate the specific directions that should be pursued in search of a solution and it leaves such directions open for exploration by the potential candidates themselves.[228] Even in setting targets, the government can employ a relatively low degree of specificity and permit creativity on behalf of innovators in choosing projects.[229] With respect to grants, researchers are typically invited to submit proposals for R&D projects under broad categories set by the administrator,[230] and various mechanisms—including, most importantly, peer review—are employed to identify the most promising proposals.[231] Interestingly, even Demsetz—in a not-

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to taxing a single market, which is generally thought to impose greater deadweight loss than the broad-based taxation that generates general revenue.").

225. Gallini & Scotchmer, *supra* note 44, at 54–55.

226. *See supra* text accompanying notes 40–44. *See also* Hemel & Ouellette, *supra* note 36, at 327 (summarizing the traditional argument according to which, "[g]overnment-set rewards are inefficient when the government cannot foresee a potential invention or evaluate its costs and benefits").

227. Hemel & Ouellette, *supra* note 36, at 327. *See also* Frischmann, *supra* note 55, at 361 n.45 (discussing the need to recognize public choice concerns regarding regulatory capture by special interest groups).

228. *Cf.* Kapczynski & Syed, *supra* note 29, at 1954 (distinguishing between setting innovation targets and finding the most promising lines of attack).

229. Admittedly, though, the lower the degree of specificity in setting the prize criteria, the more uncertainty market players have as to their chances to win the prize and, therefore, a lower incentive to assume the risk.

230. *See, e.g.*, Frischmann, *supra* note 55, at 388 ("Grants are often employed to support or stimulate innovation without a predetermined application or result in mind."); Gallini & Scotchmer, *supra* note 44, at 56 (noting that for medical research, the sponsor may solicit open-ended proposals). In instances where funding is dedicated in advance to highly specific causes, it is often the case that the government indeed holds superior information regarding the value of the project. Gallini & Scotchmer, *supra* note 44, at 55 (noting, as an example, the case of military wares, where the sponsor actually defines the investment's prospective value).

231. Peer review is central in funding decisions regarding basic research. As illuminated by

often-cited part of his seminal article advocating the superiority of the patent system—acknowledged that there are ways for governments to make informed decisions while funding innovation: "Surveys of scientists and managers could be taken and a weighting scheme could be applied to the opinions received; no doubt there are many other ways of making such decisions."[232] As to the risk of politicization and regulatory capture affecting the decision-making process, it should be noted that such concerns exist in the "patent district" as well, where the legislature is subject to intense pressure on behalf of interest groups.[233]

Most importantly, as this Article demonstrates, market demand—the main source of information that the patent system relies on in incentivizing information—does not accurately reflect social value. Once one recognizes the problems associated with the preference satisfaction criterion of well-being, the alleged informational advantage of the patent system seems all the more doubtful, and the justification for considering an increased role for alternative schemes becomes stronger. In fact, once moving from preference satisfaction to an objective criterion of well-being, government-set awards could have an advantage over a market platform in facilitating a greater role for the government in setting and implementing innovation policy.[234] Hence, what is generally considered a problem under the prevailing approach might hold promise under the proposed new framework.

Notably, this Article does not recommend substituting patents with government-set awards; yet, it does endorse increasing the weight assigned to these alternative schemes alongside the patent system to improve the link among incentives to innovate and their social value. The primary function of government-set awards should be to strengthen incentives to produce innovations that might be underincentivized by the patent system, either because of their own inherent characteristics or as a result of the overincentive provided by the patent system to other less

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Katherine Strandburg, while it "is widely seen as a mechanism of quality control," peer review "is also a mechanism for determining the scientific 'demand' for particular research projects." Strandburg, *supra* note 61, at 97, 119 n.17. This observation regarding the allocative role of the peer review process in regards to basic research may be applicable, at least to some extent, with respect to applied research as well.

232. Demsetz, *supra* note 41, at 12.

233. *See, e.g.*, Christopher M. Holman, *Biotechnology's Prescription for Patent Reform*, 5 J. MARSHALL REV. INTELL. PROP. L. 318, 325 (2006) (noting that the biotechnological industry is against virtually all of the major proposed reforms to patent law that would weaken patents or restrict the rights of patent holders); Jay P. Kesan & Andres A. Gallo, *The Political Economy of the Patent System*, 87 N.C. L. REV. 1341, 1353, 1359–61 (2009) (discussing the lobbying efforts on behalf of pharmaceutical companies in order to maintain a strong patent system).

234. *See supra* note 210 and accompanying text (regarding the need to increase the state's role in directing innovation under an objective approach).

valuable innovations.

Whereas the shift to an objective-welfare perspective supports an increased role for direct funding schemes, the existing use of such schemes by the state—which tends to be piecemeal—stresses the need to formulate an overall evaluative framework. The use of objective metrics for evaluating technologies—developed in accordance with the guidelines proposed in this Article, within the ambit of government-set awards—might improve the way the state employs these schemes by facilitating a more systematic and consistent framework for decision making. For example, the input of an objectivist innovation agenda can be instrumental in: setting targets within a prizes scheme; defining categories of research within which grants are available; and prioritizing research projects conducted in government laboratories.[235] Similarly, while R&D tax credits are generally broadly applicable, the state could potentially make tax credits only available in connection with R&D projects focused on specific causes—or, at the very least, the percentage of creditable research costs could vary by context.[236] In addition, to further an objectivist agenda, it might be advisable to set various criteria and conditions for government funding (e.g., a criterion related to the environmental impact of the technological innovation at hand).[237] Such factors could be incorporated, for example, into guidelines for peer review of grant applications and in award criteria for procurement auctions.

Finally, the measures used to calculate the size of the reward could also be adjusted in an attempt to ensure better correlation to social value. With respect to prizes, in particular, the reward could plausibly be determined ex post, by various proxies of the invention's actual impact.[238] Notably, under an objective well-being theory, caution should be employed in using sales data for this end.[239] Other assessments of ex post outcomes indicative of social value, which are not so directly linked to market demand, should be considered—for instance, observed outcome in terms of improved health, reduced environmental impact, or other relevant

235. For a nonexhaustive list of information sources and various considerations that may be used by policy makers in prioritizing among R&D projects, see *supra* notes 197–201 and accompanying text.

236. Hemel & Ouellette, *supra* note 36, at 332.

237. *See supra* text accompanying note 192.

238. *See supra* text accompanying note 217.

239. *Cf.* Kapczynski & Syed, *supra* note 29, at 1955–56 (discussing, in the context of the continuum of excludability, the need to sever measures of social value from reliance on sales data).

indicators.[240]

Clearly, the alternative institutions for incentivizing innovation are far from perfect, and each one has its own drawbacks.[241] This Article does not purport to resolve all problems associated with these schemes, but it certainly calls for further inquiry by scholars and policy makers to address the challenges at hand. In light of the grave deficiencies of a market-based approach, discussion of innovation policy cannot confine itself to the mechanics of IP law and adequate attention must be paid to the alternatives.[242]

B. Within Patent Law

The shift to an objective theory of well-being might call for certain revisions in the patent system itself to reduce some of the distortive effects resulting from its reliance on actual preferences. Patent law generally applies in a uniform manner to all technologies.[243] Nevertheless, as pointed out by Dan Burk and Mark Lemley, the patent statute includes many flexible legal standards that could be used by the courts as policy levers to take account of the varying needs of different types of innovations in different industries, and enhance the way the patent system deals with the wide range of technologies it covers.[244] In the context discussed herein, such policy levers could also potentially be harnessed to attain better correlation between incentives to innovate and social value.

One set of rules and doctrines that could prove important in correlating

240. In the context of medicine, for example, "quality-adjusted life year" ("QALY") or similar measures may be helpful. *See supra* text accompanying notes 205–208. *See also* Rai, *supra* note 12, at 128–30 (discussing the possibility of using a prize system that calibrates rewards based on the number of QALYs produced by the technology). For other possible considerations that may be relevant in determining the size of the reward in connection with medical innovations, see *supra* note 201.

241. Ultimately, optimal innovation policy is highly context-dependent, and the choice among various funding schemes is affected by a variety of considerations, only some of which are considered above. Other relevant factors are, for example, the timing of the reward, and whether it is funded only by direct beneficiaries, as in the case of patents, or by the general public, as in the cases of grants, prizes and tax credits. For discussion of these and other factors, see generally Hemel & Ouellette, *supra* note 36.

242. *Cf.* Kapczynski, *supra* note 36, at 1026 (encouraging the adoption of a broader frame of reference for IP scholars and policy makers).

243. *See, e.g.*, Burk & Lemley, *supra* note 1, at 1576–77 (noting that the patent statute creates a general uniform set of legal rules that is designed to govern a wide variety of technologies).

244. *Id.* As highlighted by Burk and Lemley, some of the patent levers operate at an industry-wide level, and some work at a case-by-case level, "treating some kinds of inventions differently than others without explicit regard to industry, but in a way that has disproportionate effects on certain industries." *Id.* at 1579.

incentives to innovate and social value are the ones that pertain to patentability. A possible direction could be making applicable patentability requirements more lenient in various manners to extend patent protection to certain valuable innovations that are currently nonpatentable—including various valuable "social innovations."[245] Yet, for several reasons, this solution cannot be recommended. First, many of such nonpatentable valuable inventions face low market demand and are more difficult to exclude than other types of information goods, and hence, the availability of patent protection would not provide a significant incentive to develop them.[246] Second, if one recognizes the high-social value of such innovations to maximize utility, one should aim to enable as many individuals as possible to benefit from them.[247] Thus, in light of the inherent restricted access entailed by patent protection, reliance on nonpatent mechanisms for incentivizing innovation might be preferable in such cases.[248]

Another direction could be to make the requirements for patentability more stringent to make it more difficult to secure patent protection over technologies with a relatively low social value. This would lower the incentive provided by the patent system to produce such technologies, so that more resources would ultimately be directed toward socially valuable innovations. One of the patentability requirements that could be particularly helpful in this regard is the utility requirement. Under the utility requirement, an invention must be *useful* to warrant patent protection.[249] This requirement has lost much of its force in the last several decades, except in certain limited contexts—notably in biology and chemistry.[250] To better align patent incentives with social value, a

245. See *supra* note 143 (regarding the concept of "social innovation"); Lee, *supra* note 4, at 43–45 (stating the reasons why such innovations are unlikely to satisfy current patentability requirements).

246. *See* Lee, *supra* note 4, at 45 (concluding, for said reasons, that patenting social innovations would be unlikely to generate significant revenues).

247. While this Article focuses on a utilitarian account of innovation, it should be noted that extending patent protection to the domain of social innovation might be very problematic from a distributive perspective as well. *Cf.* Kapczynski, *supra* note 36, at 1002–04 (noting that "some information goods are of such foundational importance to human freedoms and capabilities that . . . everyone should have them").

248. *See also* Lee, *supra* note 4, at 46–47 (explaining why patent protection would defeat the purpose and character of most social innovations, which are aimed at low-income populations).

249. 35 U.S.C. § 101 (2014).

250. *See, e.g.*, Burk & Lemley, *supra* note 1, at 1644 (noting that United States courts have permitted patents even on inventions that seem calculated to deceive, and that "[t]he PTO has permitted patents on a wide variety of seemingly frivolous inventions"); Michael Risch, *A Surprisingly Useful Requirement*, 19 GEO. MASON L. REV. 57, 58 (2011–2012) (describing the low level of utility an applicant must currently demonstrate to obtain a patent: "[T]he invention need

stricter standard of utility could perhaps be imposed, under which an applicant would need to demonstrate the potential of his or her invention to yield social benefits at a level exceeding a minimum threshold.[251]

A slightly different course that is worthy of careful consideration is to make certain patentability requirements—including the utility and nonobviousness requirements—more stringent in their application to specific categories of inventions that might be overincentivized under the current legal regime.[252] One such category of inventions could be improvements to existing consumer products.[253] Such products might already enjoy a heightened level of market demand as a result of various factors discussed above—including hedonic adaptation and the dependence of individual preferences on relative positions[254]—while their contribution to human welfare over existing products may not always be significant.[255] Applying more stringent patentability standards with respect to these type of inventions might reduce some of the market's distortive effects.[256]

One other, more concrete, proposal relates to the "nonobviousness" requirement for patentability.[257] Due to the difficulty to determine an

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only operate as described and potentially provide some de minimis public benefit").

251. The main challenge associated with this tentative proposal relates to the need to promulgate such standard in a sufficiently detailed manner that does not leave an undue level of discretion at the hands of individual patent examiners. It is not clear whether this is feasible.

252. For the ability to use legal standards included in the patent statute in a nuanced manner, see *supra* note 244 and accompanying text. For general background with respect to the nonobviousness requirement, see *infra* note 257.

253. For the ability to register a patent for an improvement, see 35 U.S.C. § 101 (2014).

254. *See supra* text accompanying notes 115–28. Market demand for such inventions may further increase as a result of marketing efforts designed to convince consumers to keep on buying new improved versions of the same technological products. *See supra* text accompanying note 122.

255. *See supra* note 191 and accompanying text. Surely, some improvements may include features with potential wide applicability in a variety of other products or serve as the basis for follow-on innovations. In such cases, the social value of the improvement is comprised not only of its stand-alone value, and this should be taken into account in designing the relevant patentability standards.

256. Discussion of the challenges associated with defining such heightened patentability standards is outside the scope of this Article. For a comparable proposal, made on different grounds, see Ted O'Donoghue, *A Patentability Requirement for Sequential Innovation*, 29 RAND J. ECON. 654, 654 (1998) (suggesting to heighten patentability standards in the context of sequential innovation in order to ensure longer market incumbency, and thus increase the level of profits that each innovator can make). An analogy could also potentially be drawn to copyright law, where courts have routinely subjected derivative works to a higher standard of originality. *See, e.g.*, Gracen v. Bradford Exch., 698 F.2d 300, 304–05 (7th Cir. 1983); Durham Indus., Inc. v. Tomy Corp., 630 F.2d 905, 910 (2d Cir. 1980); Batlin v. Snyder, 536 F.2d 486, 490 (2d Cir. 1976) (en banc); *but see* Schrock v. Learning Curve Int'l, Inc., 586 F.3d 513, 520–21 (7th Cir. 2009) (noting that derivative works are not subject to a heightened standard of originality).

257. For the nonobviousness requirement, see 35 U.S.C. § 103 (2014). Nonobviousness is often

invention's nonobviousness, courts have developed "secondary considerations"—various objective factors extrinsic to the technical features of the invention—that can assist in evaluating nonobviousness.[258] One of these secondary considerations is commercial success.[259] Yet, various scholars have criticized the use of commercial success as a proxy of the technical ingenuity embodied in the invention, noting that commercial success might result from a multiplicity of market-related factors that are not necessarily related to technical advancement.[260] To the extent that market demand is not strongly correlated with social value, as demonstrated in this Article, making patent protection more available for commercially successful inventions might also increase the already-existing distortive effect of the patent system on resource allocation for R&D.[261] Thus, from this perspective as well, it might be better to decrease the weight ascribed to market success to determine nonobviousness and focus on other measurements of technological ingenuity.

To prioritize inventions based on social value, it might also be possible to use, as policy levers, the rules and doctrines pertaining to the *features*

considered to be the most important requirement for patentability. Merges, *supra* note 93, at 812. Under this requirement, the invention must represent a technical advance that is not merely a trivial step forward in the state of the art. *See, e.g.*, Glynn S. Lunney, Jr. & Christian T. Johnson, *Not So Obvious After All: Patent Law's Nonobviousness Requirement,* KSR*, and the Fear of Hindsight Bias*, 47 GA. L. REV. 41, 42 (2012-2103) ("The whole point of the [nonobviousness] doctrine is to separate trivial advances from more substantial advances and to ensure that only the latter receive patents."); Merges, *supra* note 93, at 812 (noting that under the nonobviousness requirement, an invention must be a "big enough technical advance", it cannot merely be a "trivial step forward in the art").

258. Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17–18 (1966). For a discussion of secondary considerations, see, for example, Burk & Lemley, *supra* note 1, at 1651; Merges, *supra* note 93, at 816.

259. In fact, commercial success is often considered to be the most influential secondary consideration. Merges, *supra* note 93, at 823.

260. *See, e.g.*, Edmund W. Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 293, 332 (1966) (pointing out that the inferential chain from the fact of commercial success to the question of obviousness is long, complex, and easily broken); Lunney & Johnson, *supra* note 257, at 49–50 (noting that commercial success is not infallible evidence of nonobvoiusness); Merges, *supra* note 93, at 806 (maintaining that reliance on commercial success tends to reward superior distribution systems, marketing decisions, and service networks, instead of rewarding actual invention). *See also* Shur-Ofry, *supra* note 90, at 67–73 (using complexity studies to show that technologies possessing similar levels of technical advancement can differ significantly in their level of success not only due to different marketing factors, but also due to features of the social network in which they are diffusing).

261. *Cf.* Burk & Lemley, *supra* note 1, at 1652 (maintaining that the use of commercial success is weighted toward patents that cover entire products that are actually sold in the market, in contrast to upstream research tools or intermediary products).

of patent protection, rather than to its *availability*.[262] Among other things, it might be possible to harness, to this end, the rules governing patent scope, exceptions and limitations to rights of the patent holder, and remedies for patent infringement. Many of these rules and doctrines are structured as flexible legal standards and it might be possible to apply them in a nuanced manner that would favor more valuable innovations.[263] Finally, certain rules governing procedural aspects of patent registration—including fee schedules and fast-track prioritized examination procedures—might also be useful in prioritizing different types of innovations.[264]

The proposals outlined above—regarding both nonpatent mechanisms and the patent system itself—are only meant to serve as the starting point for discussion. Further elaboration of these and other potential directions is warranted as the objectivist framework of analysis continues to develop. In light of the tentative nature of the recommendations, this Article does not ascertain whether the proposed policy reforms conform to the requirements of the Agreement on Trade-Related Aspects of Intellectual Property Rights ("TRIPS")[265]—the primary international instrument governing the IP arena.[266]

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262. *Cf.* Ho, *supra* note 27, at 492 (suggesting that "perhaps there could be better tailoring of patent rewards" to produce more innovative drugs, rather than incremental pharmaceutical innovation).

263. Such tailoring, however, should be done very cautiously while balancing the potential positive impact of strengthening patent protection for more valuable technologies with the potential for increased costs in terms of restricted access to such innovations. *See also supra* note 196 and accompanying text. In addition, while making such reforms in patent doctrine, it is important to bear in mind that, as a general matter, there is no linear cause-effect connection between the scope of IP protection and the level of incentives provided by the system. *See* Shur-Ofry, *supra* note 90, at 96 ("The expectations that each increase in the scope of IP will lead to a proportionate increase in the level of innovation; that each limitation of that scope will result in a corresponding decrease in innovation; or that we can promote external socially desired values simply by limiting or calibrating the scope of intellectual property protection—are unrealistic.").

264. Consider, for example, the decision of a number of national IP offices across the world to implement measures to fast-track "green" patent applications. *See, e.g.*, Antoine Dechezleprêtre and Eric Lane, *Fast-Tracking Green Patent Applications*, WIPO MAG. (June 2013), http://www.wipo.int/wipo_magazine/en/2013/03/article_0002.html (discussing the various programs in place).

265. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 33 I.L.M. 81 [hereinafter TRIPS].

266. In general, it seems that the proposed measures could be implemented in a manner that would not violate the international framework. TRIPS mandates that patents shall be available for any inventions meeting the requirements for patentability and prohibits member states from discriminating in the grant of patents based on "the field of technology." TRIPS, *supra* note 265, at art. 27(1). It does not prohibit, though, tailoring of patent protection based on the specific needs of various industries. In practice, both in the United States and in Europe, various industry-specific

V. POTENTIAL CRITICISM

Before concluding, it is worth addressing the main potential lines of criticism against this Article's proposal to embrace an objective criterion of well-being as the basis for innovation law and policy. First, some readers might contend that the objective theory of welfare advanced herein is inherently paternalistic, as it is premised on the notion that a person's well-being is not necessarily determined according to his or her own judgment.[267] Regarding the specific context of innovation law discussed herein, critics may stress that an objective welfare perspective invites less neutrality from the state in setting the direction of innovation and could result in undue government interference in the market.

This Article undeniably calls for greater state involvement. This is justified in light of the deficiencies of the preference satisfaction criterion and the distortive effects on incentives to innovate caused by an unfettered reliance on the market.[268] Yet, this Article does not advocate an extreme interventionist approach. While an objective theory of well-being constrains the role of individual preferences, it is far from being excessively paternalistic. As noted above, the "goods" on an objective list are typically defined in a very broad manner, leaving room for sufficient flexibility, rather than prescribing a uniform conception of the "good life" that would fit everyone.[269] Moreover, even in the context of an objective theory of well-being, a person's desires and sense of enjoyment have significant weight.[270] In the setting discussed herein, such a flexible and pluralistic perception of well-being can, and should, be reflected in how the state formulates its objectivist agenda and sets

rules have been enacted over the years. *See, e.g.*, Burk & Lemley, *supra* note 1, at 1634 (noting the existance of such industry-specific rules). In fact, the proposals made in this Article do not necessarily require a differential treatment by "field of technology," rather than by the specific attributes of the invention at hand. In regards to alternative mechanisms for incentivizing innovation, to the extent they are used as supplements to the patent system, the TRIPS does not pose any barrier. While using such mechanisms as substitutes for patent protection might be more problematic, international law does not prevent it so long as the option of registering a patent remains available and the substitutes are merely voluntary. For a discussion, see Hemel & Ouellette, *supra* note 36, at 370 (noting, for example, that the availability of prizes or grants could be conditioned on an innovator's consent to forgo patent protection or settle for a shorter patent life).

267. *See* Lewinsohn-Zamir, *supra* note 11, at 1710 (noting that an objective theory of well-being can be accused of paternalism).

268. *See supra* Part II.

269. *See supra* notes 176–177 and accompanying text.

270. *See supra* note 178 and accompanying text. *See also* Lewinsohn-Zamir, *supra* note 11, at 1710 (discussing the weight of autonomy, free-will and pleasure under an objective theory).

priorities among various types of innovations.[271]

Most importantly, while an objective theory contends that the best criterion of well-being has significant objective dimensions, it does not mandate interference with individuals' choices to coerce such standards.[272] In the context discussed herein, embracing an objective perspective mandates that the state reevaluate its macro policy regarding innovation funding, but does not call for the adoption of any measures that would amount to regulation of consumer behavior. Under this Article's thesis, to promote the well-being of its constituents, the state should make an effort to channel resources to innovative projects that would generate the most socially valuable technologies. But even if the proposed policy reforms that are designed to balance market distortions are adopted, the state would not have absolute control over the direction of innovative activity, and incentives to invest in innovative projects with a relatively low social value might still be generated, either by the market or outside of it.[273] Most certainly, individual consumers could continue to exert free choice in deciding which products available in the market to purchase.

As to the argument that the proposed approach invites undue government intervention, it is also important to note that the patent system, to begin with, is far from being a regulation-free zone. As noted by William Fisher and Talha Syed, "the shape of all markets is already heavily influenced by state action," and in fields covered by the patent system, in particular, the market is "heavily shaped by the state."[274] Governments establish patent systems as a way to incentivize innovation

271. *See, e.g.*, *supra* text accompanying notes 198–200 (discussing the possibility of using studies of individual preferences and SWB surveys when formulating an objectivist innovation agenda).

272. Lewinsohn-Zamir, *supra* note 11, at 1712. *See also* Zamir, *supra* note 64, at 241 n.32 ("Rejection of actual preferences as a measure of well-being is typically grounded on the realization that people's actual preferences are frequently not in accord with their best interest. Such rejection does not necessarily entail the endorsement of paternalism."). *Cf.* Oren Bracha & Talha Syed, *Beyond Efficiency: Consequence-Sensitive Theories of Copyright*, 29 BERKELEY TECH. L.J. 229, 256 (2014) (noting that theories of human flourishing do not go "so far as to dictate the details of individual or collective choices," but rather seek to foster social conditions conducive to flourishing lives).

273. *See supra* note 28 (noting various examples of nonmarket incentives).

274. Fisher & Syed, *supra* note 10, at 675, 677. *See also* Subha Ghosh, *Patent Law and the Assurance Game: Refitting Intellectual Property in the Box of Regulation*, 19 CAN. J.L. & JURIS. 307 (2005) (explaining how patent law regulates the invention process and the market for innovative products); Mark A. Lemley, *IP and Other Regulations* (Stanford Law & Econ., Working Paper No. 476, 2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2589278 ("IP laws are deliberate government interventions in the market.").

in light of the free rider problem associated with information goods.[275] Thus, by design, the patent system interferes with the free market, and its very purpose is to affect resource allocation. While seemingly extending its protection uniformly to "anything under the sun that is made by man,"[276] the patent system is anything but neutral in its application to various technologies. Among other things, the effectiveness of patent incentives inherently depends on multiple factors that vary widely by industry and by invention.[277] Moreover, by setting patentability criteria, the state takes a stance on the question of what is worthy of protection.[278] In addition, as noted above, patent law includes many flexible standards, which are operated by courts in a nuanced manner with respect to different technologies.[279] On a more fundamental level, as demonstrated in this Article, the reliance of the patent system on market demand tends to favor certain types of innovations, while underincentivizing others.[280] Hence, no choice by the state in this context is truly neutral.[281] In light of all the above, this potential line of criticism—which focuses on the alleged paternalistic nature of the objective approach—seems largely misplaced.

A second line of criticism could doubt the practicability of the proposed objectivist approach for innovation policy. The argument might stress that the very nature of technological innovation precludes the possibility of performing accurate ex ante evaluations of its social value. Lacking concrete evidence, a decision maker, entrusted with the task of assessing the potential value of different inventions, would inevitably have to engage in guesswork and speculation. Moreover, it is not clear how one is expected to prioritize between various technological prospects based on their potential value for mankind, without injecting

275. *See supra* text accompanying notes 22–23.

276. Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980). *See also supra* note 243 and accompanying text.

277. Burk & Lemley, *supra* note 1, at 1580–89.

278. *Cf.* Shlomit Yanisky-Ravid, *Eligible Patent Matter—Gender Analysis of Patent Law: International and Comparative Perspectives*, 19 AM. U.J. GENDER SOC. POL'Y & L. 851, 859 (2011) (stressing, in the context of a feminist analysis of patent law, that "patent law does not provide protection for all products and processes equally, but only for those products or processes that the law itself defines as worthy of protection").

279. *See supra* text accompanying note 244.

280. For instance, the patent system disfavors innovation for the poor. *See supra* text accompanying notes 47–49. *See also* Lee, *supra* note 4, at 6–7 (stressing the nonneutrality of markets and arguing that "a market-based framework for driving innovation will not adequately address the needs of the poor and underprivileged").

281. *See* Boyle, *supra* note 7, at 111 (noting that the state already implicitly selects among types of innovation).

some subjective value judgment. Thus, even if a market mechanism is imperfect, there may not be a workable alternative solution. To paraphrase Winston Churchill on the subject of democracy, a market-based platform might be a very bad way to incentivize innovation, except for everything else that has been, or could be, tried.[282]

Indeed, this Article acknowledges the challenges associated with developing and implementing an objective approach to innovation, and to a large extent, already takes such challenges into account.[283] Most importantly, this Article does not doubt the necessity of some degree of reliance on the market in incentivizing innovation, and accordingly, it does not advocate abolishing the patent system. What this Article does call for, first and foremost, is a conceptual change. Based on its exploration of the deficiencies of preference satisfaction as a criterion of well-being, this Article encourages the embracement of a new outlook—which relies on an alternative criterion of well-being—as the foundation for innovation policy. On a practical level—to the extent the state already funds innovation outside the realm of the patent system—such new conceptual framework might actually improve the way the state employs such schemes, by providing a uniform rationale that could serve as a basis for policy making. Nonetheless, this Article also encourages increasing the weight of such alternative mechanisms to supplement and adjust patent incentives; and by doing so, this Article stresses the importance of developing rigorous metrics for evaluating R&D projects. Such metrics are also needed to implement the proposed reforms to the patent system itself. To formulate such metrics, further deliberation on the matter—based on the initial inquiry conducted in this Article—is clearly warranted.

In the end, this Article seeks to encourage scholars and policy makers to attend to fundamental questions regarding the social value of innovation that have been largely ignored thus far. At the same time, it also sets a theoretical framework for deliberating such questions, while proposing various directions, guidelines, and sources of information that might be used for that matter. The objectivist approach that this Article proposes surely does not need to be adopted all at once, and could rather be implemented in a gradual fashion following a process of

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282. Winston Churchill declared in 1947 that "it has been said that democracy is the worst form of Government except all those other forms that have been tried from time to time." LITTLE OXFORD DICTIONARY OF QUOTATIONS 100 (Susan Ratcliffe, ed., 5th ed. 2012).

283. *See supra* notes 193–196 (regarding the need to account for the difficulty to foresee, in advance, which innovations will be developed in the future based on an existing technology). *See also supra* note 255.

experimentation with various funding schemes and different metrics for welfare—employed, at first, in discrete technological domains.[284]

On a final note, it is important to stress that even readers who might not feel comfortable with the objectivist approach for innovation policy proposed in this Article—or with the specific policy measures recommended herein—could find the critique of the prevalent preference satisfaction criterion useful. At the very least, acknowledging the dissonance between market value and social value should have an impact in policy debates regarding proposals to extend or expand patent protection.

CONCLUSION

Philosophers and legal theorists extensively debate the question of which criterion of well-being the state should adopt. In the context of innovation law and policy, however, this question is seldom discussed, and the law-and-economics approach—equating well-being with preference satisfaction—prevails. The reliance of the patent system on the market allows policy makers and scholars to avoid dealing with the need to evaluate technologies based on their social value. Technological progress is commonly viewed as an end in itself, and the incentives provided by the system are designed to generate future goods that current market participants would value the most.

This Article demonstrates the shortcoming of this narrow perspective. It identifies and criticizes the implied choice of preference satisfaction as the criterion of well-being underlying innovation theory and policy making. For various reasons explored above, the mere fact that a future technology is likely to have demand in consumer markets does not necessarily imply that said technology would enhance the well-being of its users in any significant manner, and that it is therefore worthwhile for the state to incentivize its development. This conclusion is reinforced when considering the alternative investments to which the resources invested in the development of such technology could have been allocated.

To better align incentives with social value, this Article proposes a conceptual shift to an objective theory of well-being. The adoption of such a new perspective as the foundation for innovation law and policy might have important normative implications. Among other things, the shift to an objective welfare perspective bolsters the arguments in favor of direct government funding of innovation. In addition, to implement

284. *See generally* Lisa Larrimore Ouellette, *Patent Experimentalism*, 101 VA. L. REV. 65 (2015) (discussing policy experimentation in the context of patent law).

an objectivist agenda, certain reforms may be warranted in the patent system itself.

Ultimately, this Article calls for a greater state involvement in directing innovation. The formulation of a framework enabling the state to pursue such a role in a systematic and coherent manner is undeniably an ambitious enterprise. This Article undertakes a first step in this endeavor, by stressing the importance of pursuing this direction and setting initial guidelines that might serve as a solid foundation for others to build upon.