Technological Self-Sufficiency and the Role of Novelty Traps

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ABSTRACT

The COVID pandemic has demonstrated the tragic consequences of technological dependency. Unable to manufacture vaccines for themselves, developing countries must rely on obtaining supplies from other nations. While strong arguments have been made to waive international obligations under the TRIPS Agreement to permit these countries to freely use COVID-related patented inventions, it is not clear that this move would produce sufficient vaccines to meet global demand. Considerable scholarship has been devoted to the question of how to help these countries reach the technological frontier and become technologically independent. In this Article, we identify a novel source of their problem: a structural feature of modern patent law traps technologies in a legal limbo, where there are inadequate incentives to invest in the adaptations and efforts needed to make technologies effectively available in low-income countries. Moreover, the current regime deprives potential innovators of an opportunity to protect their intellectual contributions and begin to build robust innovative ecosystems. The Article proposes a modified patent regime designed to

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break what we call the "novelty trap" and discusses its compatibility with international intellectual property law.

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I. INTRODUCTION

If there is one thing that the COVID pandemic has taught us, it is the value of technological self-sufficiency. Technologically sophisticated countries are pulling themselves out of the coronavirus crisis.[1] They do so by developing, manufacturing, and distributing the inventions needed to test people for SARS-CoV-2, including its variants, and to trace, cure, and immunize the local population.[2] Nations that lack the appropriate resources are not faring as well.[3] In India, for

1. *See, e.g.*, *Covid-19: The Global Crisis — in Data*, FIN. TIMES (Oct. 18, 2020), https://ig.ft.com/coronavirus-global-data/ [https://perma.cc/4FUM-QFTZ] [hereinafter *Covid-19: The Global Crisis*].

2. *See, e.g.*, Shawn Radcliffe, *Here's Exactly Where We Are with Vaccines and Treatments for COVID-19*, HEALTHLINE (Jan. 25, 2022), https://www.healthline.com/health-news/heres-exactly-where-were-at-with-vaccines-and-treatments-for-covid-19 [https://perma.cc/XYQ3-5VBT].

3. *Covid-19: The Global Crisis*, *supra* note 1.

example, the disease raged on long after developed countries had stockpiled the materials needed for treatment and had immunized a significant portion of their residents.[4] Blaming their fate partly on a global intellectual property regime that blocks access to supplies at prices they can afford, low-income countries demanded that the World Trade Organization (WTO) waive their obligations under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) to protect patents and trade secrets.[5] Waiving their obligations, the low-income countries claimed, would allow them to suspend their patent laws, manufacture the products they need to deal with the pandemic, and make those products available at cost or prices that do not include the payment of royalties to right holders.[6] Although many countries joined in this initiative,[7] it was never clear that a waiver would constitute an effective response. As the Max Planck Institute argued, shortages in supplies were largely caused by the insufficiency of worldwide production capacity.[8] That problem, the Institute suggested, did not stem from patents or other forms of intellectual property protection but rather from the paucity of manufacturing know-how and technical infrastructure in many low-income countries.[9]

There is, however, a way in which intellectual property law was a core obstacle to universal delivery of the material needed to contain the coronavirus. As currently structured, the international intellectual

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4. Jeffrey Gettlemean & Suhasini Raj, *Covid Desperation Is Spreading Across India*, N.Y. TIMES, https://www.nytimes.com/2021/05/11/world/asia/covid-india-ganges-oxygen.html [https://perma.cc/LF4U-JQW5] (May 13, 2021).

5. Agreement on Trade-Related Aspects of Intellectual Property Rights art. 31, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 313 (1994) [hereinafter TRIPS]; Communication from India and South Africa, *Waiver from Certain Provisions of the TRIPS Agreement for the Prevention, Containment, and Treatment of COVID-19*, WTO Doc. IP/C/W/669 (Oct. 2, 2020), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/IP/C/W669.pdf&Open=True [https://perma.cc/EB45-FTTV] (asking, in the face of a "global emergency" for "a waiver from the implementation, application and enforcement of Sections 1, 4, 5, and 7 of Part II of the TRIPS Agreement", paras. 3, 12) [hereinafter Communication].

6. Communication, *supra* note 5.

7. *See, e.g.*, *Statement from Ambassador Katherine Tai on the Covid-19 TRIPS Waiver*, U.S. TRADE REPRESENTATIVE (May 5, 2021), https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/may/statement-ambassador-katherine-tai-covid-19-trips-waiver [https://perma.cc/S9RT-28XA].

8. Reto M. Hilty, Pedro Henrique D. Batista, Suelen Carls, Daria Kim, Matthias Lamping & Peter R. Slowinski, Max Planck Inst. for Innovation & Competition, *Covid-19 and the Role of Intellectual Property: Position Statement of the Max Planck Institute for Innovation and Competition of 7 May 2021* at 2 (Max Planck Inst. for Innovation & Competition, Research Paper No. 21-13, 2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3841549 [https://perma.cc/SD6F-4WEQ] (click "Open PDF in Browser").

9. *Id.*

property system makes it difficult for countries to acquire the capabilities necessary to develop modern technologies, to adapt them to local conditions, or even to simply manufacture and disseminate them.[10] In this Article, we identify for the first time an important source of that problem: the emergence of an absolute standard of novelty.[11] Under this standard, no country will award a utility patent to an invention that was disclosed in, or rendered obvious by, prior art available anywhere in the world—that is, if the elements of the invention were published, patented, or even simply practiced in any place, regardless of its local accessibility.[12] As we explain, that standard traps technologies that could improve social welfare in a no man's land where there are inadequate incentives to do the work needed to make, distribute, and use them.[13] Hence our label: the novelty trap.[14]

For developed countries in the North, this high standard of novelty largely makes sense. As long as the people working in a field have the absorptive capacity to learn from publicly disclosed materials, one can assume that they will identify promising technologies, make any incremental changes needed to promote their domestic use, and develop distribution networks.[15] Moreover, it is likely that customers in these countries will be receptive to—indeed, eager for—advanced technologies, have the funds to buy them, and possess the complementary assets, such as electricity and refrigeration, needed to adopt them.[16] Thus, one can also assume that customer demand will provide an impetus to innovate.[17] Although incentives to commercialize

10. For a collection of essays on this impact of exclusive rights, see INTELLECTUAL PROPERTY RIGHTS: LEGAL AND ECONOMIC CHALLENGES FOR DEVELOPMENT 5 (Mario Cimoli, Giovanni Dosi, Keith E. Maskus, Ruth L. Okediji, Jerome H. Reichman & Joseph E. Stiglitz eds., 2014); *see also* DANIEL BENOLIEL, PATENT INTENSITY AND ECONOMIC GROWTH 36–38 (2017) (discussing the challenge of capacity building in developing countries).

11. *See* World Intell. Prop. Org. [WIPO], *Information Provided by the Members of the Standing Committee on the Law of Patents (SCP) Concerning the Definition of Prior Art Brief Summary*, ¶ 6, WIPO Doc. SCP/6/INF/2 (Nov. 2, 2001) (reviewing the prior art policies of forty-nine countries; noting that in a large majority, disclosure anywhere in the world is sufficient to constitute prior art).

12. *See infra* text accompanying notes 75–79.

13. *See infra* text accompanying notes 86–90.

14. Empirical evidence on the impact of the novelty trap will be presented in another paper. *See* Daniel Benoliel & Michael Gishboliner, *Novelty Traps, Kiwis, and Other Flightless Birds*, 2020 MICH. ST. L. REV. (forthcoming 2022), https://law.haifa.ac.il/wp-content/uploads/2022/03/Novelty-Traps-law-rev.pdf [https://perma.cc/87QZ-64TV].

15. Shaker A. Zahra & Gerard George, *Absorptive Capacity: A Review, Reconceptualization, and Extension*, 27 ACAD. MGMT. REV. 185, 196–97 (2002).

16. *See, e.g.*, Nir Kshetri, *Barriers to E-Commerce and Competitive Business Models in Developing Countries: A Case Study*, 6 ELEC. COM. RSCH. & APPLICATION 443, 444 (2007).

17. *Cf.* Stanley L. Engerman & Kenneth L. Sokoloff, *Factor Endowment, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic*

may sometimes be desirable,[18] patent law generally focuses on inducing inventions that would not be created otherwise through the skills of ordinary industrialists and artisans in the field, subject to conventional market forces.[19]

For developing countries in the Global South, however, these assumptions do not always hold. "State-of-the-art" patentable inventions, of the type prevalent in Northern countries, are often beyond the reach of local technologists.[20] While indigenous inventors may be in a position to make "low-end" advances ("good enough" technologies by the poor, for the poor,[21] such as appliances that work without a steady supply of electricity) truly effective use of foreign technology would take considerable effort.[22] What might be called "midlevel inventiveness" can be needed for diffusion—to build factories capable of manufacturing high-tech products, adapt inventions made in developed countries to local conditions, supply complementary assets,

Historians of the United States, *in* MODERN POLITICAL ECONOMY AND LATIN AMERICA: THEORY AND POLICY 122 (Jeffrey Frieden, Manuel Pastor Jr. & Michael Tomz eds., 2000) (noting how the US middle class's demand for standardized goods affected inventive activity and technological change).

18. *See, e.g.*, Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 388–89 (2010).

19. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 402–03 (2007); Michael Abramowicz & John Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1601–02 (2015).

20. Xiaolan Fu & Jing Zhang, *Technology Transfer, Indigenous Innovation and Leapfrogging in Green Technology: Solar-PV Panel Industries in India and China*, 9 J. CHINESE ECON. & BUS. STUD. 329, 332–33 (2011).

21. *See* Richard Heeks, Christopher Foster & Yanuar Nugroho, *New Models of Inclusive Innovation for Development*, 42 J. INNOVATION & DEV. 175 (2014) (discussing inclusive innovation as a policy lever for development); *Beijing Forum Promotes Inclusive Innovation for Sustainable Growth*, THE WORLD BANK (June 21, 2012), https://www.worldbank.org/en/news/feature/2012/06/21/beijing-forum-promotes-inclusive-innovation-for-sustainable-growth [https://perma.cc/QR32-3NKH] (discussing the spread of inclusive innovation in emerging markets); JULIO A. BERDEGUÉ, INT'L FUND FOR AGRIC. DEV., PRO-POOR INNOVATION SYSTEMS 1–11 (2005), http://www.lamolina.edu.pe/postgrado/pmdas/cursos/innovacion/lecturas/Obligatoria/3%20-%20Berdegue%202005.pdf [https://perma.cc/H5LF-ARAG] (discussing inclusive innovation in agriculture in developing countries).

22. For the definition of diffusion as used by innovation theorists, see, e.g., Bronwyn Hall, *Innovation and Diffusion*, *in* THE OXFORD HANDBOOK OF INNOVATION 459–60 (Jan Fagerberg, David C. Mowery & Richard R. Nelson eds., 2006) [hereinafter INNOVATION HANDBOOK] ("[T]he word diffusion is commonly used to describe the process by which individuals and firms in a society/economy adopt a new technology, or replace an older technology with a newer . . . it is also an intrinsic part of the innovation process, as learning, imitation, and feedback effects which arise during the spread of a new technology enhance the original innovation.").

educate and train the domestic market, and create systems to distribute products and build demand.[23]

Unfortunately, it is precisely the type of advances necessary that are most likely caught by the novelty trap: because the basic technologies are already known, the incremental changes inventors would wish to make are not always patentable. Yet without adequate incentives to diffuse Northern technology, the activity necessary to do so will be inefficient, if not entirely absent. If that is the case, the social welfare gains associated with the use of foreign technology will not be realized. Moreover, without an incentive system geared to local inventive capacities, the ecosystem required to support entrepreneurship and risk-taking, human capital formation, as well as capital accumulation and investment, is likely to be inadequate. The result is that developing countries will tend to remain technologically dependent on developed ones, and the likelihood is that inventions of importance to the South will not be adapted or produced. Examples include COVID vaccines, which may be scarce and, as formulated for the North, can be difficult for nations in the South to make, store, and transport;[24] plants that grow in the arid environments characteristic of many low-income countries;[25] and agricultural technologies, such as harvesters, adapted to local conditions.[26]

There are many actions a country that is behind the technological frontier might take to become technologically self-sufficient—a term that we use to encompass acquiring the capacity to absorb foreign technologies, produce these advances, and make effective use of them, with the objective of reaching the point where the country is inventing at the global knowledge frontier, at least in sectors

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23. *See* World Bank Group [WBG], *Global Economic Prospects: Technology Diffusion in the Developing World*, at xi, WBG Doc. 42097 (2008), https://documents1.worldbank.org/curated/en/827331468323971985/pdf/42097optmzd0REVISED0GEP020081PUBLIC1.pdf [https://perma.cc/9P9J-YGSN] [hereinafter *2008 World Bank Report*].

24. Joselyn Kaiser, *Temperature Concerns Could Slow the Rollout of New Coronavirus Vaccines*, SCI. (Nov. 16, 2020), https://www.sciencemag.org/news/2020/11/temperature-concerns-could-slow-rollout-new-coronavirus-vaccines [https://perma.cc/DWR4-FZY3].

25. *See, e.g.*, Ronald Herring, *Stealth Seeds: Bioproperty, Biosafety, Biopolitics,* 43 J. DEV. STUD. 130, 131 (2007) [hereinafter *Stealth Seeds*].

26. *Cf.* Gregory Graff & David Zilberman, *How the IP-Regulatory Complex Affects Incentives to Develop Socially Beneficial Products from Agricultural Genomics, in* INNOVATION IN AGRICULTURAL GENOMICS 68 (Emily Marden, R. Nelson Godfrey & Rachael Manion eds., 2016) (discussing the dearth of drought-tolerant genetic technology); GOV'T OF PUNJAB, HUMAN DEVELOPMENT REPORT 171 (2004) [hereinafter PUNJAB DEVELOPMENT REPORT] (describing the steps taken to achieve a "Green Revolution").

of local priority.[27] We see as one key to that endeavor the introduction of a second-tier regime of patent protection. A second-tier regime would be designed to break the novelty trap and release innovative opportunities for local inventors. In essence, we recommend that developing countries create, as a supplement to utility patents, a new and distinctive intellectual property right, which we term "diffusion patents." These rights would be loosely analogous to pre-TRIPS patents of importation and would incentivize the efforts necessary for a country to reach technological self-sufficiency.[28] To that end, we recommend three changes to the novelty, inventive step, and disclosure requirements of patent law.[29] First, and most important, we would define the landscape against which the novelty and inventiveness of a technology is determined to exclude art that is not patented (or perhaps simply not worked) locally. Second, we would modify the inventive-step inquiry by focusing on the skills of the ordinary local artisan. Third, we suggest adapting the disclosure requirements of patent law to respond to the capacities of domestic inventors. In addition, we consider various implementation issues, including narrowing the scope of protection, restricting the availability of the regime to inventors from low-income countries, and imposing price controls.[30]

This Article proceeds as follows. Part II elaborates on the reasons that diffusion patents would mitigate technological dependency. Part III describes the novelty trap in greater depth and discusses the details and advantages of a diffusion patent regime. Part IV considers justifications, both empirical and theoretical, for the moves we suggest. Finally, Part V discusses the consistency of this approach with international intellectual property law.

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27. *See, e.g.*, Jan Fagerberg & Manuel M. Godinho, *Innovation and Catching-Up*, *in* INNOVATION HANDBOOK, *supra* note 22, at 514; KEUN LEE, SCHUMPETERIAN ANALYSIS OF ECONOMIC CATCH-UP: KNOWLEDGE, PATH-CREATION AND THE MIDDLE-INCOME TRAP 6 (2013).

28. *See* J.H. Reichman, *Legal Hybrids Between the Patent and Copyright Paradigms*, 94 COLUM. L. REV. 2432, 2449 (1994).

29. *See, e.g.*, 35 U.S.C. §§ 101–103, 112.

30. As the International Monetary Fund (IMF) has demonstrated, the pandemic revealed that alongside low-income countries, many middle-income countries also suffer from technological inequality. *See* IMF, *A Fair Shot*, Fiscal Monitor 28, 31 (Apr. 2021), https://www.imf.org/en/Publications/FM/Issues/2021/03/29/fiscal-monitor-april-2021 [https://perma.cc/MA46-46UV] (Click "Full Report"). Thus, although we focus our proposal on low-income countries, we acknowledge that it could be applied, at least partly, to middle-income countries.

II. TECHNOLOGICAL DEPENDENCY

Although there are many reasons for growing global inequality in the technological sphere, an important factor stems from the decision to link intellectual property with trade and to incorporate obligations to protect intellectual property into the WTO regime.[31] To a considerable extent, the TRIPS Agreement's one-size-fits-all regime was intended to benefit the high-income, developed countries of the North.[32] The thinking was that commodification of intellectual property rights would facilitate global trade in information.[33] Furthermore, without WTO-wide commitments to protect intellectual property, opening Northern markets to goods produced cheaply in low-wage countries in the South would leave Northern inventors without a return on the knowledge inputs embedded in manufactured products.[34] That said, proponents of the TRIPS Agreement also made strong arguments that TRIPS would likewise help the South.[35] The Washington Consensus suggested that rigorous intellectual property protection would encourage foreign direct investment (FDI) and technology transfer, promote a local innovation culture, and enable the South to catch up and progress to the technological frontier.[36]

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31. *See, e.g.*, Peter K. Yu, *The Objectives and Principles of the TRIPS Agreement*, 46 HOUS. L. REV. 979, 984–85 (2009); Anselm Kamperman Sanders, *Intellectual Property, Free Trade Agreements and Economic Development*, 23 GA. ST. U. L. REV. 893, 894 (2007); Rochelle Cooper Dreyfuss & Diane L. Zimmerman, *The Culture and Economics of Participation in an International Intellectual Property Regime*, 29 J. INT'L L. & POL. 1, 3 (1996-1997). *See generally* Antony Taubman, *Thematic Review: Negotiating "Trade-Related Aspects" of Intellectual Property Rights*, *in* THE MAKING OF THE TRIPS AGREEMENT: PERSONAL INSIGHTS FROM THE URUGUAY ROUND NEGOTIATIONS 15 (Jayashree Watal & Antony Taubman eds., 2015), https://www.wto.org/english/res_e/booksp_e/trips_agree_e/history_of_trips_nego_e.pdf [https://perma.cc/Y4MF-URS2] (discussing how TRIPS "reframed both the international governance of IP and the very concept of 'trade' within multilateral trade law and policy."); Peter Drahos, *Thinking Strategically About Intellectual Property Rights*, 21 TELECOMM. POL'Y, 201 (1997) (discussing the globalization of intellectual property standards resulting from TRIPS).

32. *See, e.g.*, Sanders, *supra* note 31.

33. *See, e.g.*, David W. Leebron, *An Overview of the Uruguay Round Results*, 34 COLUM. J. TRANSNAT'L L. 11, 28–29 (1995).

34. *See, e.g.*, Harvey E. Bale, Jr., *Patent Protection and Pharmaceutical Innovation*, 29 N.Y.U. J. INT'L L. & POL. 95, 95, 99, 101 (1996). Sometimes, technological advances are embedded in processes; in this piece, we generally use products to encompass both products and processes.

35. *See, e.g.*, *id.* at 101.

36. Douglas A. Irwin & Oliver War, *What is the "Washington Consensus?"*, PETERSON INST. FOR INT'L ECON. (Sept. 8, 2021, 12:30 PM), https://www.piie.com/blogs/realtime-economic-issues-watch/what-washington-consensus [https://perma.cc/9TX2-B6SG]. The Washington Consensus describes a set of policy reforms originally aimed at improving welfare in developing countries. *See* John Williamson, *The Strange History of the Washington Consensus*, 27 J. POST KEYNESIAN ECON. 195, 196 (2004–2005).

Furthermore, the intellectual property obligations required by the WTO would provide Southern legislators with political cover and allow them to escape short-term concerns about higher prices; in the long term, developing countries would achieve the social welfare gains associated with scientific advancement.[37]

More than twenty-five years have elapsed since the TRIPS Agreement came into effect, and the North does appear to have benefited from stronger protection.[38] However, it is also evident that the South has suffered.[39] The projected benefits to the Global South have not materialized.[40] World markets for the commodities sold in the South did not compensate for the higher costs associated with intellectual property-protected goods.[41] Nor did high levels of intellectual property protection induce significant FDI or give rise to world-class indigenous inventorship.[42] Instead, technological dependency has persisted, the technological divide endures, and, as evidenced by the uneven distribution of COVID-19 vaccines, TRIPS is contributing to increasing global inequality.[43] For example, Keith Maskus and Lei Yang have found that although the changes TRIPS required have improved performance in research-intensive industries, the impact is smaller in lower-income economies, with minimal increases in indigenous innovation.[44] Similarly, the United Nations Conference on Trade and Development (UNCTAD) has expressed concerns about a widening

37. J.H. Reichman, *The TRIPS Agreement Comes of Age: Conflict or Cooperation with the Developing Countries?*, 32 CASE W. RES. J. INT'L L. 441, 450, 459, 469 (2000).

38. Suma Athreye, Lucia Pisciello & Kenneth C. Shadlen, *Twenty-Five Years Since TRIPS: Patent Policy and International Business*, 3 J. INT'L BUS. POL'Y 315, 318 (2020).

39. *See generally* James Thuo Gathii, *Strength in Intellectual Property Protection and Foreign Direct Investment Flows in Least Developed Countries*, 44 GA. J. INT'L & COMPAR. L. 499 (2016) (discussing the high costs to implement intellectual property regimes in Least Developed Countries).

40. *See, e.g.*, JOSEPH STIGLITZ, GLOBALIZATION AND ITS DISCONTENTS 29–30 (2003).

41. *Id.* at 29.

42. The strength of the patent system does not appear to be related to investment decisions. *See* Nagesh Kumar, *Determinants of Location of Overseas R and D Activity of Multinational Enterprises: The Case of US and Japanese Corporations*, 30 RSCH. POL'Y 159, 166 (2001).

43. *See World Social Report: Inequality in a Rapidly Changing World*, UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS 57–80 (2020), https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/02/World-Social-Report2020-FullReport.pdf [https://perma.cc/734T-7PKP].

44. Keith E. Maskus & Lei Yang, *Domestic Patent Rights, Access to Technologies, and the Structure of Exports*, 51 CAN. J. ECON. 483, 489 (2018).

technological gap and associated it with increased inequality across a variety of dimensions.[45]

As it turns out, reaching technological self-sufficiency is a far more complex task than acknowledged by the Washington Consensus.[46] Indeed, extensive literature has grown up around questions concerning the conditions and mechanisms that would improve the innovative environment in the South and equalize its access to modern technologies.[47] As we explain in more detail below,[48] among other things, commentators suggest that catching up to the global knowledge frontier requires skilled workers, firms, and customers, as well as an infrastructure capable of supporting research, development, and distribution.[49]

These insights have led intellectual property scholars to focus on creating job opportunities that enable workers to "learn by doing"—to develop technological capabilities by using imported high-tech equipment and processes, and facilitating access to such materials.[50] In accordance with that view, efforts have been made to ensure that international intellectual property laws give countries the flexibility to require patent holders to "work" their inventions—manufacture patented products or use patented processes—locally.[51] At the same time, a strong emphasis has been

45. U.N. Conference on Trade and Development, *Technology and Innovation Report 2021*, at 15 (2021), https://unctad.org/system/files/official-document/tir2020overview_en.pdf [https://perma.cc/M7KT-WZZ2].

46 46. Narcis Serra, Shari Spiegel & Joseph E. Stiglitz, *Introduction: From the Washington Consensus Towards a New Global Governance*, *in* THE WASHINGTON CONSENSUS RECONSIDERED: TOWARDS A NEW GLOBAL GOVERNANCE (Narcis Serra & Joseph E. Stiglitz eds., 2008).

47. *See, e.g.*, ALEXANDER GERSCHENKRON, ECONOMIC BACKWARDNESS IN HISTORICAL PERSPECTIVE 127 (1962); LEE, *supra* note 27, at 5; Fagerberg & Godinho, *supra* note 27; Moses Abramovitz, *Catching Up, Forging Ahead, and Falling Behind*, 46 J. ECON. HIST. 385, 390 (1986); J.H. Reichman, *Universal Minimum Standards of Intellectual Property Protection Under the TRIPS Component of the WTO Agreement*, 29 INT'L LAW. 345, 373 (1995); J.H. Reichman & David Lange, *Bargaining Around the TRIPS Agreement: The Case for Ongoing Public-Private Initiatives to Facilitate Worldwide Intellectual Property Transactions*, 9 DUKE J. COMPAR. & INT'L L. 11, 29 (1998).

48. *See infra* text accompanying notes 178–236.

49. Fagerberg & Godinho, *supra* note 27, at 536.

50. *See, e.g.*, Carlos M. Correa, *Public Health and Patent Legislation in Developing Countries*, 3 TUL. J. TECH. & INTELL. PROP. 1, 50 (2001); Reichman & Lange, *supra* note 47, at 50–51.

51. Paris Convention for the Protection of Industrial Property art. 5A(4), Mar. 20, 1883, 21 U.S.T. 1629, 828 U.N.T.S. 305; *see, e.g.*, MAX PLANCK INST. FOR INNOVATION & COMPETITION, DECLARATION ON PATENT PROTECTION: REGULATORY SOVEREIGNTY UNDER TRIPS 9 (2014), https://www.mpg.de/8132986/Patent-Declaration.pdf [https://perma.cc/NA4C-BK56]; Farida Shaheed (Special Rapporteur in the Field of Cultural Rights), *Rep. of the Special Rapporteur in the Field of Cultural Rights*, U.N. DOC. A/70/279 (Aug. 4, 2015); GRAEME B. DINWOODIE & ROCHELLE

placed on relaxing intellectual property obligations so that patented inventions are available in the South at reasonable prices.[52] The proposed COVID waiver stems from that view, and the one modification that has been made to the TRIPS Agreement—the addition of another provision on compulsory licensing—reflects a similar approach.[53] Like the waiver, it reduces the degree of exclusivity rights holders enjoy in order to promote access—in the case of the modification, by allowing one WTO country to produce pharmaceuticals for the benefit of a WTO member that lacks manufacturing capacity.[54]

The scholarship of innovation economists suggests, however, that these steps are not nearly enough—workers who learn by doing become adept at imitation.[55] In the short term, countries can improve social welfare using that approach because their firms can exploit wage differences with higher-income countries and profit from selling cheap versions of advanced products on global markets.[56] But there is a limit to this strategy: over time, the workers with imitative skills demand higher pay, and countries with even lower wage scales develop the skills to compete in the same sectors.[57] Reducing the cost of high-tech materials through compulsory licensing or other mechanisms is often also ineffective because both private and commercial consumers may need sufficient knowledge capital to understand what technologies are available. Similarly, they may need that capacity to evaluate these technologies, implement them, and adapt them to local conditions and social practices.[58] Adaptation can also require fresh investments.

C. DREYFUSS, A NEOFEDERALIST VISION OF TRIPS: THE RESILIENCE OF THE INTERNATIONAL INTELLECTUAL PROPERTY REGIME 57, 116 (2012); Rochelle Dreyfuss & Susy Frankel, *From Incentive to Commodity to Asset: How International Law Is Reconceptualizing Intellectual Property*, 36 MICH. J. INT'L L. 557, 563 (2015) (discussing the local working requirements in Paris Convention article 4 and its incorporation into the TRIPS Agreement).

52. *See, e.g.*, Carlos M. Correa, *Intellectual Property Rights and the Use of Compulsory Licenses: Options for Developing Countries* 1 (S. Ctr. Working Paper No. 5, 1999), https://www.iatp.org/sites/default/files/Intellectual_Property_Rights_and_the_Use_of_Co.pdf [https://perma.cc/TZH9-DT8J].

53. TRIPS, *supra* note 5, art. 31bis.

54. Whether the modification provides enough access is, of course, another question, see Nicholas G. Vincent, *TRIP-ing Up: The Failure of TRIPS Article 31bis*, 24 GONZ. J. INT'L L. 1, 8 (2020). The pandemic suggests it is not.

55. Boyan Jovanovic &Yaw Nyarko, *Learning by Doing and the Choice of Technology,* 64 ECONOMETRICA 1299, 1299 (1996).

56. *See, e.g.*, Linsu Kim & Richard. R. Nelson, *Introduction*, *in* TECHNOLOGY, LEARNING & INNOVATION: EXPERIENCE OF NEWLY INDUSTRIALIZING ECONOMIES 4 (Linsu Kim & Richard R. Nelson eds., 2000).

57. LEE, *supra* note 27, at 5.

58. Abramovitz, *supra* note 47; Hall, *supra* note 22, at 469 ("[The] factors that might be expected to influence the diffusion of innovations . . . can be classified into four main groups, those

Zvi Griliches, notably, studied the speed at which hybrid corn diffused across the Midwest of the United States.[59] He found that the rate of diffusion depended on how fast suppliers could customize the seed for use in a particular geographic area.[60] Similarly, Kristine Bruland demonstrated that the development of the Norwegian textile industry turned on the training that British machinery suppliers provided.[61] Put differently, reducing the profits available from information-based products works at cross purposes with the objective of promoting investments in diffusion because lowering available returns makes it difficult to recoup the extra costs associated with activities such as customization and training.

A domestic cohort of midlevel inventors and entrepreneurs could help resolve both the inadequacy of the imitation model and knowledge-capital inefficiencies. Countries that are behind the technological frontier have employed a variety of strategies to support the activities needed to promote the development of local inventiveness. Some have relied on government subsidies, direction, and involvement (examples include Japan's Ministry for Trade and Industry (MITI), Korea's Industrial Technology Research Institute (ITRI), and China's state-owned enterprises); some have benefited from investments by family- or business-based cartels (Japan's zaibatsus and keiretsus; Korea's chaebols).[62] There are also examples of firms in low-income countries entering into co-development deals or other arrangements with foreign firms that enhance local technological capacity.[63]

Significantly, in a comprehensive study of the countries that have successfully caught up technologically, Keun Lee notes that many countries have found it effective to "detour" into a supplementary regime of patent-like protection.[64] In addition to offering utility patents, these countries have a petit (or second-tier) patent system with standards that reflect local technological capacities and domestic priorities.[65] Once the catching-up phase is over, Lee suggests that this

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that affect the benefits received, those that affect the costs of adoption, those related to the industry or social environment, and those due to uncertainty and information problems.").

59. *See* Zvi Griliches, *Hybrid Corn: An Exploration in the Economics of Technological Change*, 25 ECONOMETRICA 501, 501–03 (1957).

60. *Id.* at 516.

61. Kristine Bruland, *Skills, Learning and the International Diffusion of Technology*, *in* TECHNOLOGICAL REVOLUTIONS IN EUROPE 173–75 (Maxine Berg and Kristine Bruland eds., 1998).

62. Fagerberg & Godinho, *supra* note 27, at 5, 18–19.

63. LEE, *supra* note 27, at 163–68.

64. *Id.*

65. *Id.* at 149.

detour process (and others that he offers) can be eliminated, leaving only the utility patent regime found in the North.[66]

It is not difficult to understand why such a detour strategy would be fruitful. Most obviously, it has the potential to create a mechanism for incentivizing the incremental innovation required to distribute technologies that improve social welfare.[67] And like intellectual property systems more generally, it avoids the hazards associated with depending on government selection processes and support.[68] Just as important, a second-tier patent regime possibly establishes a lower, easier-to-reach rung on the protective regime ladder. Thus, it enables people who are behind the technological frontier to enter the system while adapting foreign technology to local needs. That, in turn, arguably promotes entrepreneurship, risk-taking, and the accumulation of human capital. With the right choice of technological sectors, these inventors can eventually develop the capacity to innovate at world levels, acquire utility patents in foreign jurisdictions, and even leapfrog over existing technologies to compete successfully in global markets.[69] At a minimum, this strategy can help a country become technologically self-sufficient in critical areas, such as healthcare.

Lee does not, however, describe what a lower-tier patent regime should look like and how it should differ from the regimes common in the North.[70] He leaves that to lawyers.[71] Accordingly, it is to this task that we turn. One aspect is clear: to the extent that the goal of a lower-tier regime is to create incentives for midlevel inventors, the inventive step should be adjusted downward to recognize the types of incremental innovation that they have the potential to accomplish.[72] But lowering the step does not supply a complete specification of the regime. Protection also requires a determination of novelty, and that analysis entails a comparison between an advance and what is already known. Thus, the determination requires countries to take a position on what is considered knowable and what people in the field can glean from prior art.

There are many ways in which this landscape of prior art could be characterized, and for a very long time, there were marked

66. *Id.* at 22.

67. See Benoliel & Gishboliner, *supra* note 14, for empirical findings showing the effect of IP in incentivizing technology diffusion.

68. Steven Shavell & Tanguy van Ypersele, *Rewards Versus Intellectual Property Rights*, 44 J. L. & ECON. 525, 534–44 (2001).

69. LEE, *supra* note 27, at 174–77.

70. *See id.* at 127–222.

71. *See id.*

72. *See* discussion, *infra* Section III.A.2.

differences in how countries approached that question. For example, fifteenth-century Venetians considered the landscape to include only inventions available in Venice; anything new brought to the city could be patented.[73] Until 1952, the United States included patents and publications from anywhere in the world, but inventions not codified in one of those ways were considered to be prior art only if they were practiced locally.[74] Similarly, there were differences in whether patent applications should constitute prior art, and whether elements inherent in a disclosure, but which were not specifically mentioned, were in the prior art.[75]

However, in an effort at the turn of the last century to negotiate a substantive patent law treaty to bring greater harmonization to national laws, the World Intellectual Property Organization (WIPO) suggested the adoption of an absolute standard of novelty.[76] Under this approach, any invention published, patented, known, used, or sold anywhere in the world would be considered in the prior art.[77] WIPO's International Bureau justified the standard this way:

> "It is a fundamental objective of the patent system that nothing be alienated from society which already belongs to it. Indeed, granting a patent on an invention already known would impose constraints on society in respect of the use of known information without offering any return or benefit."[78]

Although WIPO's substantive patent law treaty initiative was never promulgated, the last two decades have witnessed a growing consensus on its view that the optimum standard is one of absolute novelty. Thus, multiple countries—including the United States—have largely adopted this approach.[79] But in the evolution of that rule, we

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73. STEPHEN LANDES, PATENTS, TRADEMARKS, AND RELATED RIGHTS: NATIONAL AND INTERNATIONAL PROTECTION 6–7 (1975) (discussing the Venetian Patent Act of 1474).

74. 35 U.S.C. § 102(a)–(b) (considering as within the prior art inventions "known or used by others in this country" before invention by the applicant and "in public use or on sale in this country" more than a year prior to the filing of the patent application).

75. *See generally* World Intell. Prop. Org. [WIPO], *"Enlarged" Concept of Novelty: Initial Study Concerning Novelty and the Prior Art Effect of Certain Applications Under Draft Article 8(2) of the SPLT* (2004), https://www.wipo.int/export/sites/www/scp/en/novelty/documents/5prov.pdf [https://perma.cc/72U2-XSGT] [hereinafter *WIPO Novelty Study*] (studying the prior art effect of unpublished earlier applications under Article 8(2) of the draft Substantive Patent Law Treaty (SPLT)).

76. Rochelle Dreyfuss & Jerome Reichman, *WIPO's Role in Procedural and Substantive Patent Law Harmonization*, *in* RESEARCH HANDBOOK ON THE WORLD INTELLECTUAL PROPERTY ORGANIZATION: THE FIRST 50 YEARS AND BEYOND 108, 120–21, 127 (Sam Ricketson ed., 2020).

77. *WIPO Novelty Study*, *supra* note 75, at 4–10.

78. *Id.* at 4.

79. *See, e.g.*, 35 U.S.C. § 102; Patent Act 2013, s 8 (N.Z.); Zhonghua Renming Gongheguo Zhuanli Fa (中华人民共和国专利法) [Patent Law of the People's Republic of China] (promulgated

believe that an important cost was overlooked: this standard creates a novelty trap. We describe the novelty trap and the problems it creates in the following sections as part of our discussion of how we would structure a lower-tier patent regime.

III. THE NOVELTY TRAP, SOCIAL COSTS, AND DIFFUSION PATENTS

The previous sections suggested that technological dependency stems in part from a global patent system that fails to reflect the needs of the Global South and the potential for midlevel inventorship that characterizes its creative communities.[80] Introducing a second-tier patent regime would alleviate the problem and create an ecosystem supportive of local innovation.[81] The question, then, is how that regime should be structured. In our view, it is important to recognize that this regime must do more than simply lower the height of the utility regime's inventive step, although it must do that as well. Rather, it is crucial to understand that the international patent system has evolved to a point where developed countries can shower their inventions on the developing world and leave valuable technologies trapped by a legal framework that prevents anyone from undertaking the efforts needed to distribute, adapt, and improve upon them.

This phenomenon possibly applies also when an inventor in the North obtains a utility patent on its invention in the South but does not choose to engage in efforts to exploit it locally. As the Patent Cooperation Treaty (PCT) has made remote patenting easier, the problem of Northern patents obstructing exploitation efforts in the South is becoming more commonplace.[82] As a result, the South might

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by the Standing Comm. Nat'l People's Cong., Dec. 27, 2008, effective Oct. 1, 2009) art. 22, 2008 China Law LEXIS 7207 [hereinafter PRC Patent Law].

80. *See supra* Part II.

81. *See supra* Part II.

82. *See generally* Patent Cooperation Treaty, June 19, 1970, 28 U.S.T. 7645, 1160 U.N.T.S. 231 [hereinafter PCT] (updating and streamlining the international patent process). According to WIPO, patents granted using a PCT application by non-residents in low-income countries have gone from 1 in 1985 to 649 in 2019. *See WIPO IP Portal*, IP Statistics Data Center, https://www3.wipo.int/ipstats/index.htm?tab=patent [https://perma.cc/83L7-TGLD] (choose "2b- Grant for PCT national phase entries" from the "Indicator" dropdown; choose "Total count by filing office" from the "Report type" dropdown; choose "1985" and "2020" from the Year range dropdowns; then select "Low-income" from the "Office" list and click "Add"; then select "Non-resident from the "Type" list and click "Add"; then click "Search"). In the next tier up (low middle-income), the numbers are 26 and 31,817. *Id.* (choose "2b- Grant for PCT national phase entries" from the "Indicator" dropdown; choose "Total count by filing office" from the "Report type" dropdown; choose "1985" and "2020" from the Year range dropdowns; then select "Lower middle-income" from the "Office" list and click "Add"; then select "Non-resident from the "Type" list and click "Add"; then click "Search").

be left with an array of inventions that are not suitable for local use. To be sure, there may be cases where the utility patent holder tries to exploit its inventions in the South. However, these efforts can easily fail. As students of innovation have shown, successful exploitation can require a local presence:[83] Feedback loops that lead to incremental changes based on user experience; networks and other social systems which help spread information, including know-how, among the users of technology and their customers.[84] Establishing a local presence can be difficult, and many foreign inventors do not try.[85] Nevertheless, once the invention is patented locally, anyone who does try to adapt the invention becomes a potential infringer.

Even when an invention is not covered by a domestic utility patent, there can be a problem under an absolute novelty standard. That is, under the WIPO prior art policy, the mere existence of an invention anywhere in the world can be enough to put that invention, and even the incremental improvements needed to make efficient use of it, in the public domain.[86] The basic invention will no longer be considered novel, and incremental improvements will often not be considered sufficiently inventive to merit independent protection.[87] Admittedly, that result—the public availability of existing inventions and marginal variations on them—was WIPO's objective in promoting

83. *See* PAUL STONEMAN, THE ECONOMICS OF TECHNOLOGICAL DIFFUSION 178–90 (2002); Alessandra Canepa & Paul Stoneman, *Comparative International Diffusion; Patterns, Determinants, and Policies*, 13 ECON. INNOVATION & NEW TECH. 279, 297 (2004); NATHAN ROSENBERG, TECHNOLOGY AND AMERICAN ECONOMIC GROWTH 191 (Harper & Row 1972). *See generally* Hall, *supra* note 22 (providing a historical and comparative perspective on diffusion that looks at the broad determinants of diffusion, economic, social, and institutional, viewed from a microeconomic perspective).

84. *See* Hall, *supra* note 22, at 460 ("[D]iffusion is not only the means by which innovations become useful by being spread throughout a population, it is also an intrinsic part of the innovation process, as learning, imitation, and feedback effects which arise during the spread of a new technology enhance the original innovation.").

85. *Cf.* Layal Liverpool, *Researchers from Global South Under-Represented in Development Researc*h, NATURE (Sept. 17, 2021), https://www.nature.com/articles/d41586-021-02549-9 [https://perma.cc/Y9Q6-Z7GK] (explaining that most research conducted on development in the Global South is conducted by researchers from the Global North); Verónica Amarante, Ronelle Burger, Grieve Chelwa, John Cockburn, Ana Kassouf, Andrew McKay & Julieta Zurbrigg, *Underrepresentation of Developing Country Researchers in Development Research*, APPLIED ECON. LETTERS, Aug. 12, 2021, at 4, https://www.tandfonline.com/doi/pdf/10.1080/13504851.2021.1965528?needAccess=true [https://perma.cc/YN3H-7BCC] (finding that the bulk of the research on the global south is conducted by the global north).

86. *WIPO Novelty Study*, *supra* note 75.

87. *Id.*

an absolute novelty standard for utility patents.[88] As we saw, its negotiators thought that releasing an invention from legal constraints would ensure its public availability.[89] However, it is simplistic to equate the existence of an invention in the public domain with its effective availability to those who could benefit from it. Customization, training, feedback loops, and networking may be required. Moreover, potential consumers may be unable to discern from remote disclosures that inventions capable of improving their welfare are available. From the perspective of the South, the absolute novelty standard thus constitutes a trap out of which new technologies cannot always emerge.

A. Structure

As noted above, we propose a second-tier regime that includes three key features: a relative novelty standard, an inventive step measured by the capacities of domestic artisans, and a disclosure requirement geared to local absorptive capacity.[90] Properly designed, this regime—a diffusion patent system—would break the novelty trap, create the incentives needed, and avert the associated social losses. And, as explained earlier, it would also function as the type of detour that Keun Lee suggested would enable countries to begin the process of becoming technologically adept in their own right.[91] In addition to discussing these modifications, this section considers other issues that a state implementing the system would be required to consider. These include questions on the scope of protection, who should be allowed to obtain these patents, and at what pricing?

1. Relative Novelty

The key to breaking the novelty trap is to redefine the landscape of prior art so that only disclosures that are locally accessible are relevant to the determination of whether an invention is novel and thus worthy of patent protection. As Part II suggested, it can require intellectual labor to identify and import remote knowledge and engage in the efforts required to diffuse it domestically.[92] Thus, awarding a form of intellectual property protection is easily justified: the protection

88. *Traditional Knowledge and Intellectual Property – Background Brief*, WIPO, https://www.wipo.int/pressroom/en/briefs/tk_ip.html [https://perma.cc/NL6G-M9WT] (last visited Jan. 22, 2022).

89. *See supra* text accompanying notes 76–78.

90. *See supra* text accompanying note 29.

91. *See supra* text accompanying note 64.

92. *See supra* Part II.

not only recognizes the intellectual contributions necessary for diffusion, but also provides economic motivation to engage in that work.

Local accessibility could, of course, mean more than one thing. One approach would be to consider an invention inaccessible only when it is not patented, published, or practiced locally. For this purpose, a country could consider an invention patented if it is covered by a patent that has been awarded, if it is covered by a patent application that is pending, or if the priority period provided by the Paris Convention for obtaining patents in third countries has not lapsed.[93] These are the most difficult inventions for a local innovator to identify as potentially useful domestically. Moreover, because learning by doing or observing is not possible, they are the hardest for a local to duplicate, improve upon, and distribute. Thus, their diffusion requires considerable intellectual effort, effort that readily justifies a separate incentive system. Diffusion patents for such inventions also make sense because if an invention is not patented locally, there is no possibility of infringement. Moreover, if the invention is not locally patented, there may be no one else with a strong incentive to do what is necessary to diffuse it.

A system that awards patents on this basis would have another advantage. Knowing that the failure to patent would allow another to obtain a diffusion patent, the original innovator might itself choose to obtain a utility patent, publish, or practice the invention locally. In other words, the potential for diffusion patents might spur foreign inventors to engage in local diffusion-oriented activities. Diffusion by foreign right holders would not necessarily be as effective in promoting an ecosystem conducive to technological self-sufficiency as awarding local diffusion patents, but it would surely provide jobs and training, bring in foreign investment, and create opportunities for locals to interact with foreign innovators and learn from their entrepreneurial cultures.

At the same time, however, it must be recognized that under a regime that considers local patents and publications to be in the prior art, whether worked or not, a foreign innovator could block local inventors by patenting or publishing locally but not doing the work needed to make the invention effectively available. As noted above, the PCT has sharply reduced the cost of that tactic.[94] There are two ways a country could counter that problem while also dealing with foreign patent holders who try to exploit locally and fail. First, the country

93. *See* Paris Convention for the Protection of Industrial Property, *supra* note 51, 21 U.S.T. at 1631–35, 828 U.N.T.S. at 313, 315, 317, 319.

94. *See supra* Part III.

could define the prior art to include only inventions *practiced* locally, even if a local utility patent had been granted, and include in the patent regime a compulsory license system to deal with the problem of blocking patents—that is, the inability of the holder of the diffusion patent to exploit it without licensing the utility patent and the inability of the utility patent holder to sell the adapted invention without the authorization of the diffusion patentee. The possibility that a compulsory license might be granted would put more pressure on foreign inventors to engage in exploitation efforts. Moreover, the compulsory license would recognize the contribution made by the original inventor and provide compensation for that effort.

Alternatively, a country could require the holder of a local utility patent to work it locally within a reasonable time period (under the Paris Convention, four years from the date of the patent application or three years from issuance).[95] If the patentee chose to work, the benefits of jobs, training, foreign investment, and learning would be realized. If that period lapsed without working, then a diffusion patent could be awarded. Again, compulsory licenses could be used to break blocking positions.

2. Inventive Step

Novelty is a technical impediment to patenting because it requires the presence of all the elements of the invention in a single piece of prior art.[96] In contrast, the inventive step, or nonobviousness, requirement allows examiners to consider whether a person of ordinary skill in the relevant art could combine disclosures from multiple sources to make the leap to the claimed invention. Thus, this requirement creates a stronger impediment to patenting than novelty.[97]

Changing the prior art landscape is one way to alter this requirement for diffusion patents because it means that the only art that can be considered is art that is published, practiced, or patented locally (or perhaps only art that is practiced locally). As argued, that would significantly reduce the source material from which elements can be drawn.[98] But more could be accomplished. Because all innovations combine elements of what is already known, the inventiveness standard requires countries to decide how much ingenuity is needed to merit protection. That has long been a controversial issue, and in many

95. Paris Convention for the Protection of Industrial Property, *supra* note 51, 21 U.S.T. at 1637, 828 U.N.T.S. at 321.

96. For an example drawn from US law, see *In re* Robertson, 169 F.3d 743 (Fed. Cir. 1999).

97. *See, e.g.*, Graham v. John Deere Co., 383 U.S. 1, 12–13, 17–19 (1966).

98. *See supra* Part II.

countries, the height of the inventive step has fluctuated over time.[99] In the United States, for example, it has gone from very high in the mid-1900s to extremely low toward the turn of the century, settling in 2007 in the middle.[100] The current standard looks to the person having ordinary skill in that art (PHOSITA), a person who is deemed to have the capacity to make predictable advances and repurpose known inventions in response to market and design pressures.[101] US examiners, therefore, ask whether that person could have reacted to market forces to make the advance in question based on the art in the person's field. They would also examine other art that a person in the field would consider in solving the problem faced (analogous art).[102] If not, the invention is considered patentable.

For diffusion patents, these questions should be modified to deal with local conditions. Thus, rather than measure the capacity of PHOSITA by global standards,[103] the inquiry should be limited to the inventive capabilities of domestic artisans and the art they would regard as within their field or analogous to it. As important, examiners in low-income countries should consider the effect of market forces in their own environment. As noted earlier, in the North, high-income customers spur demand.[104] However, the diffusion patent regime should

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99. *See generally* LODEWIJK W.P. PESSERS, THE INVENTIVENESS REQUIREMENT IN PATENT LAW: AN EXPLORATION OF ITS FOUNDATIONS AND FUNCTIONING (2016) (providing an overview of the inventive step over time and around the world). For an example of Australia's inventive step reform, see *Intellectual Property Laws Amendment (Raising the Bar) Act 2012* (Cth); Explanatory Memorandum, Intellectual Property Laws Amendment (Raising the Bar) Bill 2011 (Cth) 8. For an example of New Zealand's inventive step reform, see Patent Act 2013, s 7. For a general discussion of these two examples, see Benoliel & Gishboliner, *supra* note 14, at 8–12, 22–23 (comparing the effects of New Zealand's patent reform to those of Australia's).

100. *Compare* Cuno Eng'g Corp. v. Automatic Devices Corp., 314 U.S. 84, 91 (1941) (requiring the invention to encompass a "flash of creative genius"), *with In re* Sang Su Lee, 277 F.3d 1338, 1343 (Fed. Cir. 2002) (requiring a teaching, suggestion, or motivation in the prior art to combine references), *and* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 419 (2007) ("[T]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents.").

101. *KSR Int'l Co.*, 550 U.S., at 421. A roughly similar approach is used in other countries. *See generally* Standing Comm. on the L. of Pats., Study of Inventive Step, WIPO Doc. SCP/22/3 (2015), https://www.wipo.int/edocs/mdocs/scp/en/scp_22/scp_22_3.pdf [https://perma.cc/9BEW-JX42] (explaining that the inventive step analysis is based on the assessment made by a "person skilled in the art").

102. *See, e.g.*, *In re* Clay, 966 F.2d 656, 658–59 (Fed. Cir. 1992).

103. 35 U.S.C. § 103.

104. *See, e.g.*, Stanley L. Engerman & Kenneth L. Sokoloff, *Inequality, Institutions and Differential Paths of Growth among New World Economies*, *in* INSTITUTIONS, CONTRACTS AND ORGANIZATIONS: PERSPECTIVES FROM NEW INSTITUTIONAL ECONOMICS 108 (Claude Ménard ed., 2000); *2008 World Bank Report*, *supra* note 23, at 6 (noting the effect of demand on the supply of technology-based inventions).

also account for the absence of that force in the South. Structuring the regime in this way would permit a local inventor to acquire protection for adaptations of foreign inventions even when the changes are ones that the North might consider to be too modest to merit protection. For example, it would allow inventors who technologically adapt patented seeds to local growing conditions to obtain protection.[105] It would similarly encourage domestic inventors to modify pharmaceuticals developed elsewhere to meet the needs of local patients, who might find the originator's version unpalatable or who might not have the refrigeration necessary to store it.[106] It would also spur inventors to educate consumers and find ways, such as new manufacturing techniques, to make inventions available at more locally affordable prices.[107]

The PHOSITA standard has another useful feature: it operates as a policy lever that promotes technological advancement.[108] As Dan Burk and Mark Lemley suggest, when a new technology emerges, the knowledge in that area will be minimal.[109] Because PHOSITA—a person having *ordinary* skill in the art—will, at that point, have only modest capacities, even small advances will be considered inventive.[110] Naturally, it will be relatively easy to acquire patent protection. The ease of obtaining patents will attract other innovators. Once that happens, more art is produced, thereby expanding the knowledge base. As the field matures, those practicing in it will become more sophisticated, which will raise the standard for obtaining protection.[111] Inventors will then realize they must be more ambitious to merit a patent.

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105. *See, e.g.*, Emily Marden, R. Nelson Godfrey, Matthew R. Voell & Loren H. Riesberg, *Biosafety* and *Intellectual Property Regimes as Elements of the IP-Regulatory Complex: The Case of Canadian Sunflower Genomics*, *in* THE INTELLECTUAL PROPERTY-REGULATORY COMPLEX: OVERCOMING BARRIERS TO INNOVATION IN AGRICULTURAL GENOMICS 15, 27 (Emily Marden, R. Nelson Godfrey & Rachel Manion eds., 2016).

106. *See id.* at 27–28; HILDE STEVENS, ISABELLE HUYS, KOENRAAD DEBACKERE, MICHEL GOLDMAN, PHILIP STEVENS & RICHARD T. MAHONEY, VACCINES: ACCELERATING INNOVATION AND ACCESS: GLOBAL CHALLENGES REPORT 17 (2017), https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gc_16.pdf [https://perma.cc/76S8-PWQD].

107. For a discussion on educating customers on product usage in developing countries, see, for example, COIMBATORE KRISHNARAO PRAHALAD, THE FORTUNE AT THE BOTTOM OF THE PYRAMID: ERADICATING POVERTY THROUGH PROFITS 26 (2006).

108. Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1651 (2003).

109. *Id.* at 1576–77.

110. *Id.* at 1618–19.

111. *See, e.g.*, *In re* Kubin, 561 F.3d 1351, 1358–59 (Fed Cir. 2009) (raising the difficulty of obtaining a biotech patent from the standard used in *In re* Deuel, 51 F.3d 1552 (Fed. Cir. 1995), when the field was less mature).

That same insight can be applied geographically. If the skill of the ordinary artisan is determined based on local—rather than global—abilities, advances that may be considered uninventive if measured by international standards might nonetheless be found to merit patent protection when created locally. As the level of technological capacity within a country grows, a person with ordinary skill in the art will be deemed to know more. As a result, the inventive step will rise with it, and simple adaptations will no longer be enough; local inventors will be forced to become increasingly creative. The field will, in this way, move towards the knowledge frontier.

3. Disclosure

In a sense, the heart of the patent bargain lies in the disclosure requirement because it is this requirement that obliges the applicant, in exchange for a period of exclusivity, to provide enough information about the invention so that people can enjoy it after the patent has expired.[112] Here again, the capacity of PHOSITA matters because the question examiners ask is whether the disclosure is sufficient for a person of ordinary skill in the art to make and use the invention without undue experimentation.[113]

The standard of the ordinary local inventor may have several useful consequences. Because a midlevel inventor is likely to require considerable direction to practice an invention, this standard will require a diffusion patent to contain more information than the North typically demands for utility patents. Codification of more information will then make it easier for subsequent innovators to identify valuable art and figure out how to make and use it. With more art available, local inventors will become more proficient, ambitious, and able to catch up. Thus, even if patent disclosures tend to have a limited impact on research and development in the North, as some claim,[114] diffusion patents could be of considerable benefit in the South if they are geared to teach artisans with low absorptive capacity. Given that patents are drafted in the language of the relevant patent office, these patents

112. *See, e.g.*, 35 U.S.C. § 112; DONALD S. CHISUM, CHISUM ON PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY AND INFRINGEMENT 7–9 (2010); Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CAL. L. REV. 805, 808 (1988).

113. *See, e.g.*, *In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988).

114. *See, e.g.*, Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 21–22. There has long been a debate in the North as to whether patent disclosures matter to innovation. *See* Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 531, 547–51 (2012) (refuting claims that scientists do not read patents).

would have the added advantage of providing this information in the local language.[115]

B. Implementation

In addition to adopting altered standards for the novelty, inventive step, and disclosure requirements of patent law, a country implementing a diffusion patent regime would also need to decide on the scope of the rights awarded, the beneficiaries of the regime, and various pricing questions.

1. Scope

Two factors determine the scope of a patent right: the breadth of coverage and the duration of protection.[116] The disclosure requirement discussed above is also used in the determination of breadth because it limits the claims to the information that is revealed in the specification.[117] For those who may be concerned about adding another layer of protection to an intellectual property system that already inhibits access to inventions, this is an important feature. If properly enforced,[118] the limitation aspect of disclosure ensures that a country that awards diffusion patents receives knowledge commensurate with the added cost associated with awarding protection. Since these patents would be geared toward encouraging marginal advances, they would only cover a narrow range of products or processes. Thus, others would be free to find other adaptations and uses for the underlying invention.

The second layer of patenting could also be constrained by a limit on the duration of protection. The patent period should be long enough to allow the right holder to capture a return on investment, but not so long that it creates its own novelty trap and inhibits further innovation. As J.H. Reichman noted in his exhaustive study of petit patents, the term of protection under these systems is usually well below the twenty years required by the TRIPS Agreement for utility patents.[119]

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115. *But see* Michael N. Meller, *Piercing the Language Veil - Transparency in Patent Applications*, 85 J. PAT. & TRADEMARK OFF. SOC'Y 22, 24 (2003) (arguing for the adoption of English as the *lingua franca* of patent proceedings).

116. *See* Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106, 106 (1990).

117. *See, e.g.*, Invitrogen Corp. v. Clontech Lab'ys Inc., 429 F.3d 1052, 1071–74 (Fed. Cir. 2005).

118. *Cf.* Brenner v. Manson, 383 U.S. 519, 533–34 (1966) (noting "the highly developed art of drafting patent claims so that they disclose as little useful information as possible.").

119. Reichman, *supra* note 28, at 2457–58; TRIPS, *supra* note 5, art. 33.

2. Beneficiaries

Because national treatment is a cornerstone of the international trade regime,[120] a country must arguably award a diffusion patent to anyone who invests in the work necessary to make the invention available to its population. However, that practice could defeat the goals of adopting a diffusion patent regime. To be sure, if foreigners were allowed to obtain diffusion patents, they would be more motivated to modify their inventions in ways that meet Southern needs. They might also increase jobs and learning opportunities. However, as long as foreigners are more technically proficient than domestic inventors, local innovators could easily be crowded out of the system.[121] As a result, domestic innovation would not receive direct encouragement. Countries may therefore wish to limit diffusion patents to their own innovators or to their own inventors plus those from similarly situated countries. That limitation would, however, arguably violate the nondiscrimination provisions of the TRIPS Agreement.[122] Part V takes up the question of the conformity of our proposal to international intellectual property law.[123]

Countries intent on developing a diffusion patent system to supplement utility patents could develop a common patent system akin to the system that the European Union is establishing. It would allow an inventor to acquire a single patent that covers multiple countries.[124] That would create a larger market for the holders of diffusion patents and allow more countries to obtain the benefits of Northern technology.[125]

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120. Mitsuo Matsushita, *Basic Principles of the WTO and the Role of Competition Policy*, 3 WASH. U. GLOB. STUD. L. REV. 363, 366 (2004).

121. *See* Xiaolan Fu, Carlo Pietrobelli & Luc Soete, *The Role of Foreign Technology and Indigenous Innovation in the Emerging Economies: Technological Change and Catching-Up*, 39 WORLD DEV. 1204, 1207 (2011) (noting the possibility that foreign investments may crowd out local innovation).

122. TRIPS, *supra* note 5, arts. 3–4.

123. *See* discussion *infra* Part VI.

124. *Unitary Patent & Unified Patent Court*, EUR. PAT. OFF., https://www.epo.org/law-practice/unitary.html [https://perma.cc/8X77-Y5VP] (last visited Jan. 24, 2022).

125. *See* EUR. PAT. OFF., UNITARY PATENT GUIDE 10 (2017), https://documents.epo.org/projects/babylon/eponet.nsf/0/C3ED1E790D5E75E0C125818000325A9B/$File/Unitary_Patent_guide_en.pdf [https://perma.cc/4HW6-PLHK]. A regional patent system would also have the advantage of reducing administrative costs; a single nation's patent office could examine applications on behalf of an entire region. *Id.* at 10–11.

3. Pricing

Diffusion patents could incur inventive costs and reduce access implying pricing considerations. On the whole, it seems unlikely that prices would put these inventions out of local reach because, under the basic system, the holder of the right could only sell the invention in countries where the original inventor did not receive a patent. Thus, the price would depend on local demand and purchasing power. Admittedly, the right holder could base the price on the demand of only the highest-income local customers.[126] In that instance, a country could impose price controls or price caps on advances protected by diffusion patents.[127]

A country that decides to award diffusion patents based on the failure of the utility patentee to practice will face another pricing issue. Because the utility patent would block the holder of the diffusion patent from exploiting her invention (and vice versa), compulsory licenses might be needed to break the blocking position, a scenario that is especially likely if the initial patent is overbroad.[128] The issuance of a license would, of course, require the party with the less valuable patent to pay royalties to the other—under TRIPS, "adequate remuneration in the circumstances of each case, taking into account the economic value of the authorization."[129] Still, access should not be a profound concern because adequacy under the circumstances would allow for consideration of the purchasing power of local customers.

IV. JUSTIFICATIONS

The previous Part recommended the introduction of a second-tier of patent protection, a right that encourages the efforts needed to diffuse new technologies within low-income countries.[130] Designed as a detour, diffusion patents would also grow the South's creative ecosystem, promote technological self-sufficiency in priority areas, and enable these countries to catch up technologically to the

126. *See* Brook K. Baker, *Patents, Pricing, and Access to Essential Medicines in Developing Countries*, 11 VIRTUAL MENTOR 527, 527 (2009) (noting that pharmaceutical companies maximize profit by selling medicines at prices only the rich and well-insured can afford).

127. *Cf. id.* at 528–29 (comparing alternative strategies to correct this "market failure").

128. *Cf.* Correa, *supra* note 52, at 10–11 (exploring varying international approaches to this issue). The "refusal to deal" is a ground for granting a compulsory license in many national laws. *Id.* at 10-11.

129. TRIPS, *supra* note 5, art. 31. In addition, the holder of the utility patent "shall be entitled to a cross-licence on reasonable terms . . . ." *Id.*

130. *See* discussion *supra* Section III.A.

developed world. This Part takes a closer look at the reasons we believe this system will achieve these goals. In part, our view is based on observations of how developing countries have structured their patent systems over time. In addition, we consider the economic literature in greater depth and discuss how it supports our recommendations.

A. Observations

As noted in Part II, Keun Lee's view, that a second-tier patent regime can facilitate catch-up, stemmed from his study of how other countries developed and, in particular, from a comparison among countries in Latin America and Asia that were originally situated similarly but later diverged sharply in their technological proficiency.[131] Admittedly, his observations do not establish causality.[132] Still, the number of examples of technologically advanced jurisdictions that had modified patent regimes during their development period is probative of the benefits of this approach.[133]

The United States' 2011 America Invents Act (AIA) is a prime example of a national policy that took one approach to the requirements for patent protection when the country was behind the technological frontier and then adopted a more rigorous standard when it became innovative at world levels.[134] Prior to the AIA, information "known or used," "on sale or in public use," or "made. . . by another inventor" was regarded as in the prior art only if the knowledge, sale, use, or invention took place in the United States.[135] However, for patents applied for on or after March 16, 2013, the AIA regards information "in public use, on sale, or otherwise available to the public" as prior art no matter where the use, sale, or availability is located.[136] In addition, under pre-AIA law, information in patent applications was considered prior art only as

131. *See* LEE, *supra* note 27, at 149, 163–68.

132. *See id.*

133. *See, e.g.*, KEUN LEE, THE ART OF ECONOMIC CATCH-UP: BARRIERS, DETOURS, AND LEAPFROGGING IN INNOVATION SYSTEMS 61, 117–18 (2019) (highlighting the successes of Hyundai Motors and Samsung in South Korea's automobile and electronics industries, respectively). In the case of Taiwan, examples include the numerous fully foreign-owned and joint-venture firms in the television industry from the late 1960s to the 1980s. *See* ALICE H. AMSDEN & WAN-WEN CHU, BEYOND LATE DEVELOPMENT: TAIWAN'S UPGRADING POLICIES 19–20, 23–24 (2003).

134. Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284; *see infra* text accompanying notes 136–49. Other countries have also moved in this direction. *See* Patents Act 2013, s 8 (N.Z.); PRC Patent Law, *supra* note 79, art. 23.

135. Act of July 19, 1952, Pub L. 82-593, § 102, 66 Stat. 792, 797–98, *amended by* American Inventors Protection Act of 1999, Pub L. No. 106-113 app. I, § 4806, 113 Stat. 1501A-552, 1501A-590 (codified at 35 U.S.C. § 102).

136. 35 U.S.C. § 102(a)(1).

of their US filing date (and only if the US patent was eventually granted or the application published).[137] Under current law, in similar circumstances, disclosures in US patent applications are effective as of their foreign filing date.[138] In other words, information disclosed in foreign patent applications can now become part of the prior art landscape.[139]

The value of the older rules to the United States is clear. Foreign inventors could not block the issuance of US patents based on most of their foreign inventive activity.[140] An inventor working offshore could, in short, find that if it later wanted to exploit an invention it made first, it would be required to pay royalties to a later inventor who did its work in the United States.[141] To prevent that occurrence, someone who created knowledge abroad was under pressure to bring the advance to the United States quickly, by describing it in a publication, putting the knowledge in a patent claim, or exploiting the inventions in the United States in a manner that made their technological contributions locally available.[142]

Although the AIA ended this practice there are ways in which the United States continues to limit the prior art landscape to meet policy objectives it regards as important for promoting innovation.[143] For example, the current rule on novelty removes from the prior art disclosures made by the inventor or by someone who derived the invention from the inventor, if they are made within a year of the inventor's patent application.[144] It also removes certain art made by another after a public disclosure by the inventor or by someone who derived the invention from the inventor. Furthermore, it removes certain art in patent applications that were filed after a public disclosure by the inventor or by someone who derived the invention from the inventor.[145] Finally, in some circumstances, if the art in two patent applications is owned by, or subject to assignment to, the same entity, the art disclosed in the first application cannot be used against

137. *See* Act of July 19, 1952 § 102(e), *amended by* Intellectual Property and High Technology Technical Amendments Act of 2002, Pub L. No. 107-273, § 13205, 116 Stat. 1901, 1902–03 (codified at 35 U.S.C. § 102(a)(2)); *accord In re* Hilmer, 359 F.2d 859, 882 (C.C.P.A. 1966).

138. *See* 35 U.S.C. §§ 102(d)(2), 119.

139. *See id.*

140. *See* Act of July 19, 1952 § 104 (repealed 2011).

141. *See id.* § 119 (amended 2012).

142. *Cf.* W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1549–50 (Fed. Cir. 1983) (holding that one party's "secret use" of a foreign machine cannot bar the later grant of a patent by another).

143. See, for example, the exceptions for recent disclosures in 35 U.S.C. § 102(b)(1).

144. *Id.* § 102(b)(1)(A).

145. *Id.* § 102(b)(1)(B).

the second application.[146] None of these new rules appears designed (or needed) to help the United States catch up technologically, but each is thought to improve the creative environment. These rules establish a grace period that allows inventors to share their nascent inventions with a community that can help improve them.[147] They also allow inventors to give potential users notice of the innovation and enable researchers in the same firm to collaborate with each other without fear that transfers of knowledge will invalidate patent rights.[148]

Japan and the Asian Tigers—a group of countries that have caught up to the technological frontier in the last few decades—demonstrate the value of a patent regime geared toward the capacity of local midlevel inventors.[149] For example, in a study sponsored by the Organization for Economic Co-operation and Development (OECD), Nagesh Kumar showed that strong intellectual property rights adversely affected absorption of knowledge spillovers, while countries that started with "soft" regimes, which favor local inventors, prospered.[150] Before TRIPS, Japan explicitly designed its patent policy to favor domestic inventors and encourage absorption spillovers from foreign activities.[151] It promoted a patenting culture with a utility model and an industrial design system that allowed and motivated local inventors to modify inventions made elsewhere. Kumar found that Taiwan and Korea took a similar approach.[152] Thus, he states:

> [T]he east Asian countries, viz, Japan, Korea, and Taiwan have absorbed a substantial amount of technological learning under weak intellectual property protection regimes during the early phases. These patent regimes facilitated the absorption of innovation and knowledge generated abroad by their indigenous firms. They have also encouraged incremental innovations on foreign inventions by domestic enterprises and developed a patent culture through utility models and design patents. As

146. *Id.* § 102(b)(2)(C).

147. *See* H.R. REP. NO. 108-425, at 3 (2004) (noting that collaborative research "is an essential pillar of the economy of the United States"); William G. Giltinan, *The Disclosure Function, Academic/Private Partnerships, and the Case for Affirmatively Used, Multinational Grace Periods*, 22 TEX. INTELL. PROP. L.J. 109, 147 (2014) (highlighting the advantages of the early disclosure of innovations); *see also* Frederik W. Struve, *Ending Unnecessary Novelty Destruction: Why Europe Should Adopt the Safety-Net Grace Period as an International Best Practice*, 39 WM. MITCHELL L. REV. 1404, 1409, 1418–25, 1438–40 (2013) (encouraging the major international patent offices to adopt a safety-net grace period as a best practice).

148. *See* Giltinan, *supra* note 147, at 147, 154.

149. *See* Nagesh Kumar, *Intellectual Property Rights, Technology and Economic Development: Experiences of Asian Countries*, 38 ECON. & POL. WKLY 209, 217 (2003) [hereinafter *Experiences of Asian Countries*].

150. *Id.* at 212.

151. *See id.* at 214.

152. *See id.* at 214–17.

> the local technological capabilities matured and the domestic industry sought stronger protection for guarding their inventions, the IPR [intellectual property rights] regime was strengthened….[153]

Countries have similarly varied how they implement the inventiveness requirement. As noted above, the rule in the United States has fluctuated, only recently settling on a version that considers PHOSITA to be a person with a modicum of creativity, spurred by exogenous forces.[154] Prior to the change, only references that included much more direction were considered capable of barring or invalidating a patent.[155] The landscape against which the inventive step is determined has also varied over time and remains less absolute than the novelty standard. Thus, although all art can be used to determine novelty, only art in the inventor's field and in analogous fields are used to decide on nonobviousness.[156] Furthermore, although elements inherent in a disclosure are considered for novelty purposes, they are not combinable when determining inventiveness.[157] The European Patent Convention goes a step further and excludes disclosures in patent applications from the inventiveness—but not the novelty—determination.[158] A 2004 study by the WIPO Standing Committee on Patents showed that, at that time, there were similar variations among all the countries that it surveyed.[159]

The utility models and design systems referenced by Kumar do nearly the same thing: they furnish protection for incremental advances.[160] Germany, for example, has offered midlevel inventors of products (but not processes) a "utility model" system that requires no substantive examination.[161] It also uses a relative novelty standard

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153. *Id.* at 217.

154. *See supra* text accompanying notes 99–102; 35 U.S.C. § 103.

155. *See In re* Sang–Su Lee, 277 F.3d at 1343 (citing *In re* Kotzab, 217 F.3d 1365, 1371 (Fed. Cir. 2000)) (stressing a "need for specificity" in analyzing the prior art when obviousness is in question).

156. *See* Nickola v. Peterson, 580 F.2d 898, 910–11 (6th Cir. 1978).

157. *See, e.g.*, Ruiz v. A.B. Chance Co., 234 F.3d 654, 665 (Fed. Cir. 2000).

158. Convention on the Grant of European Patents art. 56, Oct. 5, 1973, 1065 U.N.T.S. 199.

159. *WIPO Novelty Study*, *supra* note 75, at 10–20 (comparing several countries' approaches).

160. *Experiences of Asian Countries*, *supra* note 149, at 223.

161. Gebrauchsmustergesetz [GebrMG] [Utility Model Law], Aug. 28, 1986, BUNDESGESETZBLATT, Teil I [BGBL I] at 1455, § 8, last amended by Gesetz [G], Aug. 10, 2021, BGBL I at 3490, art. 3 (Ger.); *see* Roland Liesegang, *German Utility Models After the 1990 Reform Act*, 20 AIPLA Q.J. 1, 4, 6–7 (1992) (noting that Germany's definition of prior art includes written material and materials in public use). *But cf. Experiences of Asian Countries*, *supra* note 149, at 217–18 (referencing a development in Indian law that restricted the "scope of patentability . . . to only processes and not products").

somewhat similar to the one we propose.[162] Significantly, however, interest in the system has declined over the years as firms have become more inventive and turned their attention to utility patent protection.[163]

Dan Prud'homme observed an analogous trajectory in Asian countries.[164] Focusing on the world's largest users of utility model patents, namely China,[165] Japan, South Korea, and Taiwan, he found that each country recalibrated its utility model regimes over time in ways that mirrored that country's stage of economic development.[166] Thus, the regimes began by offering weak protection, as measured by requirements for novelty, inventive step, and the use of an examination procedure.[167] That created a lower rung in the protective ladder and also gave other inventors leeway to use the material in the disclosure for their own purposes.[168] As local innovators attained the proficiency needed to use accumulated knowledge, the requirements for obtaining rights became more demanding, and the regime offered broader protection.[169]

Many industrialized countries followed a similar path.[170] Some have now dropped their lower-tier systems entirely.[171] However, utility model regimes endure in some places, and a handful of industrialized countries still continue to experiment with them.[172] The European Union, for example, has considered adopting a utility model system as a way to encourage improvements to known advances and to spur

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162. *Compare* Gebrauchsmustergesetz [GebrMG] [Utility Model Law], Aug. 28, 1986, BGBL I at 1455, §§ 1–3, last amended by Gesetz [G], Aug. 10, 2021, BGBL I at 3490, art. 3 (Ger.) (protecting inventions that are "new, involve an inventive step and are commercially applicable"), *with* discussion *supra* Section III.A. (proposing "a second-tier regime that includes three key features: a relative novelty standard, an inventive step measured by the capacities of domestic artisans, and a disclosure requirement geared to local absorptive capacity.").

163. *See* Liesegang, *supra* note 161, at 2.

164. *See* Dan Prud'homme, *Utility Model Patent Regime "Strength" and Technological Development: Experiences of China and Other East Asian Latecomers*, 42 CHINA ECON. REV. 50, 67 (2017).

165. *Id*. at 51.

166. *Id*. at 59–61.

167. *See id*. at 67.

168. *See id.* at 52.

169. *Id.* at 61.

170. *See, e.g.*, UMA SUTHERSANEN, UTILITY MODELS AND INNOVATION IN DEVELOPING COUNTRIES 40–41 (2006), https://unctad.org/system/files/official-document/iteipc20066_en.pdf [https://perma.cc/4KND-4NFB].

171. Tyler J. Boschert, *Would Utility Models Improve American Innovation? Evidence from Brazil, Germany, and the United States*, 12 J. TELECOMM. & HIGH TECH. L. 133, 144–145 (2014).

172. Mark D. Janis, *Second Tier Patent Protection*, 40 HARV. INT'L L.J. 151, 166 (1999). As suggested *supra* note 30, this approach might also benefit middle income countries.

technological development within small and medium-sized firms.[173] Although the justification for such patents is in some ways similar to ours, these systems have arguably tended to pay little attention to the prior art landscape. Thus, in defining the state of the art as "everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the utility model application,"[174] the European Union's system fails to break the novelty trap.

B. Theory

As suggested earlier, economists have extensively studied why technological progress has been slow in many low-income countries, such as those in Latin America, and how it is that other countries, including the Asian Tigers, have prospered.[175] That work, which identifies many key factors, also provides support for connecting the availability of lower entry points in the intellectual property regime to a country's propensity to become innovative.[176] We summarize that literature here and demonstrate its connection to our proposals. To begin, economists essentially see two deeply interconnected problems which the following Section discusses. One is the lack of innovative capacity; the other is the difficulty of diffusing Northern technology in less-developed countries.

1. Capacity

The economics literature suggests that technological progress in developing countries is largely a matter of dependency—it depends on adopting ideas and technologies developed elsewhere.[177] Innovation is a

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173. *Amended Commission Proposal for a European Parliament and Council Directive Approximating the Legal Arrangements for the Protection of Inventions by Utility Model*, at 2, COM (1999) 309 final (Aug. 29, 2000).

174. *Id*. at 5.

175. *See supra* Section IV.A.

176. *See supra* Section IV.A.

177. *See generally* Hans Singer, *Beyond Terms of Trade—Convergence and Divergence*, 11 J. INT'L DEV. 911 (1999) (noting the differences in technological complexity between the goods traded by developed and developing countries); Hans W. Singer, *The Distribution of Gains Between Investing and Borrowing Countries*, 40 AM. ECON. REV. 473 (1950) (noting that export industries in underdeveloped countries are highly dependent on foreign technology); Raúl Prebisch, *International Trade and Payments in an Era of Coexistence: Commercial Policy in the Underdeveloped Countries*, 59 AM. ECON. REV. 251 (1959) (noting the need for industrialization in underdeveloped countries as technical progress spreads); RAÚL PREBISCH, THE ECONOMIC DEVELOPMENT OF LATIN AMERICA AND ITS PRINCIPAL PROBLEMS (1950), https://repositorio.cepal.org/bitstream/handle/11362/29973/002_en.pdf [https://perma.cc/64TY-EXMX] (noting

function of how socioeconomic, political, geographical, and legal subsystems interact, and, importantly, it is contingent upon the existence of diverse local capabilities.[178] In particular, innovation requires absorptive capacity, which is defined as "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability."[179] Thus, the extent to which a country relies on foreign technologies depends as much on its absorptive capacity as on its actual development needs.[180]

A 2008 World Bank Report corroborates this observation.[181] It shows that much of the technological progress in developing countries measured over two decades has been associated with an increase in the exposure of developing countries to foreign technologies.[182] Unfortunately, however, as the World Bank Report also demonstrates, the capacity of the population of these countries to absorb technology has improved much less.[183] Lacking the capacity to create new or adapt and improve existing technologies, average productivity and income have remained low.[184] Since these countries cannot generate innovations at the technological frontier, those with a degree of technical proficiency tend to rely instead on an explicit policy of copying foreign technologies.[185]

Steven Schnaars, following Theodore Levitt's 1966 seminal article, *Innovative Imitation*, categorized several distinct types of copying.[186] These include counterfeits or product pirates, knockoffs or clones, design copies, creative adaptations, technological leapfrogging, and adaptation to another industry.[187] Counterfeits and knockoffs are

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that the economic development of certain Latin American countries depends heavily on foreign investment).

178. Following Sanjaya Lall's seminal piece, *Technological Capabilities and Industrialization*, 20 WORLD DEV. 165 (1992), technology capability, or capacity, became widely discussed. *See, e.g.*, Giacomo Zanello, Xiaolan Fu, Pierre Mohnen & Marc Ventresca, *The Creation and Diffusion of Innovation in Developing Countries: A Systematic Literature Review*, 30 J. ECON. SURVS. 884, 904 (2016).

179. Zahra & George, *supra* note 15; Fu & Zhang, *supra* note 20 (comparing absorptive capacity policies of China and India in the Solar-PV Panel Industries).

180. Zahra & George, *supra* note 15.

181. *2008 World Bank Report*, *supra* note 23, at 7–13, 149–150.

182. *Id.* at xi.

183. *Id*. at 149.

184. *See id.* at 150.

185. *Id*. at 146.

186. STEVEN P. SCHNAARS, MANAGING IMITATION STRATEGY: HOW LATER ENTRANTS SEIZE MARKETS FROM PIONEERS 18–14 (1994); Theodore Levitt, *Innovative Imitation*, 44 HARV. BUS. REV. 63, 63 (1966).

187. SCHNAARS, *supra* note 186, at 5–8.

duplicative imitations. Counterfeits are copies sold under the same brand name as the original, often of lower quality, thereby depriving the innovator of owed profits.[188] Knockoffs or clones are different. Because they are based on products that are not (or no longer) protected by intellectual property, they are legally sold at lower prices. Clones may even exceed the original in quality.[189] From a development economics perspective, however, an economic policy based on imitation—of any kind—does not convey a sustainable competitive advantage, even when the copying is legal. If the wage cost in the imitator's country is significantly lower than the originator's, the imitator will enjoy a competitive edge in price. However, that advantage tends to be of limited duration. Eventually, lower-wage countries step in and take the market.[190]

However, adjacent to policies supporting copying are policies directed at technology adaptation. These are more beneficial for at least two reasons. First, an edge here is likely to be more durable. Second, adaptation of foreign technology makes it possible for locals to understand the benefits of these advances, use them, and progress technologically. Indeed, many developing countries that began with simple technologies (and low-intensity R&D), such as textiles, clothing, food processing, and wood products, were able to rely on such policies to advance to somewhat more complex industries, such as metals, petroleum refining, or metal products.[191] In this regard, the 2008 World Bank Report notes the importance of both imports and exports.[192] Importing foreign technology helps developing countries raise the quality of their own products and production methods.[193] Exports put locals in contact with those who can provide them with guidance on how to meet global demand. Exportation also exposes domestic producers to foreign competition.[194]

As the World Bank explains, countries differ in the ways and the rapidity with which they improve their capacity to invent.[195] The World Bank characterizes some countries as "traditionalist slow learners."[196]

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188. *Id*.

189. *Id*.

190. *See, e.g.*, Kim & Nelson, *supra* note 56.

191. U.N. Conference on Trade and Development, *World Investment Report 2005: Transnational Corporations and the Internalization of R&D*, 107–11 (2005), https://unctad.org/system/files/official-document/wir2005_en.pdf [https://perma.cc/X9FQ-PKM5].

192. *2008 World Bank Report*, *supra* note 23, at 109–110.

193. *Id.*

194. *Id*.

195. *Id*. at 110.

196. *Id*.

These countries rely heavily on learning from imports.[197] Others are considered "passive FDI dependent;"[198] they develop competencies from higher-tech exports.[199] Finally, some countries are categorized as "active FDI-dependent;" they strive to develop a strong domestic technological base.[200] Presumably, the differences stem from cultural and educational factors as well as from differences in their ability to attract FDI and technological assistance. However, given enough time, all of these learning techniques can lead to significant improvements in technological competence.[201] For example, Bangladesh, which the World Bank considered a slow learner in 2008, has since developed a vibrant manufacturing sector supported by its growing technological capability.[202] Significantly, in the last two decades, it has set up systems to ensure that rural communities can access the internet and information, created a portal for training, and improved its system of higher education.[203]

The countries that succeed in expanding their capabilities may, in the end, enjoy special advantages from entering foreign competition as latecomers.[204] Thus, even in the North, there is often a lag between the time a new technology is created and the time it is adopted.[205] First,

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197. *Id*.

198. *Id*.

199. *Id*.

200. *Id*.

201. *See generally* U.N. Conference on Trade and Development, *Facilitating Transfer of Technology to Developing Countries: A Survey of Home-Country Measures*, UNCTAD/ITE/IPC/2004/5 (2004) [hereinafter *UNCTAD Tech Transfer Report*] (providing an overview of developed countries' attempts and incentives to transfer technology to developing countries), https://unctad.org/system/files/official-document/iteipc20045_en.pdf [https://perma.cc/Z4YC-5TCA].

202. *See, e.g.*, Word Bank Group [WBG], Bangladesh: Improving Productivity and Technology Adoption Key to a Globally Competitive Manufacturing Sector (June 24, 2021), https://www.worldbank.org/en/news/press-release/2021/06/24/bangladesh-improving-productivity-and-technology-adaption-key-to-a-globally-competitive-manufacturing-sector [https://perma.cc/UX75-YHCZ] (citing Yunfan Gu, Gaurav Nayyar & Siddharth Sharma, *Gearing Up for the Future of Manufacturing in Bangladesh*, WORLD BANK GROUP [WBG] (2021), https://openknowledge.worldbank.org/handle/10986/35879 [https://perma.cc/PN3S-W657]).

203. *See, e.g.*, Anit Chowdhury, *A Tech Revolution Helps Boost Bangladesh's Development*, WORLD BANK BLOG (Oct. 8, 2017), https://blogs.worldbank.org/end-povertyinsouthasia/tech-revolution-helps-boost-bangladesh-s-development [https://perma.cc/C7YD-HAXC]; Stefan Trines, *Education in Bangladesh*, WORLD EDUC. NEWS & REV. (Aug. 1, 2019), https://wenr.wes.org/2019/08/education-in-bangladesh [https://perma.cc/EFT9-TGE3].

204. *See, e.g.*, Elise S. Brezis, Paul R. Krugman & Daniel Tsiddon, *Leapfrogging in International Competition: A Theory of Cycles in National Technological Leadership*, 83 AM. ECON. REV. 1211, 1218 (1993).

205. Diego Comin & Bart Hobijn, *Cross-Country Technology Adoption: Making the Theories Face the Facts*, 51 J. MONETARY ECON. 39, 61–62 (2004).

firms are reluctant to invest in new technology because they cannot always recover the sunk costs associated with the technology they already possess.[206] Second, it can be difficult for them to retrain workers and switch old employees to a new system of doing business.[207] In comparison, countries with newly acquired capacity do not experience these problems: when they enter the field, they do so with the latest equipment and skills and can accordingly capture gains from using more efficient equipment and production methods.[208] As a result, numerous countries have experienced these latecomer advantages and have proven that they can compete effectively on the world stage. These countries include Japan, South Korea, and Taiwan, where rapid post-war growth was rooted in the successful acquisition, imitation, and copying of technologies initially developed in industrialized economies.[209]

2. Technology Diffusion

The question then becomes: Why do industries in developing countries, which could potentially enjoy latecomer advantages, not regularly leapfrog over industries in advanced economies? Here, as the World Bank report shows, the core problem is that capacity can require familiarity with foreign inventions, yet the diffusion of new technologies can be extremely slow, especially in developing countries.[210] The World Bank looked at 102 country-technology pairings and compared how long it took, from the time of invention, for adoption to reach specified levels.[211] Over time, the pace of diffusion improved everywhere, but, at all points, it was faster in high-income countries than in low-income countries.[212]

Economists have developed a variety of models to identify and characterize technology diffusion.[213] Capacity is (ironically) a major

206. *See* Joseph Stiglitz, *Technological Change, Sunk Cost, and Competition*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 883, 889 (1987).

207. *See* Boyan Jovanovic & Yaw Nyarko, *Learning by Doing and the Choice of Technology*, 64 ECONOMETRICA 1299, 1299 (1996).

208. *See* V.V. Chari & Hugo Hopenhayn, *Vintage Human Capital, Growth, and the Diffusion of New Technology*, 99 J. POL. ECON. 1142, 1144 (1991).

209. YOUNGIL LIM, TECHNOLOGY AND PRODUCTIVITY: THE KOREAN WAY OF LEARNING AND CATCHING UP (1999).

210. *2008 World Bank Report*, *supra* note 23, at 90.

211. *Id.*

212. *Id.*

213. *See generally* ROSENBERG, *supra* note 83 (exploring technological and economic development over time in the United States). For a review of these models, see Comin & Hobijn, *supra* note 205, at 61–69 (listing vintage capital theory; a vintage human capital

factor influencing the willingness to take risks on new-to-the-country and market technologies, as well as basic technological literacy, and the skills needed to undertake the research necessary to understand, implement, and adapt modern technologies.[214] However, other factors are important as well, including the availability of financing, means for capital accumulation, the rate at which information is exchanged, and thus the presence of networks of learning.[215] Of considerable importance are the net gains that firms expect to enjoy should they implement new technology.[216] Since revenue depends on the willingness of consumers to purchase their product, the buyers' absorptive capacity and the resources they have for learning are important here as well, as does the suitability of the product to their needs.[217]

Aiding this process is complex. Both FDI and licensing opportunities can play an important role because they help make imported technologies available, sometimes without added domestic investment.[218] Furthermore, they produce technology spillovers; local workers receive training and accumulate experience as they deal with investors, which are typically multinational foreign firms.[219] Foreign affiliations can also give local workers the opportunity to work in other locations where they can learn management skills.[220] Their growing familiarity with high-tech products and techniques for using them eases the domestic adoption of similar—sometimes adapted—technology.[221] Public-private partnerships and other sorts of affiliations can have a similar impact.[222]

In some countries, migration has also proved to be significant. While the so-called brain drain can deplete the population of technically trained individuals, the diaspora can also constitute a resource.[223] It establishes connections between countries at different stages of

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model; innovator-imitator models; and theories based on the availability of general purpose technologies and complementary assets, factor endowments, trade, and vested interests and political institutions).

214. *2008 World Bank Report*, *supra* note 23, at 9.

215. *Id.* at 8–9.

216. *See* Malerba, Richard Nelson, Luigi Orsenigo & Sidney Winter, *Demand, Innovation, and the Dynamics of Market Structure: The Role of Experimental Users and Diverse Preferences*, 17 J. EVOLUTIONARY ECON. 371, 381 (2007).

217. *Id.* at 385.

218. *2008 World Bank Report*, *supra* note 23, at 116.

219. *Id.* at 117.

220. *UNCTAD Tech Transfer Report*, *supra* note 202, at 6–7.

221. *Id.*

222. *Id.* at 9–11.

223. *2008 World Bank Report*, *supra* note 23, at 123–26.

development and creates access to networks of learning.[224] Moreover, some migrants return with the knowledge and skills needed to bring foreign technologies home.[225] In India, for example, Sam Pitroda, an Indian-American, founded the Center for Development of Telematics, which introduced rural telephone exchanges that were cheap to maintain and designed to operate without air conditioning.[226] This adaptation later diffused to other developing countries.[227]

Trade can also be a significant factor in improving the rate of diffusion. As Diego Comin and Bart Hobijn have observed, it has a push and pull effect.[228] Pushing—making sales of foreign technology into developing countries—gives locals exposure to high-tech products and to their advantages.[229] In addition, these sellers have the incentives Zvi Griliches observed in connection with hybrid corn, which prompt them to help adapt the technology to local conditions.[230] Pulling happens because the domestic rivals of the firms that import the technology must adopt it themselves to stay competitive.[231]

These intertwined considerations—capacity and diffusion—provide developing countries with a choice of strategies. Some nations have made technological progress by emphasizing the capacity aspect of the problem. China, for example, has directed considerable efforts to building the capabilities of its domestic science and technology sectors.[232] Bangladesh now has a major pharmaceutical industry and has reached the point where it could, for instance, probably be manufacturing COVID-19 vaccines.[233] Other countries have focused on diffusion. Thus, the Green Revolution in India is largely attributable to the improvements to agricultural productivity and performance made possible by the widespread adoption of technological advancements.[234]

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224. *Id*.

225. *Id*.

226. *Id*. at 125.

227. *Id*.

228. Comin & Hobijn, *supra* note 205, at 66.

229. *Id*.

230. *See* Maskus & Yang, *supra* note 59, at 500.

231. Comin & Hobijn, *supra* note 205, at 67.

232. Riccardo Crescenzi & Andrés Rodríguez-Pose, *The Geography of Innovation in China and India*, 41 INT'L J. URB. & REG'L RSCH. 1010, 1030–32 (2017).

233. ABDULLAH AL FAISAL, EBL SEC., PHARMACEUTICAL INDUSTRY OF BANGLADESH 2 (2019), https://www.arx.cfa/~/media/2A85F9B2CEAB43CFAF325AB54F3EF404 [https://perma.cc/GJA5-YH32]; Kerry Cullinan, *Indonesia and Bangladesh Reveal Massive Untapped Vaccine Production Capacity at C-TAP Anniversary*, HEALTH POL'Y WATCH (Mar. 28, 2021), https://healthpolicy-watch.news/indonesia-and-bangladesh-reveal-massive-untapped-vaccine-production-capacity-at-c-tap-anniversary/ [https://perma.cc/46H4-5K9D].

234. *See* PUNJAB DEVELOPMENT REPORT, *supra* note 26.

Either way, a lower-tier patent system can help. It would afford protection geared toward the capacities of local innovators (and potential innovators) in the South and would create incentives for them to provide the education and make the adaptations required for successful diffusion. As locals begin to work in sectors of greater technological complexity, they would learn to convert proof of concept to product, develop communication styles and management techniques, and develop the ability to assess the risks and benefits of entering particular fields.[235] Over time, the manufacturing skills and scientific and technological knowledge acquired would also have the potential to enable domestic entrepreneurs to introduce evermore substantive innovations. They may also discover niches where latecomers enjoy special advantages and target those industries. These steps would, in turn, nurture the creative community and produce the ecosystem that is key to technological self-sufficiency. But because so much of this is dependent on the availability of technology that already exists in the North, breaking the novelty trap is a crucial element if a second-tier regime is to be successful.

V. CONSISTENCY WITH INTERNATIONAL INTELLECTUAL PROPERTY OBLIGATIONS

For the most part, this Article's proposals are compatible with international law. The TRIPS Agreement requires that "patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application" and allows members to "implement more extensive protection in their law than is required by this Agreement, provided that such protection does not contravene the provisions of [the] Agreement."[236] Thus, adding a second-tier regime would not in and of itself constitute a violation of TRIPS commitments. Indeed, the Paris Convention, which is incorporated by reference into the TRIPS Agreement, specifically mentions "utility models."[237] Furthermore, other than to say that "inventive step" is synonymous with "non-obvious,"[238] none of the relevant terms is defined by the TRIPS Agreement. States therefore enjoy substantial flexibility in how

235. Calestous Juma, Karen Fang, Derya Honca, Jorge Huete-Perez, Victor Konde & Sung H. Lee, *Global Governance of Technology: Meeting the Needs of Developing Countries*, 22 INT'L. J. TECH. MGMT. 629, 632 (2001).

236. TRIPS, *supra* note 5, arts. 1.1, 27.1.

237. TRIPS, *supra* note 5, art. 2.1; Paris Convention for the Protection of Industrial Property, *supra* note 51, 21 U.S.T. at 1630, 828 U.N.T.S. at 309.

238. TRIPS, *supra* note 5, art. 27 & n.5.

they structure their systems.[239] Finally, there is nothing in the TRIPS Agreement that deals with pricing or limits the ability of WTO members to impose price controls.[240]

There are, however, three somewhat difficult issues. The first concerns the key recommendation for breaking the novelty trap, which is to exclude from the landscape of prior art inventions that are not locally patented—or even inventions that are not locally practiced. The TRIPS Agreement requires that "patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced."[241] It further requires that "each Member shall accord to the nationals of other Members treatment no less favorable than that it accords to its nationals about the protection of intellectual property."[242] Arguably, these provisions mean that foreign patent holders must be permitted to enjoy the right to prevent local inventors from acquiring protection over the same, or incrementally altered—or as patent lawyers say, patentably indistinct—advances. That is, the reference in TRIPS to the enjoyment of patent rights could be understood to include the right to block others from obtaining protection on incremental improvements.[243]

It is not, however, clear that TRIPS guarantees were meant to cover anything more than the right to exclude others from practicing a patented invention.[244] Specifically, there is little to indicate that the TRIPS language should be understood as requiring states to recognize a right by one inventor to bar others from obtaining protection on related contributions. As noted above, there was a time when the United States regarded foreign knowledge and patent applications differently from US knowledge and patent applications.[245] Its trading partners objected to the practice because they saw it as depriving foreign inventors of opportunities to exploit and further develop their

239. *See, e.g.*, Novartis AG v. Union of India, AIR 2013 SC 1311 (India) (refusing to recognize patent protection for an invention patented in the North on the ground that it did not meet India's TRIPS-consistent patentability requirements).

240. *See* TRIPS, *supra* note 5, art. 1.1.

241. TRIPS, *supra* note 5, art. 27.1.

242. TRIPS, *supra* note 5, art. 3.1.

243. *Cf.* Harold C. Wegner, *TRIPS Boomerang—Obligations for Domestic Reform*, 29 VAND. J. TRANSNAT'L L. 535, 556–58 (1996) (discussing whether the US failure to allow foreign patent applications to block later-filed patents is consistent with TRIPS).

244. *Id.*

245. *See supra* text accompanying notes 134–38.

inventions in the United States.[246] Significantly, however, they did not challenge this practice in the WTO. Given that precedent, it would be difficult to argue that a second-tier system that relies on a relative novelty standard violates the TRIPS Agreement.

The proposed diffusion patent system is also different from the one US trading partners objected to in that a foreign utility patent holder could avert the creation of a separate right by engaging in diffusion activities itself. Moreover, if a foreign inventor has obtained a local patent, but the country nonetheless awarded a diffusion patent, the former patent would most likely block the use of the latter. The holder of the patent on the original advance could then either agree to license it or earn whatever royalties are set in connection with a compulsory license. Notably, the TRIPS Agreement specifically contemplates the possibility of blocking patents and allows countries to issue compulsory licenses to deal with them.[247] To put this another way, TRIPS can arguably be understood as recognizing that patent rights do not extend to blocking improvements and that later inventors might diminish some of the opportunities otherwise available to earlier innovators.

But the compulsory license alternative suggests another problem. To a considerable extent, the diffusion patent system is designed to put pressure on the original utility patentee to exploit the invention itself. That is not very different from the way the local working requirement in the Paris Convention is meant to operate.[248] That provision has been the source of considerable controversy precisely because it limits the choices that patentees can make.[249] It has been repeatedly amended to make it more difficult to invoke.[250] And it currently includes waiting periods that are not a principal part of our recommendations.[251] In addition, there are questions as to whether the local working provision was voided *sub silentio* by the TRIPS Agreement's ban on discriminating between imported and locally

246. *See, e.g.*, Lauren A. Degnan, *Does U.S. Patent Law Comply with TRIPS Articles 3 and 27 with Respect to the Treatment of Inventive Activity?*, 78 J. PAT. & TRADEMARK OFF. SOC'Y 108, 120 (1996).

247. TRIPS, *supra* note 5, art. 31.

248. Paris Convention for the Protection of Industrial Property, *supra* note 51, 21 U.S.T. at 1636–37, 828 U.N.T.S. at 321.

249. G.H.C. BODENHAUSEN, GUIDE TO THE APPLICATION OF THE PARIS CONVENTION FOR THE PROTECTION OF INDUSTRIAL PROPERTY 67–68 (1968).

250. *Id.*

251. Marketa Trimble, *Patent Working Requirements: Historical and Comparative Perspectives*, 6 U.C. IRVINE L. REV. 483, 496 (2016).

produced inventions.[252] Nonetheless, we believe that the differences between a local working requirement and a diffusion patent are significant enough for the proposal to survive a TRIPS challenge. Among other things, the diffusion patent recognizes that simply working an invention is not sufficient to diffuse it or to build a local creative community. Rather, it requires intellectual contributions to adapt it to local conditions and to create markets for the product.

The third problem is more serious. Limiting diffusion patents to local inventors conflicts with the national treatment guarantee—that is, with the obligation to accord to nationals of every WTO member "treatment no less favourable" to that which the member accords to its own nationals.[253] To avoid a violation, the class of beneficiaries could be broadened. It could be structured to include anyone willing to operate locally. But as we suggested, that practice could easily crowd out locals.[254] The same benefits might be achieved for diffusing the invention, but the protection is likely to be less effective at fostering domestic creativity. Thus, it may do little to promote technological self-sufficiency.

Another approach is to broaden the class of potential beneficiaries to include nationals in similarly situated developing countries. Even better would be to create a unitary system that protected and encouraged diffusion activities in multiple countries in the South. That would increase the pool of mid-level inventors who would be interested in undertaking local diffusion. And the larger market would enhance the available incentives. More important for TRIPS, if the beneficiaries are defined by economic status, other countries could not claim de jure discrimination.[255]

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252. TRIPS, *supra* note 5, art. 27.1; NUNO PIRES DE CARVALHO, THE TRIPS REGIME OF PATENT RIGHTS § 27.66 (2010) (arguing that the local working requirement is not TRIPS-compatible); Thomas Cottier, Shaheeza Lalani & Michelangelo Temmerman, *Use It or Lose It? Assessing the Compatibility of the Paris Convention & TRIPS with Respect to Local Working Requirements*, 17 J. INT'L ECON L. 437, 439 (2014) (suggesting conditions that justify invocation of the Paris Convention Article 5A); DANIEL GERVAIS, THE TRIPS AGREEMENT: DRAFTING HISTORY AND ANALYSIS 232 (4th ed. 2012) (arguing that the working requirement survives TRIPS).

253. TRIPS, *supra* note 5, art. 3; *see also* TRIPS, *supra* note 5, art. 4 (requiring that any protection given to one member be accorded to all members); Paris Convention for the Protection of Industrial Property, *supra* note 51, 21 U.S.T. at 1631, 828 U.N.T.S. at 313 art. 3 (requiring all members receive the same treatment as would be afforded to domestic actors).

254. Cottier et al., *supra* note 252.

255. U.S. PAT. & TRADEMARK OFF., SUMMARY OF THE REPORT OF THE PANEL (WT/DS174/R) OF MARCH 15, 2005 REGARDING THE COMPLAINT BY THE UNITED STATES AGAINST THE EUROPEAN COMMUNITIES ON THE PROTECTION OF TRADEMARKS AND GEOGRAPHICAL INDICATION FOR AGRICULTURAL PRODUCTS AND FOODSTUFFS 1 (2005), https://www.uspto.gov/sites/default/files/web/offices/dcom/olia/globalip/pdf/case_summary.pdf [https://perma.cc/R7VP-ZDXJ].

Other countries might, however, argue that such a system discriminates de facto: they might claim that status is simply a proxy for nationality.[256] As the WTO panel decision in the *EC-GI* dispute made clear, de facto discrimination can also be actionable.[257] That case involved an EU Regulation that set out one procedure for acquiring geographical indications for foods produced in the European Union and another (more onerous) procedure for foods made elsewhere.[258] Although the Regulation did not expressly discriminate among WTO countries, the Panel held the distinctions between the place of production did not "occur as a random outcome in a particular case but as a feature of the design and structure of the system," and the system would "operate in practice" to discriminate "to the detriment" of the nationals of countries that are not in the European Union.[259] The Panel then held that to permit members to substitute the *place of production* for *nationality* would undermine an important feature of the WTO framework agreements: the guarantee that right holders would enjoy "effective equality of opportunities" to trade in WTO markets.[260] To be sure, there are differences between the Regulation at issue in *EC-GI* and a law that treats inventors from developing countries in a special way. However, substituting economic indicators for nationality has essentially the same effect. Indeed, limiting the diffusion patent regime to nationals of similarly situated countries is intended as a form of protectionism: its goal is to enhance domestic technological proficiency by sheltering locals from being crowded out by foreigners.

It is, however, worth noting that it is not clear that the national treatment obligation has ever been faithfully honored in the patenting realm. In a series of studies of patent office actions in the IP5 (the USPTO, the Japanese Patent Office, the European Patent Office, the National Intellectual Property Administration of the People's Republic of China, and Korean Intellectual Property Office), Beth Webster and her coauthors observed systematic bias against foreign inventors.[261] Although the authors found that the bias is reduced when inventors

256. *Id*. at 4.

257. *Id*. at 1.

258. *Id.*

259. Panel Report, *European Communities – Protection of Trademarks and Geographical Indications for Agricultural Products and Foodstuffs*, ¶ 7.194, WTO Doc. WT/DS174/R (Mar. 15, 2005).

260. *Id*. ¶¶ 7.199–.200.

261. Elizabeth Webster, Paul H. Jensen & Alfons Palangkaraya, *Patent Examination Outcomes and the National Treatment Principle*, 45 RAND J. ECON. 449, 464 (2014).

rely on local prosecution attorneys, it does not disappear.[262] The PCT can even exacerbate the effect because it too creates a bias in favor of local applicants.[263] Indeed, in Kumar's close study of patenting in the Tiger economies, he found that until Japan developed technological capacities on par with developed economies, patent applications by foreigners experienced longer pendency periods in the patent office relative to domestic applications (and, since the term begins on the filing date, therefore enjoyed shorter terms of protection).[264] The claims that were eventually issued also tended to be narrower than claims in the patents of domestic inventors.[265] Similarly, Korea tolerated lax enforcement (and multiple complaints from the United States) to facilitate duplicative imitation.[266] In his report to the OECD, Kumar concluded that the TRIPS Agreement should be revised to give developing countries more flexibility until they reach a specified per capita income.[267]

A strong argument can be made that even without amending the Agreement, this flexibility is available. While it is true that the transition provisions included in TRIPS (some of which have been extended several times) do not apply to national treatment obligations,[268] WTO law should be construed to give developing countries room to maneuver with respect to issues involving development. For example, Simon Klopschinski, Christopher S. Gibson, and Henning Grosse Ruse-Khan have suggested that the national treatment obligation in TRIPS should be interpreted in light of its analog in the General Agreement on Tariffs and Trade (GATT).[269] The relevant GATT provision requires nondiscrimination among products of

262. Gaétan de Rassenfosse, Paul H. Jensen, T'Mir D. Julius, Alfons Palangkaraya, & Elizabeth Webster, *Is the Patent System a Level Playing Field: The Effect of Patent Attorney Firms*, 62 U. CHI. J.L. & ECON. 663, 667 (2019).

263. *Id.* at 779.

264. *Experiences of Asian Countries*, *supra* note 150, at 214.

265. *Id.*

266. *Id*. at 215.

267. *Id*. at 224.

268. TRIPS, *supra* note 5, arts. 65–66; Decision of the Council for Trade-Related Intellectual Property Rights, *Extension of the Transition Period Under Article 66.1 for Least Developed Country Members*, ¶ 1, WTO Doc. IP/C/64 (June 11, 2013).

269. General Agreement on Tariffs and Trade art. 3.4, Oct. 30, 1947, 61 Stat. A-11, 55 U.N.T.S. 194 [hereinafter GATT] ("The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to *like products* of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation") (emphasis added); SIMON KLOPSCHINSKI, CHRISTOPHER S. GIBSON & HENNING GROSSE RUSE-KHAN, THE PROTECTION OF INTELLECTUAL PROPERTY RIGHTS UNDER INTERNATIONAL INVESTMENT LAW 204 (2021).

different national origins. Notably, it applies only to *like* products.[270] Accordingly, WTO members can distinguish among products that are different in ways that further their own national policies. TRIPS focuses on the nationality of right holders rather than products.[271] True, it does not include the comparator "like."[272] But interpolating a comparison into the Agreement that permits countries to distinguish among inventors of different nationalities is consistent with WTO goals and values.[273] TRIPS would then recognize that inventors from different countries are in very different positions from one another and that affording them effective equality of opportunities requires nations to make distinctions to enable their inventors to compete. Significantly, Thomas Cottier, a member of the Swiss delegation during the negotiation of the TRIPS Agreement, has argued that the objectives and principles articulated by the TRIPS Agreement, which explicitly refer to "the promotion of technological innovation and to the transfer and dissemination of technology in a manner conducive to social and economic welfare," requires that the Agreement be interpreted in a manner conducive to technological development.[274]

A softer view of national treatment also accords with recommendations that UNCTAD made when WIPO first considered the idea of harmonizing IP laws more thoroughly.[275] In its view:

> "[E]quality of treatment only makes sense when the parties involved are in a general way equal; when they are not, equality of treatment simply gives the stronger party unlimited freedom to utilize his power at the expense of the weaker party."[276]

Writing in 1975, UNCTAD was concerned that harmonization would create a "reverse system of preferences" that would favor highly developed countries and impose heavy costs on other nations.[277]

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270. GATT, *supra* note 269. "Like products" is a term of art in the GATT; for a discussion of its many uses, see WON-MOG CHOI, 'LIKE PRODUCTS' IN INTERNATIONAL TRADE LAW: TOWARDS A CONSISTENT GATT/WTO JURISPRUDENCE (2003).

271. TRIPS, *supra* note 5, art. 3.

272. *Id.*

273. *See, e.g.*, KLOPSCHINSKI ET AL., *supra* note 269.

274. Cottier et al., *supra* note 252, at 448–50 (citing TRIPS, *supra* note 5, art. 7; World Trade Organization, Ministerial Declaration of 14 November 2001, WTO Doc. WT/MIN(01)/DEC/1, 41 ILM 746 (2002) [hereinafter Doha Declaration]) (noting that the preamble to TRIPS recognizes the special needs of development and that the Doha Declaration emphasizes the need for flexibility).

275. U.N. Dep't of Econ. & Soc. Affs., U.N. Conf. on Trade & Dev. Secretariat & Int'l Bureau of the World Intell. Prop. Org., *The Role of the Patent System in the Transfer of Technology to Developing Countries*, at 47, TD/B/AC.11/19/Rev.1 (1975) [hereinafter *The Role of the Patent System*].

276. *Id.*

277. *Id.* at 64.

Subsequent events have shown UNCTAD to be prescient.[278] As noted in the introduction, technological inequality has persisted under TRIPS, and the sequelae of the COVID-19 pandemic demonstrate its tragic consequences.[279] UNCTAD advocated for an international system that allowed for national differences designed to promote technological development.[280] Although TRIPS may represent more harmonization than UNCTAD considered wise,[281] it is a minimum standards agreement, and the commitment to flexibility should permeate the interpretation of all its provisions, including the ones on nondiscrimination.[282] Furthermore, although the WTO does not generally make normative judgments concerning the regulatory purpose of challenged legislation,[283] a strong argument can be made that the catastrophic consequences of technological dependency require the WTO to take into account the need of all countries to grow their technological sectors.[284]

VI. CONCLUSION

The inadequacy of the global response to COVID-19 has exposed a deep flaw in the international intellectual property system. By raising costs and impeding technological development in the Global South, the TRIPS Agreement has left many countries incapable of developing, manufacturing, and distributing innovations that are crucial to survival. Changing intellectual property law will, of course, not cure the problem. Technological dependency has many root causes, including the absence of a trained workforce and an appreciation for the value of acquiring human capital; the paucity of venture capitalists, entrepreneurs, and lawyers; deficiencies in infrastructure, such as the absence of laboratories, roads, and refrigeration; governance problems; and inadequate institutions to support education, capital accumulation, and risk-taking. But it is important to remember that these factors are interdependent: a country needs a research base to create incentives to

278. *See generally* Gathii, *supra* note 39.

279. *See supra* text accompanying notes 1–9.

280. *The Role of the Patent System*, *supra* note 275, at 64.

281. *See* Dreyfuss & Reichman, *supra* note 76, at 126.

282. *Id.* at 109; TRIPS, *supra* note 5.

283. DINWOODIE & DREYFUSS, *supra* note 51, at 117.

284. *Id.* at 193; *cf.* Weihuan Zhou, *Rethinking National Treatment and the Role of Regulatory Purpose: Lessons from the Theory of Distortions and Welfare*, 12 MANCHESTER J. INT'L ECON. L. 243, 267–68 (2015) (arguing that the welfare objectives should be taken into account when analyzing the national treatment guarantees of all WTO agreements).

adopt a strong patent system.[285] It needs a patent system to attract venture capitalists, high-tech jobs to make it worth acquiring human capital, and seekers of education to promote the need for universities. Thus, while modifications to the intellectual property system are not a cure, reform can be an important step.

A fundamental question is how that step ought to be designed. In this Article, we discuss one way in which intellectual property law has interfered with development: the structure of patent law has trapped novel advances in a legal limbo that makes it difficult for less developed countries to enjoy high-tech products, reach the technological frontier, or even attain technological self-sufficiency in areas of critical importance, such as health care. Accordingly, we have offered various approaches to breaking that trap.

285. *See, e.g.*, Walter Park & Juan Carlos Ginarte, *Intellectual Property and Economic Growth*, 15 CONTEMP. ECON. POL'Y 51, 52 (1997).