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Patents and Economic Inequality

Daniel Benoliel[*] *and Rochelle C. Dreyfuss*

INTRODUCTION

The needs of the Global South (or South) are proving to be far more complex and difficult to ameliorate than anticipated when the World Trade Organization was established amid promises of enhancing social welfare.[1] In particular, inequality among member states has persisted despite the optimistic projections made during the Uruguay Round negotiations. This is an issue of concern to intellectual property scholars because economic theory suggests that technology policy is a key contributor.[2] That is, it appears that strong patent protection and the returns on investment available to those who innovate lead to advances that increase productivity. For example, in their book *The Second Machine Age*, Erik Brynjolfsson and Andrew MacAfee found an exponential rise of digital technologies automating jobs, offering capital owners and innovators an accumulative stake of productivity.[3] With that increase, there is a concomitant growth in income for the innovators themselves, as well as both income and other benefits that accrue to the countries where these inventors reside.[4]

[*] This chapter was completed as an Oxford Intellectual Property Research Center (OIPRC) Visiting Academic, University of Oxford Faculty of Law (Hilary and Trinity Terms, 2021).

[1] Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299 [hereinafter TRIPS Agreement]; Philip M. Nichols, *Trade without Values*, 90 Nw. U. L. Rev. 658 (1996).

[2] See, for example, Erik Brynjolfsson & Andrew McAfee, The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies 133 (2014) (concluding that the main driver of inequality is "exponential, digital, and combinatorial change in the technology that undergirds the economic system").

[3] *Id.* at 171–72.

[4] In the recent decade, several studies have considered the impact of innovation and patent policies on income inequality. See, for example, Philippe Aghion, Ufuk Akcigit, Antonin Bergeaud, Richard Blundell & David Hémous, *Innovation and Top Income Inequality*, 86 Rev. Econ. Stud. 1 (2019); Angus C. Chu, *Effects of Patent Policy on Income and*

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Developed countries are in a superior position in this regard, not only because their technical capabilities are at the technological forefront. As economists such as Stanley Engerman and Raymond Sokoloff have demonstrated, they are also advantaged by the presence of wealthy individuals and a large middle class with a strong appetite for technological advances, which helps to spur innovation from the demand side.[5]

The situation can be very different in developing countries. Reflecting their limited market and institutional capacity to innovate, or to adapt and improve upon existing technologies,[6] many developing countries are characterized by low incomes resulting from low average productivity. There are, however, a few developing countries – such as Brazil, China, India, and Malaysia – that have achieved relatively advanced levels of technological capability.[7] Significantly, these countries have primarily relied on an explicit policy of copying foreign technologies.[8] Rather than attempting to expand the global frontier – which, as the World Bank has found, is likely beyond their past (and often present) abilities[9] – these nations advance the adoption and adaptation of preexisting technologies.[10] In short, they engage, at least partly, in what Jerome Reichman has termed "fair following."[11] In a prescient article, written as the

Consumption Inequality in a R&D Growth Model, 77 S. Econ. J. 336, 337 (2010) (finding that patent policies contributed to the recent trend of inequality in the United States). British researchers Richard Wilkinson and Kate Pickett have found higher rates and numbers of patents issued in countries and states with higher inequality. Kate E. Pickett & Richard G. Wilkinson, *Income Inequality and Health: A Causal Review*, 128 Soc. Sci. & Med. 316 (2015).

For a detailed discussion of how intellectual property inhibits innovation, see Joseph E. Stiglitz, The Price of Inequality: How Today's Divided Society Endangers Our Future 54 (2012); Joseph E. Stiglitz, Making Globalization Work (2006); Claude Henry & Joseph E. Stiglitz, *Intellectual Property, Dissemination of Innovation, and Sustainable Development*, 1 Glob. Pol'y 237 (2010). *See also* discussion in Section 5.1.

On the historical inequalities within U.S. and British patent systems, see B. Zorina Khan & Kenneth Sokoloff, *Patent Institutions, Industrial Organization and Early Technological Change: Britain and the United States, 1790–1850*, *in* Technological Revolutions in Europe (Maxine Berg & Kristine Bruland eds., 1998); B. Zorina Khan, *Intellectual Property and Economic Development: Lessons from American and European History* (Comm'n on Intell. Prop. Rts., Study Paper No. 1a, 2002); B. Zorina Khan, The Democratization of Invention: Patents and Copyrights in American Development 1790–1920 (2005).

5 Stanley L. Engerman, Stephen H. Haber & 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).

6 See, for example, Tilman Altenburg, *Building Inclusive Innovation Systems in Developing Countries: Challenges for IS Research*, *in* Handbook of Innovation Systems and Developing Countries 33, 35 (Bengt-Åke Lundvall, K.J. Joseph, Cristina Chaminade & Jan Vang eds., 2009).

7 *See* Jean-Eric Aubert, *Promoting Innovation in Developing Countries: A Conceptual Framework* 3 (World Bank Pol'y Rsch., Working Paper No. 3554, 2005).

8 *Id.*

9 *Id.*

10 *See id.* at 12; Altenburg, *supra* note 6, at 35.

11 Jerome H. Reichman, *From Free-Riders to Fair Followers: Global Competition under the TRIPS Agreement*, 29 N.Y.U. J. Int'l L. & Pol. 11 (1997).

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Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) went into force, Reichman suggested that fair following creates domestic training and educational opportunities, plugs local personnel into global information networks, and gives rise to conditions conducive to growth in technological capacity.[12] Twenty-five years of experience with the TRIPS Agreement suggests that Reichman and the countries that followed his vision were right. Many lessons can be drawn from their practices, as we discuss, given the concern over economic inequality.

The first section of this chapter identifies the roles that innovation and international intellectual property protection play within the theory of economic inequality. The second section focuses on the impact of international patent law and demonstrates how the demands of the North for ever-stronger patent and patent-like protection exacerbate the problem of technological inequality. The third section suggests ways in which the patent system could be restructured to better enable local inventors to avail themselves of the global knowledge base and enhance the incentives available to innovators who fulfill the needs of the South. In our view, reducing intellectual property–based inequality in the ways we outline is a key step toward mitigating the problem of income inequality.

5.1 INEQUALITY ECONOMICS AND THE ROLE OF INTELLECTUAL PROPERTY

5.1.1 *The Kuznets Theorem and Its Demise*

Much of the intellectual framework that led to the present-day economic inequality critique emerged as the backdrop of postwar theories put forth by economists Simon Kuznets and John Maynard Keynes.[13] Kuznets used twentieth-century U.S. tax returns to correlate income as measured by GDP per capita with income inequality. The resulting inverted U-shaped curve demonstrated that as per capita income increases, inequality at first increases as well but eventually declines.[14] Kuznets viewed the shape of the curve optimistically and hypothesized that as economic development increases per capita income, more people are put in a position to take advantage of the opportunities presented. As a result, Kuznets theorized, inequality would decline over time and stabilize at a tolerable level.[15] The Kuznets curve

[12] *Id.* at 80–81.

[13] For discussion of the two economists, see Thomas Piketty, Capital in the Twenty-First Century 13–15 (2014); David Singh Grewal & Jedediah Purdy, *Inequality Rediscovered*, 18 Theoretical Inquiries L. 61, 64–66 (2017).

[14] Simon Kuznets, *Economic Growth and Income Inequality*, 45 Am. Econ. Rev. 1 (1955); *see also* Emmanuel Saez & Gabriel Zucman, *Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data*, 131 Q.J. Econ. 519 (2016).

[15] As Piketty explains, the share of total income accruing to the top 1 percent declined remarkably from about 24 percent in the mid-1920s to a low of about 9 percent in the early 1970s. Piketty, *supra* note 13, at 300.

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became macroeconomic shorthand for confidence about the social value of economic growth and led to numerous theoretical ramifications. Most notable was Grossman and Krueger's "environmental Kuznets curve," which suggests a comparable relationship between income and environmental degradation.[16]

Keynes presented the second theory, which is that the "economic problem" of scarcity was solvable.[17] In his view, the state had gained the capability, authority, and legitimacy to improve economic well-being. While Keynes's main contribution was that business cycles could be managed by inducing demand through the use of public spending or low interest rates,[18] the application of his findings had broader social and political ramifications. Taken together, the optimistic views of Kuznets and Keynes implied that economic inequality would not increase. Moreover, if inequality did grow, there was no reason that a democratic political order would not be able to correct the problem.

Nonetheless, since the early 1970s, economic inequality has risen steadily.[19] During the 1990s, Klaus Deininger and Lyn Squire collected data on changes in the Gini index of income distribution in numerous countries and developed an intertemporal correlation between growth and inequality.[20] They concluded that the correlation Kuznets found between economic growth and inequality is more often disproved than confirmed. Sudhir Anand and R.S.M. Kanbur,[21] as well as others,[22] including notably Joseph Stiglitz[23] and Thomas Piketty,[24] offered comparable critiques that systematically refuted Kuznets' findings. Concern about the optimistic view of inequality spread from economics to political philosophy, law,

[16] Gene M. Grossman & Alan B. Krueger, *Economic Growth and the Environment*, 110 Q.J. Econ. 353 (1995) (arguing that pollution rises early in the development process and then falls as wealthy societies adopt environmental regulations).

[17] John M. Keynes, *Economic Possibilities for Our Grandchildren*, *in* Essays in Persuasion 358 (W.W. Norton & Co. 1963) (1931).

[18] *Id.*

[19] Piketty, *supra* note 13, at 300.

[20] Klaus Deininger & Lyn Squire, *A New Data Set Measuring Income Inequality*, 10 World Bank Econ. Rev. 565 (1996); *see also* Klaus Deininger & Lyn Squire, *New Ways of Looking at Old Issues: Inequality and Growth*, 57 J. Dev. Econ. 259 (1998).

[21] Sudhir Anand & S.M.R. Kanbur, *The Kuznets Process and the Inequality-Development Relationship*, 40 J. Dev. Econ. 25 (1993).

[22] Robert Barro, *Inequality and Growth in a Panel of Countries*, 5 J. Econ. Growth 5 (2000); Matthew Higgins & Jeffrey G. Williamson, *Explaining Inequality the World Round: Cohort Size, Kuznets Curves and Openness* (Nat'l Bureau of Econ. Rsch., Working Paper No. 7224, 1999); Andreas Savvides & Thanasis Stengos, *Income Inequality and Economic Development: Evidence from the Threshold Regression Model*, 69 Econ. Letters 207 (2000); *see also* Anthony B. Atkinson, *The Changing Distribution of Income: Evidence and Explanations*, 1 German Econ. Rev. 3 (2000); Anthony B. Atkinson, *Income Inequality in OECD Countries: Data and Explanations*, 49 CESifo Econ. Stud. 479 (2003).

[23] Joseph E. Stiglitz, The Great Divide: Unequal Societies and What We Can Do about Them 88 (2015) (providing a comparison of the wealth controlled by the top 1 percent over time).

[24] Piketty, *supra* note 13.

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and public policy.[25] It began to engage thinking within the international intellectual property community, as this volume demonstrates.

5.1.2 *Economic Inequality, Capital, and Innovation*

To date, economic inequality in the United States is still largely explained by unequal income effects. Thus, the perception is that stagnancy within the middle- and lower-income classes – their lack of consumption relative to the rich – hampers sustainable economic growth.[26] The presence of wealth does not help, as the rich, under this view, are thought to have reached the point of saturation.

This conception of the problem has had a substantial influence on the literature of the economics of intellectual property. Thus, Angus Chu,[27] alone and with Shin-Kun Peng,[28] and Christian Kiedaisch[29] examined the causal effect of patent policy on inequality. Similarly, Philippe Aghion and his coauthors found that "the top 1% income share in a given U.S. state in a given year, was positively and significantly correlated with the state's degree of innovativeness,"[30] and that there is a "causal effect of innovation-led growth on top incomes."[31] In recent work, researchers demonstrated that intellectual property–based capital accounts entirely for the observed decline of the U.S. labor share measured by wages paid to employees. Wages are otherwise constant for traditional capital. This decline in the labor share arguably reflects the transition that the United States is undergoing to a more knowledge-based economy.[32]

The effects of intellectual property protection have also been noted. Joseph Stiglitz argued that one effect of monopoly rent regimes is that they impede access to healthcare, which creates inequality and hampers growth more generally.[33] Keith Maskus added that an effective intellectual property regime has an impact not only

[25] Grewal & Purdy, *supra* note 13, at 64.

[26] Federico Cingano, *Trends in Income Inequality and Its Impact on Economic Growth* 18 (Org. for Econ. Co-operation & Dev., Soc., Emp. & Migration Working Paper No. 163, 2014); Ganesh Sitaraman, The Crisis of the Middle-Class Constitution: Why Economic Inequality Threatens Our Republic 17 (2017).

[27] Chu, *supra* note 4.

[28] *See* Angus C. Chu & Shin-Kun Peng, *Effect of TRIPS on Growth, Welfare and Income-Inequality in an R&D Growth Model*, 33 J. Macroeconomics 276 (2011) (finding that strengthening intellectual property protection increases growth rates, which raises disparities in wealth distribution and ultimately leads to an increase in income inequality).

[29] Christian Kiedaisch, *Growth and Welfare Effects of Intellectual Property Rights When Consumers Differ in Income* (Univ. of Zurich, Dep't of Econ., Working Paper No. 221, 2016).

[30] Aghion et al., *supra* note 4, at 3.

[31] *Id.*

[32] Dongya Koh, Raül Santaeulàlia-Llopis & Yu Zheng, *Labor Share Decline and Intellectual Property Products Capital* (Barcelona Graduate Sch. of Econ., Working Paper No. 927, 2016).

[33] Joseph E. Stiglitz, *How Intellectual Property Reinforces Inequality*, N.Y. Times (July 14, 2013), https://opinionator.blogs.nytimes.com/2013/07/14/how-intellectual-property-reinforces-inequality/.

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on the incentive to create new knowledge and disseminate it but also on the structure of markets, prices, and distributional equity.[34] In a vast panel regression analysis, Samuel Adams found that strengthening intellectual property protection has a positive and statistically significant effect on income inequality.[35]

Some scholars further elucidated the connection between inequality and intellectual property. One core observation related to the unique contribution of capital. As Piketty showed, capital is distributed less evenly than labor income, and this factor has a significant impact on overall household income.[36] Significantly, he defined capital to include land, real estate, equipment, financial capital, and also intellectual property.[37] According to Piketty, Kuznets's predictions were wrong because he failed to take into account capital – tangible and intangible – as a central variable. To correct the problem, Piketty developed an updated Kuznets curve for a 100-year period, from 1910 to 2010. According to this curve, until 1955, the share of the top income decile in the United States changed in the same manner as shown in Kuznets's paper. This share declined from the 1920s to the end of World War II and then leveled out until the early 1980s. However, starting in the 1980s, when deregulation and privatization policies were launched, the share of inequality increased dramatically.[38] Changes in the strategies for privatizing innovation, primarily through the aggregation of thousands of patents, shifted the sole focus from the value of one patent to the size and diversity of a portfolio. These strategies regularly posed a new and more substantial threat to entry because they forced the targets of litigation to face multiple simultaneous infringement allegations, which raised the cost and difficulty of mounting a successful defense.[39]

[34] Keith E. Maskus, *Intellectual Property Rights and Economic Development*, 32 Case W. Rsrv. J. Int'l L. 471 (2000).

[35] Adams examines the relationship between intellectual property rights and income inequality for a cross-section of sixty-two developing countries over the period 1985–2001. *See* Samuel Adams, *Globalization and Income Inequality: Implications for Intellectual Property Rights*, 30 J. Pol'y Modeling 725 (2008).

[36] Piketty, *supra* note 13, at 266–69. For earlier findings, see Deborah Reed & Maria Cancian, *Sources of Inequality: Measuring the Contributions of Income Sources to Rising Family Income Inequality*, 47 Rev. Income & Wealth 321 (2001) (showing that asset income causes about one-fourth of the increase in income inequality in the 1990s, compared to one-tenth of the rise in income inequality in the 1970s).

[37] Piketty, *supra* note 13, at 61.

[38] *Id.* at 172.

[39] *See* Tom Ewing & Robin Feldman, *The Giants among Us*, 1 Stan. Tech. L. Rev. 1 (2012); Colleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 Hastings L.J. 297, 299 (2010); Julien Pénin, *Strategic Uses of Patents in Markets for Technology: A Story of Fabless Firms, Brokers and Trolls*, 84 J. Econ. Behav. & Org. 633 (2012); James E. Bessen & Michael J. Meurer, *The Private Costs of Patent Litigation*, 9 J.L. Econ. & Pol'y 59, 80 (2012) (discussing the deterring effect of costly patent litigation); Rosemarie Ham Ziedonis, *Don't Fence Me In: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms*, 50 Mgmt. Sci. 804, 817 (2004) (using transaction cost theory to predict that firms with many patents will be inclined to patent more aggressively).

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Another strand of literature examined the global dimension of inequality as it interrelates with economic development in the South. During the 1980s and 1990s, there was a sharp increase in wage inequality matched by a sharp decrease in the relative demand for less skilled workers. Elias Dinopoulos and Paul Segerstrom provided the common North–North trade explanation for these results, which presumably also applies to income inequality in the South.[40] In this view, income inequality results from trade liberalization, which enhances the benefits of upgrading skills and engaging in research and development (R&D).[41] The relationship between skilled employment and R&D activity, as well as between trade liberalization and R&D, received renewed attention during the 1990s. Studies by Alberto Alesina and Dani Rodrik, among others, found a negative correlation between inequality and economic development across the North–South divide.[42] Alesina and others suggest that the effect is largely caused by patterns of foreign investment. After the TRIPS Agreement came into force, developing countries were required to amend their intellectual property laws to conform to its requirements.[43] This led to a proliferation of intellectual property rights, followed by an upsurge in income inequality in the South. TRIPS conformity had, in short, further increased skilled labor wages and created a wage bias in favor of skilled, relative to unskilled, labor. In this way, compliance with the TRIPS Agreement aggravated income inequality across the development divide.[44] Because higher levels of inequality tend to generate political instability and result in policies that favor income redistribution, inequality also discouraged investment, and, in turn, further slowed economic growth.

[40] Elias Dinopoulos & Paul Segerstrom, A *Schumpeterian Model of Protection and Relative Wages*, 89 Am. Econ. Rev. 450 (1999).

[41] *Id.*

[42] Alberto Alesina & Dani Rodrik, *Distributive Politics and Economic Growth*, 109 Q.J. Econ. 465 (1994); Roberto Perotti, *Income Distribution and Development*, 38 Eur. Econ. Rev. 149 (1994); Alberto Alesina & Roberto Perotti, *Income Distribution, Political Instability, and Investment*, 40 Eur. Econ. Rev. 1203 (1996). See Lawrence Khoo & Benjamin Dennis, *Income Inequality, Fertility Choice, and Economic Growth: Theory and Evidence* (Harv. Inst. for Int'l Dev., Discussion Paper No. 687, 1999) for a cross-national study of seventy-nine to ninety-one countries between 1960 and 1985 witnessing the negative effect of income inequality on economic growth. For earlier findings, see also Torsten Persson & Guido Tabellini, *Is Inequality Harmful for Growth? Theory and Evidence*, 84 Am. Econ. Rev. 600 (1996); Perotti, *supra*.

[43] Swati Saini and Meeta Mehra argue that intellectual property rights increased within-country income inequality for a cross-section of sixty-five developed and developing countries between 1995 and 2009. *See* Swati Saini & Meeta K. Mehra, *Impact of Strengthening Intellectual Property Rights Regime on Income Inequality: An Econometric Analysis*, 38 Econ. Bull. 1703 (2018). For economic literature concluding that developing countries have been losing in terms of economic growth due to stringent TRIPS standards, see also Edwin L.C. Lai, *International Intellectual Property Rights Protection and the Rate of Product Innovation*, 55 J. Dev. Econ. 133 (1998); Gene Grossman & Edwin L.C. Lai, *International Protection of Intellectual Property*, 94 Am. Econ. Rev. 1635 (2004).

[44] *See* Saini & Mehra, *supra* note 43, at 4.

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Observations that are valid for intellectual property generally can be especially acute for the international patent system, where there are several dimensions to the inequality problem. First, there is a gap in patent ownership between developed and developing countries. Although data gathered by the World Intellectual Property Organization (WIPO) suggest that the divide in the distribution of ownership is gradually narrowing, it is doing so only for the more technologically sophisticated developing countries. Another problem relates to patent commercialization.[45] With regard to the volume of licensing and royalty revenues, most developing countries appear to be drastically marginalized.[46] An additional, and perhaps most important, issue is social surplus. As a general matter, patent owners cannot capture the full value of their advances; some benefit is enjoyed by consumers who acquire the product at a price below that which they would be willing to pay. Furthermore, innovations often have spillover R&D effects: They can prompt collateral developments and lead to follow-on inventions that do not fall within the scope of the original patents.[47] When patents are not granted and inventions are not commercialized in a particular country, the citizens of that country cannot experience these positive externalities. Thus, the divide in patent activity also depresses the social surplus available to the South.[48]

[45] *See* Eugene Mattes, Michael C. Stacey & Dora Marinova, *Surveying Inventors Listed on Patents to Investigate Determinants of Innovation*, 69 SCIENTOMETRICS 476, 483 (2006) (reviewing studies on patent commercialization concluding that approximately 43–54 percent of patents get commercialized); *see also* PatVal EU Project, *The Value of European Patents: Evidence from a Survey of European Inventors* 41 fig.6.3 (2005), www.ipeg.com/wp-content/uploads/2015/02/PatVal-EU-study-2005.pdf (providing a European Commission-funded survey that focused on "important" patents, upholding that 38 percent of the patents were never commercialized); STAFF OF SUBCOMM. OF PAT., TRADEMARKS & COPYRIGHTS, COMM. ON THE JUDICIARY, 85TH CONG., AN ECONOMIC REVIEW OF THE PATENT SYSTEM 12 (Comm. Print 1958) (Fritz Machlup). For the scope of developing countries, see Roya Ghafele & Benjamin Gibert, *IP Commercialization Tactics in Developing Country Contexts*, 5 J. MGMT. & STRATEGY 2 (2014).

For a discussion on the various costs of patent commercialization, see Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 362–81 (2010) and sources therein (further proposing to create an entirely new form of patents labelled as "commercialization patents," to reduce the risks associated with commercializing inventions).

[46] *See* Ghafele & Gibert, *supra* note 45, at 3–4, 6, tbls. 1, 2 (suggesting that licensing revenues remain unequally distributed across nations, with high-income countries receiving $237,309,868,237 in royalties from licensing in 2012, middle-income countries receiving $4,473,163,968 (1.18 percent of high-income countries), and low-income countries receiving $63,957,821 and noting further that the gap cannot be explained by the gap in patent ownership).

[47] *See* Michael Kremer, *Patent Buy-Outs: A Mechanism for Encouraging Innovation* 1 (Nat'l Bureau of Econ. Rsch., Working Paper No. 6304, 1997); Steven Shavell & Tanguy V. Ypersele, *Rewards versus Intellectual Property Rights* 5–6 (Nat'l Bureau of Econ. Rsch., Working Paper No. 6956, 1999).

[48] The social surplus loss due to patents that are commercialized is measured in the short term. *See* Jeffrey L. Bran, *Turning Intellectual Assets into Business Assets*, *in* FROM IDEAS TO ASSETS: INVESTING WISELY IN INTELLECTUAL PROPERTY 65, 78 (Bruce Berman ed., 2002) (finding that market adoption occurs between three and five years); Christoph Palmberg, *The Sources of*

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5.2 PATENTED LAW AS A SOURCE OF ECONOMIC INEQUALITY

It is not only the availability of patented technology that plays a role in inequality. Patent law itself contains features that contribute to the loss of social welfare predominantly in the South. Two factors stand out. First, patent rights wall off segments of the world's knowledge base. Exclusivity can prevent others from making incremental improvements or adaptations, including advances that meet the needs of the poor but which the patent holder refuses to fulfill. Second, the patent system fails to deliver incentives to invest in inventions of interest to the South because the knowledge base – whether accessible or not – nonetheless constitutes prior art. As a result of this so-called novelty trap, the developer of advances that fulfill the demands of the South is unlikely to acquire the protection that would allow it to earn a return on investment.[49]

5.2.1 *Access*

The access problem is well recognized in the context of patented products and public health, where the ability of the South to enjoy the benefits of progress in the life sciences is limited by the TRIPS Agreement, TRIPS-plus provisions found in subsequent free trade agreements (FTAs) and various side agreements, as well as procedures certifying implementation.[50] The effect of giving right holders more control over the availability of their advances is illustrated by Ellen 't Hoen's work documenting the problem of distributing medicines to those stricken with HIV/AIDS[51] and by Amy Kapczynski's and Ana Santos Rutschman's studies of the delivery of vaccines.[52] Carlos Correa has more generally explored the impact of intellectual property on health in developing countries.[53]

Success of Innovations – Determinants of Commercialization and Break-Even Times, 26 TECHNOVATION 1253, 1259 tbl. 4 (2006) (finding that commercialization times ranged from 2.5 to 4.1 years in the chemical sector).

[49] Rochelle C. Dreyfuss & Daniel Benoliel, *Technological Self-Sufficiency and the Role of Novelty Traps*, 24 VAND. J. ENT. & TECH. L. 441 (2022).

[50] See, for example, Dominican Republic–Central America–United States Free Trade Agreement Implementation Act, § 101(b), Pub. L. 109-53, 19 Stat. 462 (2005) (providing provisions similar to those used in connection with the FTAs with Chile, Oman, Singapore, and Bahrain); Carlos M. Correa, *Mitigating the Regulatory Constraints Imposed by Intellectual Property Rules under Free Trade Agreements* 14–16, 27 (S. Ctr., Rsch. Paper No. 74, 2017); UNAIDS, *The Potential Impact of Free Trade Agreements on Public Health* (2012), www.unaids.org/sites/default/files/media_asset/JC2349_Issue_Brief_Free-Trade-Agreements_en_0.pdf.

[51] Ellen 't Hoen, *TRIPS, Pharmaceutical Patents, and Access to Essential Medicines: A Long Way from Seattle to Doha*, 3 CHI. J. INT'L L. 27 (2002).

[52] *See* Amy Kapczynski, *Order without Intellectual Property Law: Open Science in Influenza*, 102 CORNELL L. REV. 1539 (2017); Ana S. Rutschman, *IP Preparedness for Outbreak Diseases*, 65 UCLA L. REV. 1200 (2018).

[53] Carlos M. Correa, *Public Health and Patent Legislation in Developing Countries*, 3 TUL. J. TECH. & INTELL. PROP. 1 (2001).

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To a considerable extent, changes have been made to deal with this dimension of the access problem. As initially drafted, the TRIPS Agreement provided for transition periods,[54] recognized the right of member states to enact exceptions and limitations and to issue compulsory licenses,[55] and permitted parallel importation.[56] When these provisions proved inadequate, World Trade Organization (WTO) members issued ministerial declarations emphasizing the right to protect health and added (or extended) transition periods several times. The WTO also supplemented the TRIPS Agreement with a provision allowing for the use of compulsory licensing to manufacture pharmaceuticals on behalf of a country that cannot produce sufficient supply for itself.[57] Newer bilateral investment agreements and FTAs are now similarly negotiated to take account of access issues, especially in the health sphere.[58]

Less appreciated is the connection between access and innovation capacity – that is, the ways in which patent protection limits the ability of inventors to engage in follow-on innovation, including advances that deal with the technological needs of the South. Thus, while the problem of patents impeding R&D in the North has been addressed, particularly regarding patents on fundamental science and abstract ideas,[59] scant attention has been paid to the ways in which patents inhibit research aimed at producing "good enough" technologies, by the poor for the poor.[60] Such

[54] TRIPS Agreement, *supra* note 1, art. 66.1.

[55] *Id.* arts. 27, 30, 31.

[56] *Id.* art. 6.

[57] Council for TRIPS, *Extension of the Transition Period under Article 66.1 for Least Developed Country Members: Decision of the Council for TRIPS of 29 June 2021*, WTO Doc. IP/C/88 (June 29, 2021); World Trade Org., *Declaration on the TRIPS Agreement and Public Health of 14 November 2001*, WTO Doc. WT/MIN(01)/DEC/2, 41 I.L.M. 746 (2002); TRIPS Agreement, *supra* note 1, art. 31 *bis*.

[58] Rochelle C. Dreyfuss, *ISDS and Intellectual Property in 2019: The Case of the Dog That Didn't Bark*, *in* Yearbook on International Investment Law & Policy 2019, at 249 (Lisa Sachs, Lise Johnson & Jesse Coleman eds., 2021); Correa, *supra* note 50. A vast literature has addressed the "flexibilities" available under the TRIPS Agreement and the negative impact of FTAs on access to medicines. See, for example, German Velasquez, Carlos Correa & Xavier Seuba, *IPR, R&D, Human Rights and Access to Medicines – An Annotated and Selected Bibliography* (2012), www.southcentre.int/wp-content/uploads/2016/05/Bk_2012_IPR-RD-HRs-Access-to-medicine_EN.pdf.

[59] Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anti-Commons in Biomedical Research*, 280 Science 698 (1998); *see also* Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 126 (2006), in which Justice Breyer, dissenting from the denial of certiorari, opined that too much protection can "impede rather than promote . . . progress." Recent cases limiting patents on abstract ideas and fundamental science are seen as a solution to this problem. *See* Rochelle C. Dreyfuss, Jane Nielsen & Dianne Nicol, *Patenting Nature – A Comparative Perspective*, 5 J.L. & Biosciences 550 (2018).

[60] *See* Richard Heeks, Christopher Foster & Yanuar Nugroho, *New Models of Inclusive Innovation for Development*, 4 J. Innovation & Dev. 175–85 (2014) (discussing inclusive innovation as a policy lever for development); *Beijing Forum Promotes Inclusive Innovation for Sustainable Growth*, World Bank (June 21, 2012), www.worldbank.org/en/news/feature/2012/06/21/beijing-forum-promotes-inclusive-innovation-for-sustainable-growth (discussing the spread of inclusive innovation in emerging markets).

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technologies include appliances that work without a steady supply of electricity, farm machinery that operates in challenging environments, and food that meets local taste and nutritional needs and grows under local conditions.[61]

Experience with seed patenting illustrates the point. At one time, protection for seeds was highly limited; farmers were free not only to save seeds for replanting but also to experiment and develop new plant varieties. Indeed, much of this work took place at public institutions, including land-grant colleges and the U.S. Department of Agriculture, which freely disseminated their inventions.[62] The advent of patent and patent-like protection for seeds may well have spurred new agricultural developments.[63] However, the availability of exclusive rights has also led to higher prices for farmers (and presumably consumers) and concentrated the industry. Furthermore, because these rights are largely held by patent holders in the North, the availability of protection has exacerbated the general problem of inequality.[64] Significantly here, these rights have also imposed obstacles to breeding plants that grow well under conditions unique to developing countries or that meet their special needs.[65] These are generally not markets rich enough to appeal to patent holders. Nonetheless, the patents can block needed development.

An example is the effort to deal with vitamin A deficiency, which caused morbidity and blindness in much of the South, through the development of a rice rich in this nutrient. Scientists interested in breeding so-called Golden Rice were, however, confronted with multiple patents that complicated their research and potentially barred commercialization.[66] While the Golden Rice problem was solved through public–private partnerships, similar problems have been experienced in achieving other advances, such as farm machinery addressing the climate and soil conditions in poor countries; not all of these problems have proved amenable to the

[61] *See* Heeks et al., *supra* note 60.

[62] Daniel J. Kevles, *Patents, Protections, and Privileges: The Establishment of Intellectual Property in Animals and Plants*, 98 Isis 323 (2007).

[63] See, for example, Plant Patent Act, 35 U.S.C. § 161; Plant Variety Protection Act, 7 U.S.C. § 2402; J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124 (2001).

[64] See, for example, Keith Aoki, *Weeds, Seeds & Deeds: Recent Skirmishes in the Seed Wars*, 11 Cardozo J. Int'l & Compar. L. 247 (2003); Jane Payumo, Howard Grimes, Antonio Alfonso, Stanley P. Kowalski, Keith Jones, Karim Maredia & Rodolfo Estigoy, *Intellectual Property and Opportunities for Food Security in the Philippines*, 21 Mich. St. Int'l. L. Rev. 125 (2013).

[65] See, for example, Debra M. Strauss, *The Application of TRIPS to GMOs: International Intellectual Property Rights and Biotechnology*, 45 Stan. J. Int'l L. 287 (2009); The Intellectual Property-Regulatory Complex Overcoming Barriers to Innovation in Agricultural Genomics (Emily Marden, R. Nelson Godfrey & Rachael Manion eds. 2016).

[66] Payumo et al., *supra* note 64, at 138–42.

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Golden Rice solution.[67] In addition, in many countries that could benefit from Golden Rice, there were no patents to block dissemination. However, as patenting spreads even to small markets through mechanisms such as the Patent Cooperation Treaty and regional agreements such as the European Patent Convention, and as FTAs require the enactment of stronger protection than required by the TRIPS Agreement, R&D and commercialization are likely to encounter more obstacles in the future.[68] We may be seeing such problems at the time of this writing, in connection with developing cures and vaccines for the COVID-19 pandemic.[69]

5.2.2 *Incentives*

The incentives problem is no less worrisome. The number of patents is increasing, as are technical publications and Internet disclosures.[70] Especially as the world moves to an absolute standard of novelty,[71] these disclosures function as prior art. They can render an invention nonnovel or obvious (noninventive) even when they are not, as a practical matter, available in the South. Moreover, because the standards for disclosure and obviousness depend on the person of ordinary skill in the art, these materials can block patents despite being insufficient to teach those with little absorptive capacity how to benefit from the invention or improve upon it. While local working requirements might remedy the absorption problem by providing opportunities for locals to learn by doing, international agreements have, over time, diminished their availability.[72] Indeed, the TRIPS Agreement arguably abolished their use.[73]

[67] *Id.* at 142–46.

[68] Graeme B. Dinwoodie & Rochelle C. Dreyfuss, A Neofederalist Vision of TRIPS: The Resilience of the International Intellectual Property Regime (2012); Jerome H. Reichman, *Universal Minimum Standards of Intellectual Property Protection under the TRIPS Component of the WTO Agreement*, 29 Int'l Law. 345 (1995); Jerome 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 (1998).

[69] Enrico Bonadio & Andrea Baldini, *COVID-19, Patents and the Never-Ending Tension between Proprietary Rights and the Protection of Public Health*, 11 Eur. J. Risk Regul. 390 (2020).

[70] World Intell. Prop. Org., World Intellectual Property Indicators 12 (2019); Jeffrey L. Furman, Markus Nagler & Martin Watzinger, *Disclosure and Subsequent Innovation: Evidence from the Patent Depository Library Program* 2 (Nat'l Bureau of Econ. Rsch., Working Paper No. 24660, 2018) (examining the expansion of the U.S. Patent and Trademark Office's Patent and Trademark Depository Library system from 1975 to 1997).

[71] In 2001, WIPO conducted the most thorough survey on prior art policies, reviewing forty-nine countries which have confirmed this finding. *See* World Intell. Prop. Org., *Information Provided by the Members of the Standing Committee on the Law of Patents (SCP) Concerning the Definition of Prior Art Brief Summary*, WIPO Doc. SCP/6/INF/2 (Nov. 2, 2001).

[72] See, for example, TRIPS Agreement, *supra* note 1, art. 27(1) (barring discrimination as to "whether products are imported or locally produced").

[73] Rochelle Dreyfuss & Susy Frankel, *From Incentive to Commodity to Asset: How International Law Is Reconceptualizing Intellectual Property*, 36 Mich. J. Int'l L. 557 (2015).

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Another problem was noted earlier: Developed countries have an important advantage on the demand side. Because the wealthy are willing to pay for technologically advanced products, the patent system offers rich opportunities for returns on "high tech" investment. A strong middle class is likewise beneficial, for its combined purchasing power similarly creates the potential for significant rewards from inventing even standardized products. Developing countries lack these advantages. Thus, the potential reward is likely to be too small to encourage patent holders in the North to exploit their patents and build on or adapt them for use in the South, or even to undertake the cost of negotiating licenses to allow others to do so.[74]

To make matters worse, solutions to the access problem work at cross-purposes with solutions to the incentives problem. For example, the TRIPS Agreement and subsequent Ministerial Declarations or Decisions dealt with access by creating a series of defenses to infringement. Recently, guarantees provided by international investment agreements have also been relaxed.[75] NGOs, intergovernmental organizations, and activists have supplemented these responses with advice on how to meet TRIPS obligations with minimal levels of protection,[76] as well as through the propagation of counter-norms that emphasize the right of everyone to, for example, "share in scientific advancement and its benefits."[77] While that effort may go a long way to solving the first problem, it exacerbates the second one in that these measures further reduce the potential rewards available under the patent system.

[74] *See* UNCTAD, World Investment Report 2015: Reforming International Investment Governance 119–20 & tbl.III.1 (2005); *see also* Keith E. Maskus, *The Role of Intellectual Property Rights in Encouraging Foreign Direct Investment and Technology Transfer*, 9 Duke J. Compar. & Int'l L. 109, 128 (1998) (identifying the various factors involved in improving a nation's foreign direct investment (FDI), adding that the multinational enterprises are primarily concerned with the likelihood that FDI will raise expected profits); Carlos A. Primo Braga & Carsten Fink, *The Relationship between Intellectual Property Rights and Foreign Direct Investment*, 9 Duke J. Compar. & Int'l L. 163 (1998) (describing the influence of strong intellectual property protection on the levels of FDI); Peter Nunnenkamp & Julius Spatz, *Intellectual Property Rights and Foreign Direct Investment: The Role of Industry and Host-Country Characteristics* 2 (Kiel Inst. for World Econ., Working Paper No. 1167, 2003) (providing evidence that FDI responds to intellectual property protection only in host countries that have reached a minimum threshold of development and have a capacity to imitate inventions); José L. Groizard, *Technology Trade*, 45 J. Dev. Stu. 1526 (2009) (finding, based on panel data for eighty countries for the year 1970, that FDI is higher for countries with stronger intellectual property rights).

[75] *See supra* notes 54–58.

[76] See, for example, Max Planck Inst. for Innovation & Competition, Declaration on Patent Protection: Regulatory Sovereignty under TRIPS (2014), www.mpg.de/8132986/Patent-Declaration.pdf. *See also* Farida Shaheed (Special Rapporteur in the Field of Cultural Rights), *Cultural Rights*, U.N. Doc. A/70/279 (Aug. 4, 2015) (examining the relationship between human rights and patent rights); Correa, *supra* note 53.

[77] Universal Declaration of Human Rights art. 27, G.A. Res. 217 A (III), U.N. Doc. A/RES/3/217 A (Dec. 10, 1948); Dinwoodie & Dreyfuss, *supra* note 68.

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5.3 REFORMING THE PATENT SYSTEM

In our view, a more fruitful approach to remedying economic inequality is to directly attack the systematic ways in which the international regime throws obstacles in the road toward technological self-sufficiency. We offer a menu of approaches that a country should consider (individually or in the aggregate) in revising its laws to promote innovation geared to local capabilities and domestic conditions. These include choosing an exclusivity regime appropriate to its technological and legal situation, structuring the landscape of prior art to facilitate access to the world's knowledge base, and choosing the right beneficiaries for protection. We discuss the choices available in each category as well as their compliance with international obligations.

5.3.1 *Nature of the Exclusivity*

While patent law is the primary regime for protecting technical innovations, it is not the only mechanism. Plants, for example, can be protected by the International Union for the Protection of New Varieties of Plants (UPOV) system;[78] many countries have, among other approaches, long recognized petit patents, patents of importation, patents of improvement, certificates of addition, and utility models.[79] Even today, countries are considering or experimenting with new forms of protection, including commercialization patents,[80] supplementary protection certificates (SPCs),[81] and data and market exclusivities.[82]

A nation interested in encouraging technological development with exclusive rights should consider each of these alternatives. As described in more detail later in the chapter, modifying the patent system is one approach. It could be altered by changing the landscape for determining novelty and nonobviousness; it could also be designed to recalibrate incentives automatically as domestic inventors increase in technological sophistication. The patent alternative offers a potentially substantial benefit. It has the advantage of socializing actors within the regime to the

[78] International Convention for the Protection of New Varieties of Plants, Mar. 19, 1991, 815 U.N.T.S. 89.

[79] Jerome H. Reichman, *The TRIPs Component of the GATT's Uruguay Round: Competitive Prospects for Intellectual Property Owners in an Integrated World Market*, 4 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 171, 249 (1993) (describing historical models that many industrialized countries favored at earlier stages of development). Reichman also mentions Japan. *See* Reichman, *supra* note 11, at 67.

[80] Sichelman, *supra* note 45.

[81] Council Regulation 1768/92, 1992 O.J. (L 182) 1 (EC).

[82] *See generally* Reichman, *supra* note 79, at 252–53; Alberto Bercovitz-Rodriguez, *Historical Trends in Protection of Technology in Developed Countries and Their Relevance for Developing Countries* 2–3, U.N. Doc. UNCTAD/ITP/TEC/18 (Dec. 26, 1990); STEPHEN P. LADAS, PATENTS, TRADEMARKS, AND RELATED RIGHTS: NATIONAL AND INTERNATIONAL PROTECTION 1898–99 (1975).

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predominant form of protection internationally. Thus, in addition to incentivizing innovation, it would help create a class of local investors, examiners, and patent lawyers, as well as new jobs and training opportunities. However, patent regimes require a country to devote resources and personnel to an examination system, and they require innovators to expend efforts on patent prosecution. Other types of exclusivity require less of the system and its participants because they can be based on mere registration. Although rights under these regimes typically last fewer years and include more exceptions and thus return less of a reward, they may nonetheless be sufficient to spur local innovation.

A close study of the behavior of "Tiger" countries and their Asian predecessor, Japan, suggests that reliance on subpatent exclusivities is more prevalent than might be imagined and that it has proved to be a critical factor in moving countries to the technological frontier. As Nagesh Kumar's work showed, strong intellectual property rights adversely affect the absorption of knowledge spillovers; countries that started with "soft" regimes that favored local inventors prospered.[83] For example, prior to the TRIPS Agreement, Japan explicitly designed its patent policy to favor domestic inventors and encourage the absorption of spillovers from foreign activities. It, along with Korea and Taiwan, encouraged a patenting culture with a utility model and industrial design system that allowed and motivated local inventors to modify inventions made elsewhere. Until Japan developed technological capacities on par with those of developed economies, it used longer pendency periods for foreign inventors coupled with efforts to narrow foreign claims. It also adopted other techniques to cut down on foreign patenting in favor of domestic applicants. Korea tolerated lax enforcement (and multiple complaints from the United States) to facilitate duplicative imitation that eventually led to a strong technological sector. In sum, Kumar stated:

> [T]he east Asian countries, viz. Japan, Korea and Taiwan have absorbed substantial amount of technological learning under weak IPR [intellectual property right] protection regime 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 the foreign inventions by domestic enterprises and developed a patent culture through utility models and design patents. As the local technological capabilities matured and the domestic industry sought stronger protection for guarding their own inventions, the IPR regime was strengthened . . .[84]

[83] Nagesh Kumar, *Intellectual Property Rights, Technology and Economic Development: Experiences of Asian Countries*, 38 Econ. & Pol. Wkly. 209 (2003) (based on a report submitted to the UK Commission on Intellectual Property Rights); *see also* Khan, *supra* note 4 (documenting the many ways that the United States and European countries once favored particular classes of inventors).

[84] Kumar, *supra* note 83, at 217.

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Systems such as these not only provide a better match between protection and technological capacity, but they are also fully consistent with the TRIPS Agreement. That Agreement requires patent protection only for advances that meet the standards of novelty and nonobviousness. And as can be seen by its incorporation of the Paris Convention's reference to "patents of importation, patents of improvement and certificates of addition, etc.,"[85] the TRIPS Agreement envisions other forms of protection as well.

5.3.2 *Landscape of Prior Art*

Countries that wish to focus exclusively on patenting could make changes to that system in order to increase their technological capacity. As suggested earlier, one problem developing countries face is that the move to an absolute standard of novelty for patent protection allows the North to shower its art (patented or not) on the South and undermine patent incentives to engage in follow-on innovation. The TRIPS Agreement does not define novelty; instead, it gives members a degree of flexibility to interpret the term for themselves.[86] Thus, members could break the novelty trap by defining novelty relatively and consider as prior art only that which is accessible locally. Thus, a country could include in prior art only inventions that are practiced locally or protected by domestic patents (or published in a locally accessible publication). Those who import (or reinvent) knowledge that is only accessible abroad, or adapt that knowledge to the local market, could then take advantage of the domestic patent system and earn returns on their efforts. At the same time, the fear of local patenting might encourage foreign originators to engage in activities that qualify their advances as prior art. Either way, more inventions would be available locally, presumably at a price set by local demand (or by the collective demand of all the countries that altered the landscape in this way).[87] Indeed, a country could go further and limit the landscape of prior art to inventions actually practiced locally.

To create even more space for local inventors to operate, the bar of the inventive step could also be lowered. Instead of measuring the knowledge of a person of ordinary skill by global standards, the inquiry could be limited to the inventive capacity of domestic scientists. That would permit a local inventor to acquire protection for adaptations of foreign inventions even when the changes are ones that the North might consider too modest to merit protection. In fact, this is the approach taken to the diversity of technological sophistication among technological

[85] TRIPS Agreement, *supra* note 1, art. 1.1; Paris Convention for the Protection of Industrial Property art. 1(4), Mar. 20, 1883, 21 U.S.T. 1583, 828 U.N.T.S. 305.

[86] Dinwoodie & Dreyfuss, *supra* note 68.

[87] *Cf.* Venetian Patent Law of 1474, *reprinted in* Graeme B. Dinwoodie, William Hennessey, Shira Perlmutter & Graeme Austin, International Intellectual Property Law and Policy 413 (2d ed. 2008); 35 U.S.C. § 102(a).

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sectors. As Dan Burk and Mark Lemley noted, when a new technology emerges, the knowledge in the area is low, and it is easier to acquire protection. The ease with which patents can be obtained encourages more innovators to enter the field; as the sector matures, more is required to obtain protection.[88] In the same way, measuring technological capacity locally would encourage more inventive activity and ultimately lead to an increasingly sophisticated pool of domestic innovators.

5.3.3 *Beneficiaries*

Under the TRIPS Agreement, a member state is required to offer to the nationals of other member states "treatment no less favorable than that it accords its own nationals with regard to the protection of intellectual property."[89] It must also give most-favored-nation status to the nationals of other members of the Agreement.[90] Accordingly, a nation that restructures its system of TRIPS-protected rights must provide the same rights to the nationals of other WTO member states.

Countries that comply with this obligation by offering the same protection to foreigners and locals might benefit from encouraging innovation in ways that meet local needs.[91] That would improve the domestic availability of the fruits of technological advancement. But if foreigners are more technically adept than locals, they could crowd out domestic innovators. Accordingly, the system would not significantly improve the country's own technological capacity. Locals would pay higher prices for protected innovations without enjoying the benefit of encouraging domestic technological growth. Countries may therefore wish to limit these new (or newly configured) rights to their own innovators. Such an effort is not entirely unprecedented: As noted earlier, Japan slowed examination for foreign inventors, thus improving the chances for domestic innovators to obtain patent rights.

One approach for dealing with the incompatibility of this approach with the TRIPS Agreement's bar on discrimination may be to limit the exclusivities available under the new regime to nationals from any country that is categorized as developing – for example, to those with a GDP below a certain level. This would avoid a complaint of de jure discrimination because nationals of any country that fits the

[88] Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law* 1651, 89 Va. L. Rev. 1575 (2003).
[89] TRIPS Agreement, *supra* note 1, art. 3.1.
[90] *Id.* art. 4.
[91] Coined by Vijay Govindarajan and Chris Trimble in their seminal 2012 book, the term "reverse innovation" explains how in certain cases Northern countries adopt Southern innovative products developed in Southern nations. *See* Vijay Govindarajan & Chris Trimble, Reverse Innovation: Create Far from Home, Win Everywhere (2012) (providing numerous case studies of production by reverse innovation); Vijay Govindarajan, *The Case for "Reverse Innovation" Now*, Bloomberg (Oct. 26, 2009), www.bloomberg.com/news/articles/2009-10-26/the-case-for-reverse-innovation-nowbusinessweek-business-news-stock-market-and-financial-advice#xj4y7vzkg (discussing the historical path leading to reverse innovation).

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category would qualify for protection. However, a de facto claim is another matter: A WTO panel found that when the qualification for protection is too tightly associated with nationality, it can constitute discrimination.[92] Yet the observed persistence of technological inequality suggests that the concept of nondiscrimination requires reconceptualization. As the U.N. Conference on Trade and Development (UNCTAD) once cautioned, "equality 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."[93] The nondiscrimination provision of the General Agreement on Tariffs and Trade applies to goods only when they are alike.[94] We join Henning Grosse Ruse-Khan in urging that under the TRIPS Agreement, the same analysis should apply to nationality. Thus, a member state should be permitted to differentiate among nationals when they are from countries that are different along a significant axis, such as wealth or technological capacity.[95]

CONCLUSION

Economic research has demonstrated an intimate connection between technological capacity, income, and inequality. As a result, reducing economic inequality requires an examination of the factors that lead to technological disparities among nations. While these differences have multiple causes, patent law is an important explanatory factor. As the experience of emerging economies shows, greater use of exclusivities that are less technologically demanding than patent rights may ameliorate these problems. However, restructuring the patent system to alter the landscape of prior art and calibrate the inventive step to domestic capabilities is also worthy of consideration. This chapter suggests the use of a relative novelty standard that includes in the prior art only locally available technology and a standard of inventiveness that takes into account the capacity of domestic innovators.

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

[93] UNCTAD, *The Role of the Patent System in the Transfer of Technology to Developing Countries*, ¶ 320, U.N. Doc. TD/B/AC.11/19/Rev.1 (1975), https://digitallibrary.un.org/record/526090?ln=en.

[94] General Agreement on Tariffs and Trade, art. III, Oct. 30, 1947, 61 Stat. A11, 55 U.N.T.S. 194.

[95] Henning Grosse Ruse-Khan, The Protection of Intellectual Property in International Law § 5.43 (2016); *see also* Graeme B. Dinwoodie & Rochelle C. Dreyfuss, *Diversifying without Discriminating: Complying with the Mandates of the TRIPS Agreement*, 13 Mich. Telecomm. & Tech. L. Rev. 445, 450 (2007).

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