A Developmental Approach to the Patent-Antitrust Interface

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Abstract: This Article proposes a set of guiding principles for approaching the patent-antitrust interface in developing countries. Based on the notion that antitrust doctrines need to be adjusted to reflect the local economic circumstances, this Article argues that any credible approach to the patent-antitrust interface in developing countries must incorporate development considerations. It proposes a set of guiding principles that takes into account a wide range of factors, including the need to provide innovation incentives, the need to facilitate domestic imitation, the need to protect domestic consumer welfare, and the need to safeguard access to basic necessities. With the support of a considerable body of theoretical and empirical economic literature, this Article challenges the widely held belief that patent protection is necessary for securing innovations. Rather, this Article argues that developing countries need to be skeptical about innovation-based justifications for restrictive patent exploitation practices, as many of them do not possess the capacity to take advantage of innovation incentives and can ill-afford to sacrifice consumer welfare. It concludes by highlighting the implicit challenge this Article poses to the drive for convergence that has dominated international antitrust in the last decade.

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I. INTRODUCTION

The patent-antitrust interface is one of the most complex and vexing areas of antitrust law. Professor Louis Kaplow characterizes it as "a source of perpetual confusion and controversy" and as a conflict "even more deep-seated than is generally perceived."[1] This conflict stems from the fact that antitrust law prohibits the acquisition or maintenance of monopoly power through exclusionary means while patent rights confer market power. Furthermore, it is said that antitrust law is chiefly concerned with static efficiency—the short-run price-cost performance of markets—and patent law with dynamic efficiency—the generation of patentee reward to spur innovation. Commentators in the established antitrust jurisdictions, most of which are developed countries, have proposed various ways to resolve this conflict. Some give primacy to competition while others emphasize the importance of pursuing dynamic efficiency.[2] Yet others advocate solutions that require careful balancing of the policy considerations underpinning these two bodies of law.[3] For example, Professor Louis Kaplow proposed a ratio test that determines the legality of a patent exploitation practice with reference to its relative impact on the consumer welfare loss and patentee reward. Despite repeated attempts to formulate a definitive approach to the patent-antitrust interface, success has so far eluded most commentators. Reconciling patent and antitrust policies is even more difficult for developing countries. Patent policy has crucial implications for development, as technological progress drives economic growth. While the implications may seem to be that developing countries should emphasize patent policy, as they are further behind the global technological frontier and are in desperate need of domestic innovation, they can ill afford the short-term consumer welfare loss that must be incurred to generate patentee reward. Given the widespread poverty in many developing countries, their consumers would be hard-pressed to bear the supra-competitive prices that

[1] Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1815–16 (1984).

[2] Ward Bowman, Jr. was one of the leading proponents of minimal competition law restrictions on the exercise of IPRs, while William Baxter advocated a stronger role for competition law in regulating the exercise of patent rights. *See generally* William F. Baxter, *Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis*, 76 YALE L.J. 267 (1966); WARD S. BOWMAN, PATENT AND ANTITRUST LAW (1973).

[3] *See* Kaplow, *supra* note 1.

create innovation incentives.[4] Developing countries seem to be in a bind. Their antitrust enforcement authorities should be careful about sacrificing consumer welfare by upholding patent exploitation practices.

To complicate matters further, many developing countries possess negligible technological capacity. They have no meaningful prospects of attracting domestic innovations. The need to generate innovation incentives, which underpins one side of the balance in the patent-antitrust interface, is weak. This means that antitrust law should be even more hesitant to sacrifice consumer welfare as the innovation incentives generated by the patent system will not induce significant domestic innovation. The most realistic way for these countries to acquire technological capacity is to allow domestic producers to imitate foreign technology, which will endow these producers with the technical capability to pursue innovations in the future. This means that patent protection should be lowered to facilitate imitation and licensing on favorable terms to the local producers. Finally, patent policy affects the incentives of multinational firms to transfer technology to, and undertake investment in, developing countries. Foreign direct investment (FDI), in particular, may create significant benefits for the host economy in the form of increased employment, capital stock growth, and transfer of managerial know-how, all of which significantly contribute to economic growth and development. Developing countries must, hence, pay close attention to how the patent-antitrust interface may affect FDI and technology transfer. Lastly, the patent-antitrust interface in a developing country must incorporate developmental considerations, such as access to medicine and other basic necessities, which often hold the key to poverty alleviation and economic development. Given these complex and sometimes conflicting considerations, some guiding principles are needed to approach the patent-antitrust interface in developed countries.

This Article is divided into eight parts. Part II reviews some of the literature on the patent-antitrust interface from the two most established antitrust jurisdictions—the United States and the European Union (EU). The review concludes with the observation that resolution of the patent-antitrust conflict must entail a balancing of some kind between static and dynamic efficiencies. Part III provides the groundwork for adapting the balancing approach for developing countries by defining the meaning of economic growth and development as they pertain to the patent-antitrust interface. This Part concludes with a summary of the main developmental considerations to be incorporated in the proposed guiding principles. Part IV examines the widely-held belief that patent protection is necessary for securing innovations, and argues, with the support of a considerable amount

[4] For a discussion of the definition of innovation incentives or incentives to innovate, see *infra* Part III.A.2.

of theoretical and empirical literature, that the belief is generally mistaken. The extent to which the belief is true depends on the industry at issue. Part V investigates the relationships between the patent-antitrust interface and the three main forms of technology transfer: trade of technological goods, FDI, and technology licensing, and suggests ways in which patent-antitrust rules should take these relationships into account. Part VI introduces three further considerations for the patent-antitrust interface in developing countries: consumer welfare and deadweight loss, impaired access to basic necessities, and stifling of domestic innovation. Part VII integrates all of the issues highlighted in the previous parts and puts forward some guiding principles for tackling the patent-antitrust interface in developing countries. Part VIII addresses two main criticisms of the proposed guiding principles: its compatibility with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement and administrability. Part IX concludes the Article.

II. RESOLVING THE PATENT-ANTITRUST CONFLICT—BALANCING STATIC AND DYNAMIC EFFICIENCIES

The interface with patent law is one of the most challenging and technical areas of antitrust.[5] What makes it so challenging is the fact that it juxtaposes two bodies of law that have ostensibly conflicting policy objectives, the reconciliation of which requires delicate balancing. Generally speaking, the focus of patent law is to encourage innovations by giving potential inventors a limited period of exclusivity so that they may recoup their investment through supra-competitive pricing. Meanwhile, antitrust law protects consumer welfare by ensuring that firms compete on the merits and that consumers obtain goods and services at the lowest price and highest quality attainable in a competitive market. In economic terms, patent law pursues dynamic efficiency, which is concerned with the generation of innovation over time, while antitrust law focuses on static efficiency, which is determined by the price-cost performance of the market at one point in time. It should be obvious that there is an ostensible conflict

[5] Many scholarly articles have been written about this area of law. *See generally* Baxter, *supra* note 2; Michael A. Carrier, *Unsettling Drug Patent Settlements: A Framework for Presumptive Illegality*, 108 MICH L. REV. 37 (2009); Daniel A. Crane, *Intellectual Liability*, 88 TEX. L. REV. 253 (2009); Josef Drexl, *Real Knowledge is to Know the Extent of One's Own Ignorance: On the Consumer Harm Approach in Innovation-Related Competition Cases*, 76 ANTITRUST L.J. 677 (2009); C. Scott Hemphill, *Paying for Delay: Pharmaceutical Patent Settlement as a Regulatory Design Problem*, 81 N.Y.U. L. REV. 1553 (2006); Kaplow, *supra* note 1; David W. Opderbeck, *Rational Antitrust Policy and Reverse Payment Settlements in Hatch-Waxman Patent Litigation*, 98 GEO. L.J. 1303 (2010); Willard K. Tom & Joshua A. Newberg, *Antitrust and Intellectual Property: From Separate Spheres to Unified Field*, 66 ANTITRUST L.J. 167 (1997); Donald F. Turner, *The Patent System and Competitive Policy*, 44 N.Y.U. L. REV. 450 (1969).

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between the means by which patent law promotes innovation—supra-competitive pricing during the exclusivity period—and the antitrust objective of securing low prices for consumers.

It has been argued, however, that this conflict is more apparent than real.[6] Antitrust law pays attention to both static and dynamic efficiencies, and recognizes that the greatest welfare gains come not from competition-driven lower prices for goods and services, but from technological advances.[7] Meanwhile, patent law also considers the effects of patent exclusivity on consumers. Implicit in the determination of the length and scope of patent rights is a balance between generating innovation incentives and allowing consumers affordable access to new technologies.[8] Professor Herbert Hovenkamp argues that the conflict between patent and antitrust laws is "readily exaggerated."[9] With the two bodies of law sharing a common set of policy considerations, the resolution of the conflict between them, if one exists, can be achieved through a weighing of these considerations.[10] The challenge is to create sufficient reward to potential innovators without unduly restricting consumers' access to new technologies.

This commonality of policy focus should not be exaggerated, however. Despite their shared concerns about static and dynamic efficiencies, patent and antitrust laws take different approaches to weighing these efficiencies. Patent law's main focus remains the provision of innovation incentives, which spawns corollary issues, such as patentability and the scope of patent rights.[11] Despite the need to balance innovation incentives and consumer welfare loss, rarely is consumer welfare explicitly considered in patent cases. If consumer welfare was ever explicitly weighed, it was at the legislative stage when Congress determined the length and scope of patent protection.[12] Judges tend to see patent issues, such as non-obviousness, as

[6] SUZANNE SCOTCHMER, INNOVATION AND INCENTIVES 161 (2004).

[7] HERBERT HOVENKAMP ET AL., 1 IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW ch. 1, at 13 (2d ed. 2010).

[8] Kaplow, *supra* note 1, at 1823–28.

[9] Herbert Hovenkamp, *United States Antitrust Policy in an Age of IP Expansion* 3 (Univ. of Iowa Legal Studies, Working Paper No. 04-03, 2004), *available at* http://ssrn.com/abstract=634224.

[10] For alternative views on how to resolve the patent-antitrust conflict, see Pierre Regibeau & Katharine Rockett, *The Relationship Between Intellectual Property Law and Competition Law: an Economic Approach*, *in* THE INTERFACE BETWEEN INTELLECTUAL PROPERTY RIGHTS AND COMPETITION POLICY 505 (Steven D. Anderman ed., 2007); Carrier, *supra* note 5, at 799–800; Crane, *supra* note 5; Drexl, *supra* note 5.

[11] SCOTCHMER, *supra* note 6, at 103–11.

[12] This is especially true in the pharmaceutical context, where Congress must balance the need to generate innovation incentives and the provision of affordable medicine to the public. *See* SHAYERAH ILIAS & IAN F. FERGUSSON, CONG. RESEARCH SERV., RL40607, INTELLECTUAL PROPERTY RIGHTS AND ACCESS TO MEDICINES: INTERNATIONAL TRADE ISSUES

technical doctrinal or factual issues that can be decided without bringing in policy considerations.[13]

Antitrust pays closer attention to dynamic efficiency considerations. When deciding cases arising in technological sectors, antitrust courts are mindful of the impact of its decisions on innovation incentives. An example is *Microsoft v. United States*, in which the D.C. Circuit, despite the weight of Supreme Court precedents, refused to apply the *per se* rule to Microsoft's tying of Internet Explorer to Windows. The rationale for the refusal was that the "novel, purported efficiencies" of such an integration of functionalities means that applying *per se* condemnation to such a tie "might stunt valuable innovation."[14] Yet one may argue that antitrust has not developed adequate analytical tools for evaluating innovation-based claims as opposed to static efficiency claims, which remain the main concern for antitrust. When antitrust courts are faced with countervailing static and dynamic efficiencies, their response is usually to downplay the conflict or subordinate one to the other without balancing.[15] This is illustrated by the D.C. Circuit's assessment of the Section 2 claim against Microsoft for creating a new Java Virtual Machine that was incompatible with the existing one developed by Sun Microsystems.[16] The court was unwilling to second-guess the veracity of Microsoft's innovation even though there was ample evidence that Microsoft had developed its own Java Virtual Machine with the express goal to create confusion in the market and to undermine Sun's product.[17] Purported dynamic efficiency gains trumped proven static efficiency loss in the case.

Having seen that patent and antitrust laws are not in an irreconcilable conflict, we are still left with a crucial question—how should the balance be struck? The foregoing discussion suggests weighing static against dynamic efficiencies. However, weighing of policy considerations is an inexact exercise in which the outcome depends on the weight attached to the individual factors. If innovations are to be pursued to the greatest extent possible, even at the cost of substantial short-term consumer welfare losses, dynamic efficiency considerations must reign supreme. Antitrust defers to patent policy, and minimizes interference with patent exploitation and licensing practices. If instead the emphasis is placed on protection of consumer welfare, antitrust restrictions on a patentee's freedom of action

2 (2009).

[13] KSR Intern. Co. v. Teleflex Inc., 550 U.S. 398, 406–07 (2007); Roanwell Corp. v. Plantronics, Inc., 429 U.S. 1004, 1006 (1976); Graham v. John Deere Co., 383 U.S. 1, 17–18 (1966); SCOTCHMER, *supra* note 6, at 107.

[14] United States v. Microsoft, 253 F.3d 34, 90–92 (D.C. Cir. 2001).

[15] Commentators have argued that it is in fact not unfeasible to attempt such balancing. *See* Carrier, *supra* note 5, at 799–800.

[16] *Microsoft*, 253 F.3d at 55.

[17] *Id.* at 77.

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will be more stringent.[18]

III. INCORPORATING DEVELOPMENTAL CONSIDERATIONS IN THE PATENT-ANTITRUST INTERFACE

For developing countries tackling the patent-antitrust interface, what is already a delicate balancing exercise takes on even greater complexity. This is due to the fact that developing country antitrust authorities need to look at a broader range of considerations than mere static and dynamic efficiencies. This need is largely derived from the fact that these authorities must take into account the impact of the interface on economic growth and development, which is the paramount challenge facing developing countries.

The fundamental premise of this Article is that the analytical approach to antitrust issues needs to be tailored to the economic circumstances of a particular country. Antitrust, being an area of economic regulation, must be applied with sensitivity to the economic environment in which it operates. The kind of adjustments called for here are not variations in enforcement priorities, but changes in the substantive analytical framework that is applied to specific antitrust issues. The need for adjustment is particularly pressing for developing countries, whose economies differ so significantly from industrialized nations that analytical approaches that have worked in the latter could prove to be unsuitable for the former. And most analytical tools in antitrust were developed with industrialized economies in mind. This is not to say that every area of antitrust law needs to be altered to suit developing countries. Cartel enforcement, for example, is unlikely to differ significantly across jurisdictions. There is an unusual consensus within antitrust circles that cartels are detrimental to consumers and society in general and should be condemned in developed and developing countries alike.[19] There are areas of antitrust law, however, that are sensitive to the particular economic circumstances of a country, and need to be adjusted accordingly. The patent-antitrust interface is one of them.

There are a number of reasons that a different approach to the patent-antitrust interface is needed for developing countries. First, and most obviously, is that developing countries' capacity to innovate differs from that of industrialized economies. While generating adequate innovation incentives is an important policy objective in developed countries,[20]

[18] Income to poor developing country consumers is worth more because of diminishing marginal utility of money. *See* Frederic M. Scherer, *A Note on Global Welfare in Pharmaceutical Patenting*, 27 WORLD ECON. 1127, 1131–32 (2004).

[19] Caron Beaton-Wells & Ariel Ezrachi, *Criminalising Cartels: Why Critical Studies?*, *in* CRIMINALISING CARTELS: CRITICAL STUDIES OF AN INTERNATIONAL REGULATORY MOVEMENT 4 (Caron Beaton-Wells & Ariel Ezrachi eds., 2011).

[20] For an overview of the range of innovation policy initiatives of the U.S. government,

developing countries simply may not have the potential inventors to benefit from patentee rewards. The need to provide innovation incentives is less pressing in developing countries.

Developing countries, of course, cannot be treated as a monolith. They range from newly industrialized nations, such as South Korea and Taiwan, to the least-developed nations of sub-Saharan Africa.[21] While the majority of the least-developed nations do not possess significant innovative capacity, the newly industrialized developing countries are highly advanced in certain high-technology sectors. South Korea is a world leader in consumer electronics; Taiwan a powerhouse in the production of semiconductors; and Brazil a leading innovator of agricultural technology.[22] Even the least-developed nations may possess limited innovative capacity in certain sectors. Therefore, sweeping generalizations must be avoided. Yet, the fact remains that industrialized economies possess vastly superior innovative capacity as compared to developing countries. This is demonstrated by the fact that OECD countries accounted for 78% of the research and development (R&D) expenditure globally in 2005 while developing countries accounted for only about 23%.[23] This figure would drop to 14.8% if one excluded China, which, due to the size of its economy and its unique economic circumstances, should be treated as *sui generis*, and analyzed separately from the remaining developing countries.[24]

see David C. Mowery & Nathan Rosenberg, *The U.S. National Innovation System*, *in* NATIONAL INNOVATION SYSTEMS: A COMPARATIVE ANALYSIS 29 (Richard R. Nelson ed., 1993).

[21] Sub-Saharan African countries include Uganda, Rwanda, Mali, Niger, to name but a few. One may in fact argue that, given their high level of educational attainment, general availability of high quality healthcare, and impressive manufacturing and innovative capacities in technological sectors, such as semiconductors and consumer electronics, it is no longer accurate to classify South Korea and Taiwan as developing countries.

[22] Abby Schultz, *How South Korea Became a Consumer Product Juggernaut*, CNBC (July 16, 2012, 2:39 PM), http://www.cnbc.com/id/48041792/How_South_Korea_Became_a_Consumer_Product_Juggernaut; DEP'T. OF INV. SERVS., TAIWAN MINISTRY OF ECON. AFFAIRS, SEMICONDUCTOR INDUSTRY: ANALYSIS AND INVESTMENT OPPORTUNITIES 4 (2008), *available at* http://investtaiwan.nat.gov.tw/doc/industry/15Semiconductor_Industry_eng.pdf (noting that the top two semiconductor manufacturers in the world are Taiwanese companies); Pedro A. Arraes Pereira et al., *The Development of Brazilian Agriculture: Future Technological Challenges and Opportunities*, AGRICULTURE & FOOD SECURITY 1, 2 (Apr. 19, 2012), http://www.agricultureandfoodsecurity.com/content/pdf/2048-7010-1-4.pdf (highlighting Brazilian innovations in agricultural technology).

[23] Jacques Gaillard, *Measuring Research and Development in Developing Countries: Main Characteristics and Implications for Frascati Manual*, 15 SCI., TECHNOLOGY & SOC'Y, 77, 95–96 (2010).

[24] China alone contributed 8.9% of the world's R&D expenditure in 2007. UNESCO INST. OF STAT., GLOBAL INVESTMENTS IN R&D (2011), *available at* http://www.uis.unesco.org/FactSheets/Documents/fs15_2011-investments-en.pdf.

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Second, as suggested earlier, developing countries need to focus on economic growth and development. While development is an ongoing process for every country, and no country can relax from the pursuit of economic progress, developing countries face a much more urgent task of improving the livelihood of their people. Given the importance of technological progress in spurring economic growth[25] and the potentially significant impact of antitrust rules on patent exploitation on innovation and technology transfer, developing countries need to tread carefully when approaching patent-antitrust issues. If adopting a permissive attitude toward patent exploitation practices will facilitate technology transfer to such an extent that the consequent boost to the economy outweighs consumer harm, a developing country will do well to give greater freedom of action to patentees. If the economic benefits turn out to be less substantial, a developing country should instead take a more pro-antitrust stance.

Third, antitrust in developing countries cannot be exclusively concerned with the pursuit of economic efficiency, because markets in those countries are likely to behave differently from those in developed countries. Markets are often less dynamic in developing countries and potential market entrants are often less abundant. For example, in developed countries, especially the United States, it is often argued that predatory pricing should only be condemned if the monopolist has a reasonable prospect for recouping its loss.[26] If new entrants can easily enter the market to undercut the supra-competitive price imposed by the monopolist after it has successfully driven out existing rivals, consumers do not suffer any harm.[27] While this assumption may be valid in an industrialized economy with dynamic markets like the United States, it is less applicable in developing countries. In some developing countries, entrepreneurship is so limited and new market entry so rare and difficult to achieve that no new entrants may come by during the recoupment period. This observation is corroborated by a report published by the International Development Research Centre in Canada. Concerning adjustments in a Peruvian market after trade liberalization, the report states:

> While the elimination of inefficiency is economically a laudable goal, the projected transfer of resources from less productive uses to more productive uses did not occur due to a lack of capital and entrepreneurship. Thus, rather than creating new jobs, trade liberalization resulted in the destruction of many of the few jobs that

[25] For a more detailed discussion of this point, see *infra* Part III.A.1.

[26] Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209 (1993) (requiring reasonable prospect of recoupment as one element of predatory pricing claim).

[27] *Id.* at 224.

existed.[28]

Developing country antitrust authorities should avoid facile, or sometimes heroic, assumptions about the competitive vitality of their markets. This observation will be highly relevant to the patent-antitrust interface in developing countries.

A. Definitions of Economic Growth and Development

Before exploring how the needs of economic growth and development can be taken into account in the patent-antitrust interface in developing countries, one needs to define these two terms. The two terms, in fact, have distinct meanings and have been studied extensively by economists. Economists have long been fascinated by the relationship between technological progress and economic growth. In particular, a considerable amount of economic research has been devoted to the question of the contribution of technological progress to economic growth. This question is of particular relevance to the patent-antitrust interface. To the extent that an increased scope of patent exploitation increases patentee reward, which promotes innovation, which in turn propels growth, the patent-antitrust interface should be tilted in favor of patent policy. Conversely, if other factors intervene in this causal chain and the relationship between scope of patent exploitation and economic growth turns out to be more tenuous, consumer welfare loss is more likely to outweigh dynamic efficiency gains. In this scenario, antitrust restrictions on patent exploitation practices should be tightened.

1. Economic Growth

Economic growth has been defined "as an historical process of structural change in the broadest sense."[29] Despite this broad definition, and partly due to the difficulty with measurement and quantification of structural changes, economists have tended to use increase in per capita income as an indication of economic growth. The economic study of growth can be said to have begun with Nobel Laureate Robert Solow, who published his seminal work on the topic in 1956.[30] Following Solow's pioneering work in the area, economists attempted to explain the relationship between technological progress and economic growth by way

[28] STEWART ET AL., INT'L DEV. RESEARCH CTR., COMPETITION LAW IN ACTION: EXPERIENCES FROM DEVELOPING COUNTRIES 20 (2007).

[29] Bart Verspagen, *Innovation and Economic Growth*, *in* THE OXFORD HANDBOOK OF INNOVATION 486, 488 (Jan Fagerberg et al. eds., 2005).

[30] Robert M. Solow, *A Contribution to the Theory of Economic Growth*, 70 QUARTERLY J. ECON. 65 (1956).

of a concept known as total factor productivity (TFP).[31] Economists identify three sources of economic growth: growth in labor; growth in capital, such as machinery; and TFP growth.[32] Technological progress, which affects TFP, is taken to be an exogenous variable.[33] Using this method, economists have concluded that more than half of the variation in per capita income can be attributable to differences in TFP.[34] Ever since Solow's work, there has been a general consensus among economists that "research and development is a major source of economic growth . . . . [M]ost studies show a high correlation between R&D expenditures and productivity growth after accounting for investment in ordinary capital."[35]

Solow's model is not without problems, however. First, many economists have been critical of the TFP concept because of difficulties with conceptualization and measurement.[36] Second, and more importantly, the results of Solow's model have not been borne out by actual data. Solow's model, which attributes growth to factor accumulation, predicts declining growth rate over time.[37] This is largely due to diminishing marginal productivity of factors of production.[38] But this prediction is inconsistent with observed data.[39] To reconcile the inconsistency between theoretical predictions and real-world observations, "technological change has to be rising over time, and rising fast enough to overcome the curtailing effects of accumulation."[40] Subsequent economists, such as Paul Romer, developed what has come to be known as endogenous growth models that attempt to account for this accelerated technological change, which is needed for long-term growth rates to be non-declining.[41]

Endogenous growth models, such as Romer's, identify R&D spillovers[42] as a central cause for non-declining growth.[43] R&D spillovers

[31] Verspagen, *supra* note 29, at 490.

[32] *Id.*

[33] *Id.* at 489.

[34] ELHANAN HELPMAN, THE MYSTERY OF ECONOMIC GROWTH 34 (2004).

[35] Richard Gilbert, *Looking for Mr. Schumpeter: Where Are We in the Competition-Innovation Debate?*, *in* 6 INNOVATION POLICY AND THE ECONOMY 159, 159 (2006).

[36] Verspagen, *supra* note 29, at 489–90. It has been said that using TFP to explain the residual of growth accounting relies on a number of strong assumptions, which are likely to be violated in practice. This means that the residual is likely to include many more factors than simply the contribution of technology. Also, many of the factors incorporated in growth accounting calculations "are interrelated by causal links not accounted for by the underlying theory." *Id.* at 490.

[37] HELPMAN, *supra* note 34, at 35.

[38] *Id.*

[39] *Id.*

[40] *Id.*

[41] Paul Romer, *Endogenous Technological Change*, 98 J. POL. ECON. S71 (1990).

[42] R&D spillovers can be understood as the externality of innovation. It refers to the fact that a considerable portion of the benefits of an innovation are not appropriated by the

eliminate the problem of diminishing returns to the aggregate knowledge of an economy, which was a main culprit for declining growth in Solow's model. It is important to emphasize that R&D spillovers do not eliminate diminishing returns to private knowledge—the technological knowledge accumulated by one firm still exhibits diminishing returns.[44] What it does eliminate is diminishing returns to the aggregate knowledge of the economy. What one firm learns from another firm's innovation will improve the productivity of the first firm's R&D.[45] In other words, there are considerable externalities for R&D that keep technological knowledge productive and economies growing at non-declining rates. Professor Elhanan Helpman describes this process as follows:

> In the model, innovators aim to invent new products, which provide them with profits and thereby an incentive to innovate. But inadvertently, they also create knowledge that is not embodied in blueprints and cannot be retained as a trade secret. This "disembodied" knowledge becomes available to other innovators and thereby reduces future R&D costs for everyone. Under these circumstances, the stock of knowledge available to innovators is a function of past R&D efforts. The more R&D was performed in the past the larger this stock and the cheaper it is to do R&D today. . . . This mechanism—of forward R&D spillovers—reduces R&D costs over time.[46]

Economic research has confirmed the existence of R&D spillovers.[47]

The economic literature on growth is vast and complex and the

innovator itself but are shared by others. WILLIAM J. BAUMOL, THE FREE MARKET INNOVATION MACHINE: ANALYZING THE GROWTH MIRACLE OF CAPITALISM 5 (2002).

[43] *See* Romer, *supra* note 41. at S89.

[44] *See* HELPMAN, *supra* note 34, at 38.

[45] For example, the success of a pharmaceutical research project is enhanced by the success of related programs in other firms. William S. Comanor, *The Economics of Research and Development in the Pharmaceutical Industry*, *in* PHARMACEUTICAL INNOVATION: INCENTIVES, COMPETITION, AND COST-BENEFIT ANALYSIS IN INTERNATIONAL PERSPECTIVE 65 (Frank A. Sloan & Chee-Ruey Hsieh eds., 2007); Gilbert, *supra* note 35, at 202.

[46] HELPMAN, *supra* note 34, at 44.

[47] *See, e.g.*, Jeffrey Bernstein & Ishaq Nadiri, *Research and Development and Intra-industry Spillovers: An Empirical Implication of Dynamic Duality*, 56 REV. ECON. STUD. 249, 249 (1989); Jeffrey Bernstein, *The Structure of Canadian Inter-industry R&D Spillovers, and the Rates of Return to R&D*, 37 J. INDUS. ECON. 315 (1989); Timothy F. Bresnahan, *Measuring Spillovers from Technical Advance: Mainframe Computers in Financial Services*, 76 AM. ECON. REV. 742 (1986); Akira Goto & Kazuyuki Suzuki, *R&D Capital, Rate of Return on R&D Investment and Spillover of R&D in Japanese Manufacturing Industries*, 71 REV. ECON. & STAT. 555 (1989); Adam B. Jaffe, *Technological Opportunity and Spillovers of R&D: Evidence from Firms' Patents, Profits, and Market Value*, 76 AM. ECON. REV. 984 (1986).

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foregoing merely attempts to provide a brief overview of essential concepts for the purposes of this Article. This discussion yields a number of important lessons for the patent-antitrust interface in developing countries. First, it is clear that in order to promote economic growth, not only do developing countries need to spur innovation and build domestic innovative capacity, they should also adopt policies that facilitate R&D spillovers. Helpman confines his discussion of spillover to disembodied or tacit knowledge, sometimes also known as know-how, which generally refers to non-patentable technical knowledge that is nonetheless essential for a firm to implement an invention.[48] This need not be the case, however, since spillover applies to patented knowledge as well. Economists have observed that knowledge spillover, including that of patented knowledge, takes place by way of patent applications and trade shows.[49] It is not uncommon for a rival firm to learn about a new technology through patent applications and utilize the technical knowledge contained in the applications to invent around the patent. Moreover, and more importantly for the purposes of this Article, antitrust law can facilitate R&D spillover by making it easier for rivals to obtain and utilize patented knowledge. This can be accomplished by restricting the scope of patent protection and exploitation.

The second important lesson for developing countries is the need to adopt pro-active policies to promote technological progress and to pursue growth. While Solow's model suggests that countries will converge to a common steady state growth rate, the endogenous growth models only predict conditional convergence: "[T]his work leads to the conclusion that steady state growth rates differ between nations. Growth rates may converge toward a country-specific steady state growth path at best (so-called conditional convergence), leading to the divergence of growth paths among countries."[50] In other words, developing countries cannot rely on their supposedly higher returns to knowledge accumulation—because of their start from a lower base—and convergence of growth rates to catch up with developed countries. Instead, they need to pursue policies that actively promote technological progress. Empirical studies have confirmed that the

[48] Professor Keith Maskus illustrates the concept of tacit knowledge by positing that "[g]aining access to blueprints of a complex technology is of little competitive advantage in itself unless there is also a way to determine how to use it efficiently." KEITH E. MASKUS, INTELLECTUAL PROPERTY RIGHTS IN THE GLOBAL ECONOMY 136 (2000); *see also* Edwin Mansfield, Mark Schwartz & Samuel Wagner, *Imitation Costs and Patents: An Empirical Study*, 91 THE ECON. J. 907, 910 (1981) (showing that tacit knowledge allows a firm to implement a complex technology from the blueprints and to use it efficiently); Frederic M. Scherer, *The Economics of the Patent System*, *in* INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 439, 445 (Frederic M. Scherer ed., 1980).

[49] Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 1987(3) BROOKINGS PAPERS ON ECON. ACTIVITY 783, 806–07 (1987).

[50] Verspagen, *supra* note 29, at 506.

conditions for catching up have become increasingly unfavorable over time, and more innovative efforts are required of the technological laggards.[51] To the extent the patent-antitrust interface can influence technology transfer, developing countries may wish to consider using antitrust law as a policy tool to accelerate catching up.

2. Development

While economic growth generally refers to increase in per capita income, the concept of development is considerably broader and more multi-faceted. The academic literature on development is vast and varied. Nonetheless, development literature can be roughly classified into two schools of thought, which Professor Margaret Chon calls the Neoliberal school and the Skeptical school.[52]

The main dividing line between these two schools is their respective faith in the ability of free market policies to deliver development. The Neoliberal school believes that development effort should focus on achieving economic growth attained through a range of liberalizing policies, such as dismantling of trade barriers, encouragement of FDI, simplification of taxation system, removal of market-distorting government policies, enhanced protection of property rights, liberalization of previously regulated industries, paring down of the state-owned sector and divestiture of state-owned enterprises, and improved protection of intellectual property.[53] Neoliberals believe that economic growth and efficiency are the main focus of development. Distributive concerns are not given much weight under the presumption that the wealth generated by pro-growth liberal policies will eventually trickle down to the poor. On the intellectual property front, the TRIPS Agreement is the culmination of this Neoliberal view of development.[54] The implicit rationale behind requiring developing countries to heighten intellectual property protection is that these countries will only develop innovative capacity by protecting domestic innovators from free-riding. As Chon notes, "Integrating intellectual property standards through TRIPS is supposed to result in long term economic growth through innovation across all member states, at the cost of short term decreases in access to goods because of higher prices."[55]

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[51] *See* Jan Fagerberg & Bart Verspagen, *Technology-gaps, Innovation Diffusion and Transformation: an Evolutionary Interpretation*, 31 RES. POL'Y. 1291, 1302 (2002) (using, as technological laggards, countries such as Thailand, the Philippines, Malaysia, and Turkey).

[52] Margaret Chon, *Intellectual Property and the Development Divide*, 27 CARDOZO L. REV. 2821, 2853–63 (2005–2006).

[53] *Id.* at 2863.

[54] *Id.* at 2864.

[55] *Id.* at 2866.

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The Skeptical approaches to development focus on "historically-driven, path-dependent, structural impediments to development."[56] Some proponents of these approaches believe that obstacles to development are legacies of colonization.[57] Others attribute slowed growth to path-dependency and economic determinism.[58] Some present feminist critiques of the discourse on development.[59] What all Skeptics share is a common opposition to the Neoliberal vision for development, especially its emphasis on growth and market liberalization as a panacea for the woes of developing countries. To them, development must mean not only higher economic growth, but also inclusive growth that benefits different socio-economic classes. Development must permit the satisfaction of basic human needs, such as education and health care. Only with satisfaction of these basic needs can individuals fulfill their full potential. This broader vision of development is best encapsulated by Nobel Laureate Amartya Sen:

> The ends and means of development require examination and scrutiny for a fuller understanding of the development process; it is simply not adequate to take as our basic objective just the maximization of income or wealth, which is, as Aristotle noted, "merely useful and for the sake of something else." For the same reason, economic growth cannot sensibly be treated as an end in itself. Development has to be more concerned with enhancing the lives we lead and the freedoms we enjoy.[60]

In short, development needs to be more broadly conceptualized than a singular focus on economic growth. At the very least, economic growth must be accompanied by a somewhat equitable distribution of income. Development policies must not wait idly by while the increased wealth trickles down the social ladder. Moreover, development policies must endeavor to improve access to basic services. With respect to patent protection, one can easily imagine the Skeptics' distrust of the TRIPS Agreement. They question the merits of imposing heightened patent protection requirements on developing countries.[61]

The Skeptics' view has found an unlikely supporter. Although not a development scholar, economist Professor William Baumol has opined on the importance of the distribution of the benefits of innovation to economic

[56] *Id.* at 2868.

[57] Tayyab Mahmud, *Postcolonial Imaginaries, Alternative Development or Alternatives to Development?*, 9 TRANSNAT'L L. & CONTEMP. PROBS. 26 (1999).

[58] *See generally* RICHARD PEET & ELAINE HARTWICK, THEORIES OF DEVELOPMENT 14 (1999).

[59] SHAWN MEGHAN BURN, WOMEN ACROSS CULTURES: A GLOBAL PERSPECTIVE 133–57 (2000).

[60] AMARTYA SEN, DEVELOPMENT AS FREEDOM 14 (1999).

[61] Chon, *supra* note 52, at 2867.

growth and development.[62] He forcefully argues that society is better off if the benefits of innovation are not reserved to the originator of the innovation, but spread broadly among members of society.[63] This is so even if the spillover of benefits beyond the innovator slightly reduces innovation incentives:

> The reason a zero spillover level is not optimal is that, though spillovers are a disincentive for investment in innovation (as most of the literature contend), they are at the same time significant benefits in themselves. A major component of these spillovers is the resulting (spectacular) increase in economic welfare of the population as a whole, so that innovation does not just benefit direct participants in the innovation process. Indeed, these spillovers, in the form of resulting rises in general living standards, *are arguably the prime social benefits of innovation*.[64]

Spillovers from innovation boost the well-being of the general public by improving access to healthcare and education, which in turn gives society a more productive and educated workforce. Baumol notes that if spillovers from innovation were successfully kept at zero, "the living standards of the vast majority of the citizens of today's rich countries would have stalled at pre-Industrial Revolution levels."[65] He proceeds to conclude that low or even zero spillovers, which can be achieved by expanding intellectual property rights and stepping up enforcement, are far from socially optimal. Innovation incentives need to be sacrificed to obtain these distributive social benefits, even at the expense of higher absolute growth.[66] In fact, Baumol questions whether permitting substantial spillovers will necessarily undermine innovation. He refers to Japan, where patent protection is considerably weaker than the United States, as an example of a country where spillovers are probably substantial, but innovations nonetheless abundant.[67] The relatively weaker patent protection available in Japan may have spurred Japanese firms to enter into technology-sharing arrangements, which have in turn allowed for the rapid dissemination of innovations, and for growth in productivity.

This willingness to sacrifice innovation incentives is all the more remarkable given that Baumol is an innovation economist. His view further buttresses the Skeptics' position that a development strategy focusing solely or predominantly on wealth creation and economic efficiency is likely to be

[62] BAUMOL, *supra* note 42, at 121.
[63] *Id.*
[64] *Id.* (italics added).
[65] *Id.* at 125.
[66] *Id.*
[67] *Id.* at 141.

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deficient. Development strategy generally, and its application to the patent-antitrust interface in particular, must account for the distributive consequences of government policy.

B. A Summary of Developmental Considerations

Reconciling these two schools of development thinking is beyond the scope of this Article. A number of useful insights, however, can be gleaned to guide our exploration of the patent-antitrust interface in developing countries. First, both schools agree that economic growth is an important component of development. The Skeptics challenge the Neoliberal view that economic growth is the be-all-end-all of development. Nonetheless, no viable development policies can afford to overlook economic growth. The first and foremost issue in this Article is a possible role for the patent-antitrust interface in promoting technological progress, and hence, economic growth. This is consistent with the earlier discussion of economic analysis of growth by Solow and Romer.

Second, after the demise of the Washington Consensus, it is increasingly questioned whether a singular focus on economic growth to the neglect of income distribution and the satisfaction of basic human needs is a sound development policy.[68] Inclusive growth that pays at least some attention to how the newly generated wealth is distributed is highly important. The welfare benefits of such inclusive growth have been noted by Baumol.[69] Antitrust law is certainly not in the business of redistributing income, nor is it an appropriate mechanism for rationing access to basic services, but it can at least pay some heed to how its doctrines affect the poor, who are more likely to be consumers than producers. Consumer welfare loss by the poor should be minimized because of the diminishing marginal utility of money. The loss of every dollar bites at low levels of income. In particular, in resolving the patent-antitrust conflict, a greater regard for the poor means that monopoly loss should not be lightly imposed on consumers in order to encourage innovation. The extra money that developing country consumers need to spend to generate patentee reward is a much more precious resource to them. This is especially so if the patented product at issue is a basic necessity, the demand for which is inelastic.

Third, the patent-antitrust interface should take into account, to the extent possible, access to basic services. The most notable example is medicine. The TRIPS Agreement already contains mechanisms for developing countries to order compulsory licensing of patented medicine in

[68] Sen, *supra* note 60, at 3–4.

[69] BAUMOL, *supra* note 42, at 121.

times of a public health emergency.[70] In cases involving medicine, foodstuffs, and other necessities, consumer interest in obtaining them at lower prices, the denial of which may result in hunger and malnutrition, should be accorded greater weight.

Fourth, inclusive growth also means encouraging indigenous entrepreneurship. One way to alleviate economic inequality in developing countries is to ensure that business opportunities are open to the poor. The poor's participation in the market is likely to be through small- and medium-sized businesses.[71] Without causing undue interference with the market and sacrifice of economic efficiency, some weight should be given to the interests of these enterprises when resolving the patent-antitrust conflict.

To sum up, while industrialized economies may only focus on the tradeoff between consumer welfare and innovation incentives when tackling the patent-antitrust interface, developing countries must consider a broader range of issues: (1) how technological progress affects their growth prospects and conditions for catching up; (2) how consumer welfare loss is distributed within their societies; (3) how the patent-antitrust interface affects access to basic necessities; and (4) how a more pro-antitrust stance may facilitate or impede technology transfer, both authorized and unauthorized, especially to small- and medium-sized enterprises.

Before attempting to incorporate these considerations into the patent-antitrust interface, one must revert to a crucial issue that has been alluded to a few times in this Article—the extent to which patent protection spurs innovation. This is an issue that warrants close scrutiny by developing countries. If the causal link between patentee reward and innovation is weak, there is a strong argument for developing countries to shift the balance in favor of antitrust policy. On the contrary, if the link is strong, developing countries that have innovative capacity should approach the patent-antitrust interface cautiously and avoid undue restrictions of patent exploitation practices. This issue is explored in the next Part.

IV. INNOVATION INCENTIVES AND THE PATENT-ANTITRUST INTERFACE

As far as innovation incentives in developing countries are concerned, one must distinguish domestic innovation from global or external innovation. In today's globalized world, the innovation incentives generated by a patent system extend beyond domestic borders and may affect foreign firms. The extent to which a shift in the patent-antitrust

[70] CARLOS M. CORREA, INTELLECTUAL PROPERTY RIGHTS, THE WTO AND DEVELOPING COUNTRIES: THE TRIPS AGREEMENT AND POLICY OPTIONS 89–94 (2000).

[71] ABHIJIT V. BANERJEE & ESTHER DUFLO, POOR ECONOMICS: A RADICAL RETHINKING OF THE WAY TO FIGHT GLOBAL POVERTY 205–24 (2011).

interface in developing countries affects innovation by developed country firms is an interesting issue examined *infra* Part IV.D.

The central issue in this Part is whether tighter antitrust restrictions on patent exploitation will undermine domestic innovation in developing countries. The relevance of this issue hinges on the existence of domestic innovative capacity in a certain sector. If there is no innovative capacity in a particular industry, the innovation incentives generated by the patent system will redound no benefit to the domestic economy. One may retort that even if innovative capacity is currently absent, patent protection may attract potential innovators. While there is some validity to this argument, for certain technology-intensive sectors, there is simply no hope for some developing countries to develop any innovative capacity in the foreseeable future.[72] There is no reason to incur valuable consumer welfare loss to generate or maintain innovation incentives in these sectors. Therefore, if a developing country currently possesses no innovative capacity in a certain sector, and has no prospect of doing so in the near future, maintenance of innovation incentives should be a low priority. The issue is different for developing countries that possess innovative capacity in particular sectors. For these countries, the extent to which tighter antitrust restrictions on patent exploitation will undermine innovation incentives is a matter of grave concern. It is this topic to which the ensuing discussion will turn.

The general belief is that patent protection is needed to generate innovation incentives, and that society would be worse off with reduced patent protection due to a loss of innovation.[73] As it turns out, there is a considerable amount of both theoretical and empirical economic literature that cast doubt on these beliefs. The extent to which patent protection is needed to secure innovations varies across industries. While patent protection is important for some industries, such as pharmaceuticals and chemicals,[74] it plays a much more attenuated role in attracting innovative efforts in others. This insight will have important implications for the patent-antitrust interface in developing countries.

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[72] CORREA, *supra* note 70, at 140. Correa argues that introducing patent protection for pharmaceuticals will not spur domestic R&D in pharmaceuticals in developing countries, because "the development of new chemical entities is outside the reach of local companies in any developing country, since there are no firms in such countries big enough (in terms of total sales) to finance the high costs of pharmaceutical R&D." *Id.* at 43. He further argues that "[t]he high investment required for mass chip production and the intensity and cost of R&D in an extremely competitive market constitute formidable barriers for potential new entrants, particularly those from developing countries." *Id.* at 140.

[73] *See* Mark A. Lemley, *Ex Ante versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 129–30 (2004).

[74] *See* MICHELE BOLDRIN & DAVID K. LEVINE, AGAINST INTELLECTUAL MONOPOLY 212–42 (2008) (challenging the view that patent protection is important in pharmaceutical and chemical industries).

A. Some Definitions

Before turning to the relevant literature, it is important to first define a number of key terms. These terms are key to understanding the entire debate about whether patent protection is necessary to spur innovation.

1. Invention vs. Innovation

Invention and innovation have been used somewhat interchangeably thus far in this Article. Economists have in fact used them to refer to different things. According to some economists, "*Invention* refers to the creation of new knowledge, and *innovation* (or *commercialization*) refers to the development of marketable products from that knowledge."[75] Innovation, hence, includes "design, production, marketing and the rest of the myriad activities that contribute to the making of things."[76] While invention and innovation usually go hand in hand, Austrian economist Joseph Schumpeter notes that "[i]nnovation is possible without anything we should identify as invention, and invention does not necessarily induce innovation, but produces of itself . . . no economically relevant effect at all."[77] Because innovation encompasses invention and much more, the costs of innovation substantially exceed invention costs.[78]

Economists have long debated whether the patent system should only provide incentives to invent, or whether patentee reward should also cover innovation costs.[79] This is important because invention does not necessarily lead to innovation and commercialization. Society as a whole must decide whether innovation is itself a sufficiently valuable activity that needs to be encouraged through policy intervention. While some have argued that the patent system should only be concerned with inventions,[80] the consensus in recent literature seems to be that innovation costs should be taken into account by the patent system.[81] This Article makes no attempt to settle this

[75] Keith E. Maskus et al., *Intellectual Property Rights and Economic Development in China*, *in* INTELLECTUAL PROPERTY AND DEVELOPMENT: LESSONS FROM RECENT ECONOMIC RESEARCH 295, 299 (Carsten Fink & Keith M. Maskus eds., 2005) (emphasis in original).

[76] Stuart Macdonald, *Exploring the Hidden Costs of Patents*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT 13, 23 (Peter Drahos & Ruth Mayne eds., 2002).

[77] *Id.*

[78] *Id.* at 23 ("It is important to remember that of the total resources required for innovation, only a small proportion comes from invention; the majority comes from design, production, marketing and the rest of the myriad of activities that contribute to the making of things.").

[79] *See* Scherer, *supra* note 48, at 441.

[80] *See* Macdonald, *supra* note 76, at 24.

[81] *See generally* ADAM B. JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS, AND WHAT TO DO ABOUT IT 43 (2004); F. Scott Kieff, *Property Rights and Property Rules for*

debate, and assumes for the purpose of discussion that the patent system should aim to compensate both invention and innovation costs. With this assumption established, invention and innovation will continue to be used interchangeably in this Article. Their more precise usage will be employed where necessary.

Some commentators have posited that the definition of innovation may be context-specific. Keith Maskus observes that "[d]efining innovation is extremely difficult in the context of a developing country. Many forms of adaptation, absorption, and even creative imitation can be legitimate manifestations of innovation."[82] In other words, there is no global standard of inventiveness. What counts as an innovation depends on the existing state of technological development of the country. A new method for producing a chemical may not be novel in a global sense, but it may be the first such implementation in a developing country. In that case, this adaptation of the production method should qualify as an innovation in that country.

Maskus's observation also hints at a very important point that has been made by other commentators: adaptation may require sophisticated technological knowledge and technical know-how.[83] Imitation is costly, in some cases even more so than the original inventive process.[84] Even though imitation may be ridiculed by intellectual property advocates as piracy to be deterred at all costs, it is in fact a very important means for developing countries to acquire technological capacity. For example, in the nineteenth century, the United States was known for its extensive copying of foreign-patented technology, which allowed it to catch up with the global technological leader of the time, Great Britain.[85] One may choose to call it innovation or imitation, the fact remains that such activity is crucial for developing countries to acquire technological capacity and catch up with industrialized economies. The patent-antitrust interface has significant impact on imitation. To the extent that facilitation of imitation will allow a developing country to acquire technological capacity, thereby accelerating

Commercializing Inventions, 85 MINN. L. REV. 697, 703 (2001) (proposing a commercialization view of patent systems and emphasizing the importance of patent systems in providing incentives to commercialize invention); Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977) (arguing that the main function of a patent system is to facilitate commercialization of inventions).

[82] Maskus et al., *supra* note 75, at 325.

[83] Mansfield et al., *supra* note 48, at 910.

[84] *See id.* at 909–10; Levin et al., *supra* note 49, at 807–12 (showing that for one-seventh of the innovations surveyed in their study, imitation costs were no smaller than the development costs by the original inventor).

[85] *See generally* Ove Granstrand, *Innovation and Intellectual Property Rights*, *in* THE OXFORD HANDBOOK OF INNOVATION, *supra* note 29, at 266, 284; Scherer, *supra* note 18, at 1140.

economic growth, antitrust law should facilitate it.

2. Incentive to Innovate

Another important term to define is the incentive to innovate, which has been used repeatedly in this Article. Professor Richard Gilbert defines the incentive to innovate as "the difference in profit that a firm can earn if it invests in research and development compared to what it would earn if it did not invest."[86] This incentive is determined by a number of factors, including "the characteristics of the invention, the strength of intellectual property protection, the extent of competition before and after innovation, barriers to entry in production and R&D, and the dynamics of R&D."[87]

3. Technological Regime

The last set of terms to be defined describes the conditions of a particular industry that determine the importance of patent protection to innovation. The first concept to be introduced is known as a technological regime, which refers to the general technological environment of an industry as it pertains to innovation. In particular, a technological regime can be broken down into two components: technological opportunity and appropriability conditions.[88] Technological opportunities "reflect the likelihood of innovating for any given amount of money invested in (re)search."[89] They refer to the ease with which innovations can be found in a particular industry, or the potential for innovation. Professor F.M. Scherer, one of the leading experts on innovation, further elucidates the concept as follows: "Technological opportunity in this context could relate partly to industry traditions or to demand conditions not manifested in mere sales volume, but it seems most likely to be associated with dynamic supply conditions dependent in turn upon the broad advance of scientific and technological knowledge."[90] Industries with close ties to traditional, basic scientific research, such as chemicals and pharmaceuticals, are replete with technological opportunities.[91] Other industries, such as paper, food products, textile, and clothing, have fewer technological opportunities.[92] The abundance of technological opportunities in a particular industry is exogenous to patent policy and the patent-antitrust interface. It is

[86] Gilbert, *supra* note 35, at 159.

[87] *Id.* at 162.

[88] Franco Malerba, *Sectoral Systems: How and Why Innovation Differs Across Sectors*, *in* THE OXFORD HANDBOOK OF INNOVATION, *supra* note 29, at 380, 382.

[89] *Id.*

[90] Frederic M. Scherer, *Firm Size, Market Structure, Opportunity, and the Output of Patented Inventions*, 55 AM. ECON. REV. 1097, 1100 (1965).

[91] Malerba, *supra* note 88, at 382.

[92] *Id.*

determined by the nature of the industry and the technologies it employs. The patent-antitrust interface thus takes this dimension of a technological regime as given.

Appropriability refers to the conditions of an industry that allow the inventor to reap the economic benefits of its invention and to recoup its investment in it. Appropriability "summarizes the possibilities of protecting innovations from imitation and of reaping profits from innovative activities. High appropriability means the existence of ways of successfully protecting innovation from imitation. Low appropriability conditions denote an economic environment characterized by widespread existence of externalities."[93] Appropriability is high when imitation is technically difficult (as in the case of complex machinery), costly, or when effective mechanisms are available to the patentee to prevent or minimize imitation. Otherwise, appropriability is likely to be low and the inventor will face considerable difficulty in reaping the benefits of its invention. Appropriability also depends on the accessibility and cumulativeness of knowledge.[94] If knowledge within the industry is easily accessible, appropriability is likely to be low. If knowledge is cumulative, competitors may have difficulty in replicating the inventor's technology without access to its knowledge base. Appropriability is thus likely to be high. Unlike technological opportunities, appropriability is endogenous to the patent system and the patent-antitrust interface. Changes in patent law and antitrust restrictions of patent exploitation affect an inventor's ability to reap rewards from its invention.

The concept of cumulativeness of knowledge refers to the fact that "today's innovations and innovative activities form the starting point for tomorrow's innovations. More broadly, one may say that high cumulativeness means that today's innovative firms are more likely to innovate in the future in specific technologies and along specific trajectories than non-innovative firms."[95] Cumulativeness highlights the fact that technological development does not start on a blank page. Every invention builds on prior knowledge or ideas.[96] Cumulativeness does not only apply

[93] *Id.*

[94] *Id.* at 388–89.

[95] *Id.* at 382.

[96] This is illustrated by the steam engine. James Watt is generally credited for inventing the steam engine. It is a widely known fact, however, that his invention built on prior technology, especially Newcomen's steam engine. He did not invent the steam engine from scratch. Many of the technologies needed for the engine had been in existence for years when Watt "invented" it. His major contribution was to equip the steam engine with a separate condenser and air pump. *See* George Selgin & John Turner, *James Watt as Intellectual Monopolist: Comment on Boldrin and Levine*, 47 INT'L ECON. REV. 1341, 1341 (2006).

to firms, but also at the country level.[97] Today's innovative nations are more likely than the technological laggards to continue to innovate. The result is path dependency in innovation for developing countries. Absent dramatic changes, developing countries are likely to remain on the low-technology path of development.

There are many reasons for this. An important one, at least as it pertains to the character of knowledge, is the relative lack of access to tacit knowledge for developing countries. Tacit knowledge, or technical know-how, tends to diffuse through more informal means. However, tacit knowledge is crucial to a firm's ability to utilize a new technology.[98] Because of the informal means by which it is transferred, tacit knowledge tends to circulate more freely within a domestic market than across national borders, even though barriers to transnational flow are eroding with globalization and advancement in communication technology.[99] As such, even if developing country firms have access to a patented technology from foreign patent documents, their limited access to tacit knowledge substantially impairs their ability to implement it. This brief discussion highlights the enormous obstacles facing developing countries in their effort to acquire technological capacity and catch up with industrialized economies.

B. Is Patent Protection Necessary for Securing Innovation?

The basic economic rationale for patents is simple: "If there were no incentives for those who discover and develop new technology, it is likely that fewer innovations would be developed, slowing progress and the benefits it brings."[100] Innovation incentives are likely to be under-supplied because technology, embodied in the form of knowledge, possesses many characteristics of a public good.[101] The consumption of technological knowledge is non-rivalrous, that is, one user's consumption does not exclude others. Moreover, technological knowledge is costly to produce but easy to imitate. This means that without some form of legal intervention, there will be an insufficient supply of technology. This is

[97] Jorge Niosi et al., *National Systems of Innovation: In Search of a Workable Concept*, 15 TECH. SOC'Y 207, 216 (1993) (noting that past performance of a nation's innovation system affects its current performance).

[98] ROHAN KARIYAWASAM, INTERNATIONAL ECONOMIC LAW AND THE DIGITAL DIVIDE 216 (Alan O. Sykes et al. eds., 2007).

[99] Joanne Roberts, *From Know-how to Show-how? Questioning the Role of Information and Communication Technologies in Knowledge Transfer*, 12 TECH. ANALYSIS & STRATEGIC MGMT. 429, 433 (2010).

[100] JAFFE & LERNER, *supra* note 81, at 8.

[101] However, technological knowledge is not a pure public good, because unlike pure public goods such as national defense, it requires its recipients to make investments to make use of it. Malerba, *supra* note 88, at 387.

where patents come in. Patents improve the appropriability of technology by allowing an inventor to exclude others from replicating, implementing, or commercializing the technology. Patents are said to serve three objectives: promote inventions, spur the development and commercial utilization of inventions, and encourage inventors to disclose their inventions to the public.[102] Discussions about the objectives of patent systems tend to focus on the first two; it is often easy to overlook the third.[103] This objective is important because in the implicit bargain between the patent system and inventors is the grant of limited exclusivity in exchange for the disclosure of knowledge that will benefit society. Moreover, as discussed earlier, patent disclosure plays a role in the dissemination of technical knowledge and R&D spillovers.

One striking feature of the discourse about the patent system is the incongruity between the general perception about the system and academic opinions among economists. While it is almost an article of faith within antitrust circles that patent protection is needed to secure innovations, economists have long expressed considerable reservations about, if not outright hostility toward, patents.[104] Professor Fritz Machlup, a pioneer in innovation economics, famously opined:

> If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it.[105]

This observation was made in 1958. Despite half a century of further research, this skepticism about the patent system has not been dispelled.

Sharing this ambivalent attitude, Scherer asserts: "It is almost impossible to conceive of any existing social institutions so faulty in many ways. It survives only because there seems to be nothing better."[106] He believes the strongest justification for the patent system is to secure the kind of rare, groundbreaking inventions that redound a disproportionately great amount of benefits to society.[107] An example is the photocopying

[102] Scherer, *supra* note 48, at 440.

[103] Economists, however, have disputed the efficacy of the patent system in disseminating information through patent disclosure. Macdonald, *supra* note 76, at 17.

[104] For highly critical views of the patent system, see generally BOLDRIN & LEVINE, *supra* note 74, 68–92; JAFFE & LERNER, *supra* note 81, 56–77; JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE 1–28 (2008).

[105] FRITZ MACHLUP, AN ECONOMIC REVIEW OF THE PATENT SYSTEM, S. DOC. NO. 85-15, at 80 (2d Sess. 1958).

[106] Scherer, *supra* note 48, at 454.

[107] *Id.*

technology invented by physicist Chester Carlson and commercialized by The Haloid Corporation, which was subsequently renamed Xerox.[108] Xerography, as the technology is officially known, is generally regarded as a technology that would not have been successfully commercialized without patent protection.[109] Professor Sol Piciotto similarly notes that economists "have therefore always had difficulty finding adequate justification for these exclusive rights."[110] Even more critically, Professors Michele Boldrin and David Levine have recently argued that intellectual property, including patents, is better called intellectual monopoly and should be abolished.[111] They assert that the patent system creates vastly more harm than good for society.[112]

What follows is an overview of the theoretical arguments and empirical evidence that shows how the case for the necessity of patent protection to spur innovation has been overstated. From a theoretical perspective, whether patent protection is necessary to reward inventors depends on the appropriability conditions of the industry at issue, i.e., whether there are other means that allow the inventor to reap the benefits of its invention without resorting to patent protection. As it turns out, economists have shown through empirical studies that inventors in many industries do not rely on patent protection as their primary means of investment recoupment. There is evidence from both developed and developing countries that support this conclusion.

1. Theoretical Analysis of the Need for Patent Protection to Spur Innovation

Patent protection is not always necessary for securing innovation. Conditions in an industry may be such that financial rewards are sufficient absent patent protections to incentivize innovation. The abundance of accessible technological opportunities lowers innovation costs, the consequence of which is that firms may pursue innovation without the financial reward provided by the patent system.[113] This abundance may be

[108] Frederic M. Scherer, *Technological Innovation and Monopolization* 42 (Am. Antitrust Inst., Working Paper No. 05-07, 2005), *available at* http://www.antitrustinstitute.org/files/431.pdf.

[109] *Id.* at 42–43. Carlson faced enormous difficulty convincing technology firms to commercialize the invention. Haloid might not have taken on the highly risky venture without patent protection for the invention.

[110] Sol Picciotto, *Defending the Public Interest in TRIPS and the WTO*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 224, 225.

[111] *See generally* BOLDRIN & LEVINE, *supra* note 74, at 212.

[112] *Id.*

[113] Scherer, *supra* note 90, at 1121 ("Differences in technological opportunity—e.g., differences in technical investment possibilities unrelated to the mere volume of sales and

attributted to the wealth of basic scientific research funded by the public bodies or the nature of the industry. Similarly, if innovations can be discovered relatively easily in the normal production process—this is particularly relevant for process innovations—firms are again unlikely to require innovation incentives supplied by the patent system.

Second, and more importantly, appropriability may be naturally high in a particular industry due to its competitive structure or the nature of the technology. Appropriability crucially depends on the likelihood of imitation. If no imitation comes into the market after a new product is invented and commercialized, the inventor's chance of successful recoupment of their investment is maximized.[114] If imitation will happen eventually, which is the case for most inventions, the key to appropriability is the length of the imitation lag.[115]

From a potential imitator's perspective, the decision to imitate or not comes down to whether the profit from imitation outweighs its costs. The two key determinants are hence the profit potential of imitation and imitation costs.[116] The profit from imitation depends on a variety of factors, such as the profit potential (quasi-rent) of the invention and the number of potential imitators. The profit potential of an invention in turn depends on the demand for the product incorporating the technology. This is where the nature of the technology comes into play. An invention that is unique or a significant improvement of existing technology will likely attract strong demand and generate significant profit potential. The profit potential for a minor improvement of an existing technology is likely to be smaller. The number of potential imitators also bears on the profit potential of imitation. The existence of a large number of potential imitators means that they will likely drive down the price of the imitated product, perhaps to even as low as marginal costs. Profit potential also depends on the inventor's pricing strategy. An inventor that charges a high price will reap greater profit, but will also attract market entrants sooner and in greater numbers. In sum, other things being equal, the higher the profit potential for an invention, the more likely it is that it will be imitated, and the lower the invention's appropriability.[117]

typically opened up by the broad advance of knowledge—are a major factor responsible for interindustry differences in inventive output.").

[114] Recoupment may still fail if the product turns out to be unpopular.

[115] Mansfield et al., *supra* note 48, at 910–13; *see also* Peter W. Roberts, *Production Innovation, Product-Market Competition and Persistent Profitability in the U.S. Pharmaceutical Industry*, 20 STRATEGIC MGMT. J. 665, 668 (1999) (suggesting that its ability to resist imitation may be reason for profit persistence in U.S. pharmaceutical industry).

[116] Mansfield et al., *supra* note 48, at 914–15.

[117] Scherer argues only innovations with low profit potential would require patent protection: "it would appear, only those innovations that offer potentially exploitable benefits small in relation to development costs need the extra lure of patent protection before

Imitation costs mainly depend on two factors: the ease of imitation and the amount of investments required to undertake the imitation, which is driven by the first factor.[118] Other things being equal, the more difficult it is to imitate a technology, the more costly the imitation process. Ease of imitation in turns depends on a variety of factors. Economists speak of the codifiability of a technology, which refers to the extent to which a technology can be accurately and comprehensively reduced to written form.[119] A technology that is easily codified, which characterizes most inventions in the chemical and pharmaceutical sectors, is more easily imitated.[120] A potential imitator merely needs to pick up a blueprint or a patent application to replicate the technology. Codifiability is related to tacit knowledge. An invention that requires substantial tacit knowledge to be implemented suffers from low codifiability and is difficult to imitate.[121] Tacit knowledge is by definition not readily codifiable. Ease of imitation lowers imitation costs and appropriability.

Imitation costs also depend on the complexity of the technology and the number of related investments—such as construction of production facilities and personnel training—that a firm must make to replicate the technology.[122] A firm may be able to reproduce an imitated technology in its existing manufacturing facility. In that case, imitation costs are likely to be low. Some new technology requires a reconfiguration of the existing manufacturing facility or even the construction of a new plant. The semiconductor industry is a prime example of this.[123] It is not uncommon for a new generation of semiconductor chips to require brand new foundries.[124] Imitation costs in such an industry are likely to be high. Even if a competitor manages to get a hold of the latest design blueprint for an Intel chip, it may still need to expend substantial resources to convert its manufacturing facility for the new product.

Imitation is not the only determinant of appropriability. Appropriability also depends on the profitability of the invention prior to or

entrepreneurs will choose to plunge." Scherer, *supra* note 48, at 448. He proceeds to ask whether "society [would] really lose much at the margin if, by abolishing the patent system, it sacrifices mainly innovations with low benefit/cost ratios?" *Id.* The answer, according to him, is likely to be negative. *Id.*

[118] Mansfield et al., *supra* note 48, at 910–13.

[119] Granstrand, *supra* note 85, at 282.

[120] Henry Grabowski, *Competition between Generic and Branded Drugs*, *in* PHARMACEUTICAL INNOVATION: INCENTIVES, COMPETITION, AND COST-BENEFIT ANALYSIS IN INTERNATIONAL PERSPECTIVE, *supra* note 45, at 164.

[121] Mansfield et al., *supra* note 48, at 910.

[122] *Id.* at 907.

[123] Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1582 (2003).

[124] *Id.*

in spite of imitation.[125] High profit potential of an invention can be both a curse and a blessing as far as appropriability is concerned. As mentioned previously, high profit margin attracts imitators, which will undercut the inventor's profit. High profit margin is also what usually attracts the inventor to invest in the invention in the first place. Profit potential varies with the competitive structure of an industry. A perfectly competitive market will require patent protection or some other kind of incentive mechanism to secure innovations, as the price of the product will be driven by competition to its marginal cost.[126] In contrast, a market that is oligopolistic or otherwise protected by substantial barriers to entry will allow the firms to make use of their market power to charge supra-competitive prices, thereby recouping their investments.[127] An oligopolistic market will also have fewer potential imitators, which helps to preserve the inventor's profit.[128]

Appropriability is preserved if an inventor can recoup its investment before imitated products come into the market. The pertinent issue is the time it takes for successful imitation to take place—referred to as imitation lag.[129] Even if a technology can be effectively imitated, it often entails substantial time lag. Secrecy, imperfect information about the technology, and the amount of tacit knowledge associated with the deployment of the technology all contribute to it.[130] Imitation lag is important, because it gives the inventor time to reap the benefits of its invention before its supra-competitive profit is competed away by imitation. This is known as the first-mover advantage in the literature, and has been found to be an important, if not the overriding, source of innovation incentives in some industries.[131] The first-mover advantage can be further augmented by brand loyalty, which allows an inventor to continue to charge a supra-competitive price after entry of imitated products.[132]

It should be clear from the foregoing discussion that patent protection is only needed to spur innovation if technological opportunities are sparse and appropriability is low in a particular industry. In particular, appropriability will be low if the technology at issue is easy to imitate,

[125] Scherer, *supra* note 48, at 446–47.

[126] *Id.* at 444.

[127] *Id.* at 447.

[128] *Id.*

[129] Levin et al., *supra* note 49 (highlighting the importance of lead time as a determinant of appropriability).

[130] *Id*. at 793–99.

[131] *Id.* at 789–90; Picciotto, *supra* note 110, at 225; Mansfield et al., *supra* note 48, at 910.

[132] Roger A. Kerin, P. Rajan Varadrajan & Robert A. Peterson, *First-Mover Advantage: A Synthesis, Conceptual Framework, and Research Propositions*, 56 J. MARKETING 33, 35 (1992) (explaining how brand loyalty contributes to first-mover advantage).

costly to develop, takes a short time to imitate, requires little tacit knowledge or few other substantial investments to implement, and is not particularly unique or economically valuable.[133] Appropriability will also be low if the market at issue is competitive and full of potential imitators, has low barriers to entry, and is characterized by low brand loyalty, which will undermine first-mover advantage. On the relationship between market structure and innovation incentives, Professor Gilbert notes that "[e]xclusive rights generally lead to greater innovation incentives in more competitive markets, while nonexclusive rights generally lead to the opposite conclusion, although there are important exceptions."[134] Patent protection is hence less vital to innovation in less competitive industries. Where appropriabilty is low, legal intervention, in the form of patent protection or otherwise, may be needed to augment returns to technological investment. However, where appropriability is already high in a particular industry, patent protection is much less essential. If inventions in that industry will continue to be made even without patent protection, a patent system redounds few benefits to society while inflicting substantial costs in the form of consumer welfare loss.

Chemicals and pharmaceuticals are industries that are marked by low appropriability. Studies have repeatedly shown that these two industries stand out in their reliance on patent protection to spur innovation.[135] This is hardly surprising given the fact that technology in both industries tends to be relatively codifiable, does not require substantial tacit knowledge to implement, is easy to imitate, and requires high R&D investment.[136] This means that both imitation costs and time lag are low. The profit potential, however, is substantial for most chemical and pharmaceutical inventions, especially the latter, because demand for medications tends to be inelastic and market structure for the industry highly concentrated.[137] This means that imitation is highly profitable. It is this somewhat unusual alignment of circumstances that renders both industries so dependent on patent protection

[133] MASKUS, *supra* note 48, at 146.

[134] Gilbert, *supra* note 35, at 159.

[135] Levin et al., *supra* note 49, at 797; Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 MGMT. SCI. 173, 175 (1986); CHRISTOPHER TAYLOR & AUBREY SILBERSTON, THE ECONOMIC IMPACT OF THE PATENT SYSTEM: A STUDY OF THE BRITISH EXPERIENCE 231 (1973).

[136] Carsten Fink, *Patent Protection, Transnational Corporations, and Market Structure: A Simulation Study of the Indian Pharmaceutical Industry*, *in* INTELLECTUAL PROPERTY AND DEVELOPMENT: LESSONS FROM RECENT ECONOMIC RESEARCH, *supra* note 75, at 227; Levin et al., *supra* note 49, at 798.

[137] Frederic M. Scherer & Sandy Weisburst, *Economic Effects of Strengthening Pharmaceutical Patent Protection in Italy*, 26 INT'L REV. INDUS. PROP. & COPYRIGHT L. 1009, 1011 (1995).

for innovation.[138] What is unfortunate is that these two industries, especially the pharmaceutical industry, have often been held out as the paradigm for innovation and used to justify patent protection. The fact of the matter is that they are the exceptions rather than the rule.[139] As the ensuing discussion of the empirical literature will show, these two industries are outliers in terms of their dependence on patent protection. For most other industries, patent protection is much less important.

What is doubly unfortunate is that the pharmaceutical industry, in particular, has hijacked patent policy both in the United States and globally. It has been relentless in its drive for expansion of patent protection in the United States, and was instrumental in the ultimate success of the TRIPS Agreement, which enlarged patent rights at the expense of developing country consumers.[140] By some accounts, the push to incorporate intellectual property issues on the then-GATT agenda came in no small part from the pharmaceutical industry.[141] It put enormous pressure on the U.S. government to force India and Brazil to abandon its opposition to pharmaceutical patents, which neither country had granted prior to TRIPS.[142] It even strenuously lobbied for a prohibition of parallel trade in the Agreement.[143] In the late-1990s, it lobbied the U.S. government to force the South African government, under the threat of trade sanctions, to drop a proposed law that would allow compulsory licensing of pharmaceuticals, despite the fact that the proposal fell clearly within the scope of the TRIPS Agreement.[144]

Further exploration of the role of the pharmaceutical industry in the

[138] Macdonald, *supra* note 76, at 30.

[139] *See* Levin et al., *supra* note 49, at 796–97; Mansfield, *supra* note 135, at 175.

[140] CORREA, *supra* note 70, at 3; Willem Pretorius, *TRIPS and Developing Countries: How Level is the Playing Field?*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 183.

[141] CORREA, *supra* note 70, at 4; KARIN TIMMERMANS & TOGI HUTADJULU, THE TRIPS AGREEMENT AND PHARMACEUTICALS: REPORT OF AN ASEAN WORKSHOP ON THE TRIPS AGREEMENT AND ITS IMPACT ON PHARMACEUTICALS 19 (2000), *available at* http://apps.who.int/medicinedocs/pdf/h1459e/h1459e.pdf.

[142] Peter Drahos, *Negotiating Intellectual Property Rights: Between Coercion and Dialogue*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 161, 170–71; Anu Bradford, *When The WTO Works, And How It Fails*, 51 VA. J. INT'L L. 1, 25–28 (2010).

[143] INT'L INTELLECTUAL PROP. INST,, PATENT PROTECTION AND ACCESS TO HIV/AIDS PHARMACEUTICALS IN SUB-SAHARAN AFRICA 14 (Dec. 2000), *available at* http://www.wipo.int/about-ip/en/studies/pdf/iipi_hiv.pdf.

[144] It was only after intense campaigning by AIDS and health activists—successfully embarrassing Presidential candidate Al Gore and marring his campaign efforts—that the United States retreated from its position and eventually reached a resolution of the matter. *Dispute Between AIDS Activists and Al Gore*, AFFORDABLE MED. (Jun. 8, 2010), http://www.affordablemedicine.org/dispute-between-aids-activists-and-al-gore/.

global expansion of patent rights is beyond the scope of this Article.[145] The fact remains, however, that in light of the foregoing discussion, developing country antitrust authorities should have reservations about claims of essentiality of patent protection for innovation and be ready to examine the technological regime, and in particular the appropriability conditions, of the underlying industry to verify those claims.

2. Empirical Evidence on the Need for Patent Protection to Spur Innovation

Economics is replete with empirical studies indicating the industry variation of the importance of patent protection to innovation. The first systematic study of this issue was conducted in the United Kingdom. Using data from twenty-seven firms, Professors Taylor and Silberston found that 64% of pharmaceutical R&D, 17% of chemical R&D, 5% of mechanical engineering R&D, and a negligible amount of electrical engineering R&D were dependent on patent protection.[146] This result was subsequently confirmed by a number of major studies on the relationship between patent protection and innovation. In 1981, Professor Edwin Mansfield and his co-authors published the results of a study of the imitation time and costs in chemical, drug, electronics, and machinery industries for forty-eight product innovations.[147] They found that 36% of the R&D expenditure by the surveyed firms would not have been made without patent protection.[148] Furthermore, innovating firms report that about 50% of the innovations in the sample would not have been introduced absent patent protection, with the bulk belonging to the pharmaceutical industry.[149] Leaving out innovations from that industry, the corresponding proportion falls to less than one-quarter.[150] All in all, they found that 90% of pharmaceutical innovations and about 20% of chemical, electronics, and machinery innovations are dependent on patent protection.[151]

Mansfield subsequently conducted another survey with an expanded

[145] In a way, the aggressiveness with which the pharmaceutical industry has advocated for greater patent protection is understandable given its unique reliance on it. The lamentable fact, however, is that one industry has hijacked patent policy not only in the United States but also across the globe. One must wonder—given the apparent inability of politicians, especially those in the United States, to resist the intense lobbying from the industry over patent policy—whether the patent system would be better off if a separate system was created for the protection of pharmaceutical inventions.

[146] TAYLOR & SILBERSTON, *supra* note 135, at 199.

[147] Mansfield et al., *supra* note 48, at 907.

[148] *Id.* at 915.

[149] *Id.*

[150] *Id.*

[151] Mansfield, *supra* note 135, at 174.

scope, covering one hundred firms in twelve industries.[152] The survey produced results largely consistent with his 1981 study. He found that patent protection was only deemed to be important for the development and commercialization of over 30% of the innovations in the pharmaceutical and chemical industries, and for 10% to 20% of the innovations in petroleum, machinery, and fabricated metal products.[153] Patent protection was of limited value in electrical equipment, office equipment, motor vehicles, instruments, primary metals, rubber, and textiles.[154] These survey results led Mansfield to conclude that "[d]espite the fact that the patent system generally is defended at least partly on the grounds that it increases the rate of innovation, the present study indicates that its effects in this regard are very small in most of the industries we studied."[155]

In one of the most authoritative studies on the topic, Levin and his colleagues at Yale conducted an extensive study of the appropriability conditions in more than one hundred manufacturing industries. This survey, which consisted of a survey of high-level R&D executives, has sometimes been referred to as the "Yale survey."[156] Levin and his colleagues reached a number of important conclusions. First, they concluded that the importance of patent protection varies with the type of innovation at issue. Patent protection was found to have a more significant effect on the appropriability conditions for product innovations than those for process innovations.[157] For process innovations, patents were generally rated as the least effective appropriabilty mechanism.[158] Lead time, learning curve advantages, and secrecy were all reported to be more effective.[159] For product innovations, patents were more effective than secrecy but substantially less so than lead time, learning curve advantages, and sales efforts.[160] Focusing on the eighteen most heavily sampled industries, they were able to establish "the limited effectiveness of patents as a means of appropriation . . . . In only one industry, drugs, were product patents regarded by a majority of respondents as strictly more effective than other means of appropriation."[161] Patents were somewhat important in only

[152] *Id.* at 173

[153] *Id.* at 174. These results were compiled based on estimates provided by leading R&D executives from a random sample of 100 U.S. manufacturing firms.

[154] *Id.*

[155] *Id.* at 180.

[156] Levin et al., *supra* note 49, at 788–93.

[157] *Id.* at 794–95.

[158] *Id.*

[159] *Id.*

[160] *Id.* at 795 (noting that 80% of the sample businesses rated the effectiveness of sales and service at 5.0 on a scale of 7 while only 20% of the sample businesses rated patents as this effective).

[161] *Id.* at 796.

three other industries: organic chemicals, plastic chemicals, and steel mill products.[162]

Similar results were obtained in studies conducted in other industrialized economies. In a study of Swiss firms published in 1995, Harabi found that lead time and related advantages in manufacturing and marketing presented the most important appropriation mechanism and patent the least important mechanism.[163] In an exhaustive comparative study that accounted for 50% and 90% of R&D spending in Japan and Sweden respectively, Professor Ove Grandstrand found that patents were by and large the least important appropriation mechanism for Swedish firms, and that marketing and lead time were more important.[164] Lastly, in an international expansion of the Yale survey, Professor Wesley Cohen and his colleagues at Carnegie Mellon concluded that there are substantial nation- and sector-specific differences in the use of patents, secrecy, lead times, and other means for appropriation of the returns from innovation.[165] Specifically, their results confirmed those from the Yale survey that patent protection was not the most important appropriation mechanism for U.S. firms.[166] Lead time and secrecy were.[167]

Apart from the basic message that patent protection is not essential for securing innovation in most industries, the foregoing empirical studies also produced other interesting findings that may have important implications for the patent-antitrust interface in developing countries. First, the widely held belief among economists that patent protection is more important for small firms than for large ones is not substantiated.[168] In fact, Mansfield concluded patent protection is equally important for small and big firms in his survey, which is consistent with the results from a number of surveys in the U.K.[169] Economists have long believed that because small firms may lack the financial means or experience to commercialize an invention, they will need to rely on licensing mechanisms to transfer their inventions to larger firms.[170] Such licensing would only be possible if the invention was

[162] *Id.* at 796–97 (finding that most respondents in these three industries rated patents as no less effective than the best alternative).

[163] Najib Harabi, *Appropriability of Technical Innovations: An Empirical Analysis*, 24 RES. POL'Y 981, 984 (1995).

[164] OVE GRANSTRAND, THE ECONOMICS AND MANAGEMENT OF INTELLECTUAL PROPERTY 168 (1999).

[165] Wesley Cohen et al., *R&D Information Flows and Patenting in Japan and the United States*, *in* ECONOMICS, LAW AND INTELLECTUAL PROPERTY 130–33 (Ove Granstrand ed., 2003).

[166] *Id.* at 134–47.

[167] *Id.* at 132.

[168] Mansfield, *supra* note 135, at 175.

[169] *Id.*; Mansfield et al., *supra* note 48, at 916; Macdonald, *supra* note 76, at 17–19.

[170] Holger Kollmer & Michael Dowling, *Licensing as a Commercialisation Strategy for*

somehow propertized and capable of transfer for value, which the patent system facilitates. The finding that patents are no more important for small firms than for large ones is significant, because as one may recall, achievement of broader development goals requires antitrust to pay attention to the welfare of small- and medium-sized enterprises. To the extent that patents were more valuable to small firms, and that small firms in developing countries produce patentable innovations, there would be a persuasive reason for developing countries to favor patent policy. That, however, turns out not to be the case.

Second, again contrary to common belief, patents do not completely eliminate imitation, but merely raise imitation costs. Mansfield and his co-authors discovered that despite patent protection, 60% of the surveyed innovations were imitated within four years of their introduction.[171] In fact, for about half of the innovations, the firms felt that patent protection only delayed entry by a few months.[172] Patent protection increases imitation costs by 30% in the pharmaceutical industry, 10% in chemicals, and 7% in electronics and machinery.[173] The Yale survey produced similar results, concluding that patents did not prevent imitations, but instead raised imitation costs by 40% for pharmaceuticals, 25% to 30% for chemicals, and 7% to 15% in electronics.[174] Furthermore, the ability legally to invent around a patented innovation was cited in the study as a major limitation on the effectiveness of patent protection.[175] Gilbert suggests that even in the pharmaceutical industry, where patents are crucial, patent protection does not preempt rivals' efforts to invent around the patent or produce a similar product.[176] In fact, he noted that discovery of a new drug by one firm usually spurs rivals to step up their R&D in the same therapeutic category.[177]

The fact that patent protection does not forestall inventing around or imitation is important because it means that the causal link between patent protection and reward for innovation becomes more complex and tenuous.

New Technology-Based Firms, 33 RES. POL'Y 1141, 1141 (2004).

[171] Mansfield et al., *supra* note 48, at 913.

[172] *Id.* at 916.

[173] *Id.* at 913.

[174] Levin et al., *supra* note 49, at 811.

[175] *Id.* at 802–03.

[176] Gilbert, *supra* note 35, at 202.

[177] *Id.* Cockburn and Henderson suggest that there is substantial positive knowledge spillover in the pharmaceutical industry, and that discoveries by one firm tend to improve technological opportunities for other firms. For example, they observe that nine different pharmaceutical companies patented ACE-inhibitor drugs in the eight years after Squibb patented the first drug in this category in 1977. Ian Cockburn & Rebecca Henderson, *Racing to Invest? The Dynamics of Competition in Ethical Drug Discovery*, 3 J. ECON. & MGMT. STRATEGY 481, 491–92 (1994).

One can no longer assume, as many economists tend to do in their theoretical models, that patent protection generates financial reward for the patentees.[178] This will be particularly relevant when assessing the consumer harm afflicted by a patent exploitation practice. To the extent that patent protection inflicts consumer welfare loss without creating corresponding innovation incentives, developing country antitrust authorities need to be particularly cautious about patent exploitation practices that raise prices on consumers.

Third, the information diffusion function of patent disclosure is much less prominent than has been assumed. It was said earlier that patents perform an important information diffusion function by allowing rivals to learn about a new technology from patent disclosure.[179] It turns out that the value of this disclosure has been overstated. Taylor and Silberston estimated that patent information only saves firms 0.75% of their R&D expenditure, a saving which they call "infinitesimal."[180] Other authors have confirmed the insignificant contribution of patents to information diffusion as well.[181] Attempts to justify patent protection on the grounds of information diffusion are suspect.

3. Evidence from Developing Countries on the Need for Patent Protection to Spur Innovation

All of the empirical studies cited in the previous subpart were conducted in developed countries. Since the question is whether patent protection spurs innovation in developing countries, studies done in these countries would be preferable. Unfortunately, comparable surveys in developing countries are rare. But all hope is not lost as there are alternative types of evidence available.

One of the silver linings of the adoption of TRIPS is that it has

[178] Where patent protections merely increase imitation costs, as opposed to completely excluding rivals, the impact of patent protection on consumer welfare would partly depend on the state of competition in the industry after rivals have successfully imitated the patented technology. In this scenario, patent protection merely becomes a tool for the patentee to raise costs of production for rivals. The magnitude of this increase provides a cushion to the patentee and gives it room to raise its prices as well. In that sense, the monopoly markup on the patented product will to some extent depend on the magnitude of increase in imitation costs. Likewise, the ease of inventing around will affect the patentee's ability to extract a monopoly price for the patented product, and hence, affect the patentee's ability to generate the patentee reward. This may be a less important issue in industries in which patent protection is not the main impetus for innovation. But for industries in which patent protection provides the main motivation for innovation, easy inventing around will undermine the patentee's ability to obtain the requisite patentee reward.

[179] *See supra* Part IV.B.

[180] TAYLOR & SILBERSTON, *supra* note 135, at 212.

[181] Macdonald, *supra* note 76, at 15–16; Jacob Schmookler, *Investors Past and Present*, 39 REV. ECON. & STAT. 321, 325 (1957).

provided a number of natural experiments on the relationship between patent protection and innovation in developing countries. A great many developing countries, such as India, Brazil, and Argentina, did not grant product patents for pharmaceuticals prior to TRIPS, but were compelled to amend their patent laws after the TRIPS Agreement came into effect.[182] One can gauge the incentive effects of patent protection by observing whether there was a substantial increase in pharmaceutical innovation after the TRIPS-required reforms were put in place.

Pharmaceutical R&D expenditure did not experience any significant increase in any of the developed countries surveyed by economists following the TRIPS Agreement. Based on a number of economic studies from Lebanon, South Korea, and Argentina, Maskus concluded that pharmaceutical R&D in those countries was not expected to increase after patent protection was introduced.[183] Nogues conducted a detailed study of the Argentine pharmaceutical industry, and similarly "found no reason to expect an increase in domestic R&D in pharmaceuticals due to recognition of product patents."[184] This is because "the development of new chemical entities is outside the reach of local companies in any developing country, since there are no firms in such countries big enough (in terms of total sales) to finance the high costs of pharmaceutical R&D."[185] Maskus shares a similar view, asserting that "[f]ew, if any, firms in developing countries are likely to find it attractive to engage in fundamental R&D in competition with the major international research-based pharmaceutical companies, which have expertise in research and marketing and benefit from significant economies of scale."[186]

Another natural experiment can be found in Italy,[187] which had not granted patent protection to pharmaceuticals prior to 1978, when the Italian Constitutional Court held that the denial of patent protection for pharmaceuticals was unconstitutional.[188] Up until then, Italy had boasted a

[182] *Pharmaceutical patents and the TRIPS Agreement*, WORLD TRADE ORG. n.2 (Sept. 21, 2006), https://www.wto.org/english/tratop_e/trips_e/pharma_ato186_e.htm (listing Argentina, Brazil, and India as coutries that had to adopt pharmaceutical patenting laws to comply with their TRIPS obligations).

[183] MASKUS, *supra* note 48, at 165.

[184] CORREA, *supra* note 70, at 43 (citing Julio Nogues, *Patents and Pharmaceutical Drugs: Understanding the Pressures on Developing Countries*, 24 J. WORLD TRADE L. 81 (1990)).

[185] *Id.*

[186] MASKUS, *supra* note 48, at 220.

[187] The Italian experience is relevant even though Italy is not a developing country, because the innovative capacity of its pharmaceutical industry circa 1978 is not significantly different from that of today's Indian and Brazilian pharmaceutical industries.

[188] Scherer & Weisburst, *supra* note 137, at 1009; *see also* BOLDRIN & LEVINE, *supra* note 74, at 245.

vibrant generic pharmaceutical sector.[189] In response to the Court's decision, the Italian Parliament amended the patent law to include pharmaceuticals.[190] Again, if pharmaceutical innovation boomed after the amendment, one may conclude that patent protection does spur innovation.

Scherer found that after pharmaceutical patents became available in Italy, there was no significant increase in pharmaceutical R&D expenditures relative to world trends, no significant increase in the number of new drug entities introduced by Italian firms, and a sharp deterioration of the Italian balance of trade in drugs.[191] Export sales plummeted and multinational firms began to import many of their products into Italy from other European countries.[192] The domestic pharmaceutical firms were gradually taken over by multinational firms,[193] and generic production capacity moved from Italy to India.[194] Most tellingly, there was no emergence of significant domestic innovators in the industry. In short, the supposed dynamic efficiency benefits of patent protection did not materialize in Italy, just like in many developing countries following TRIPS. The results of these natural experiments are particularly persuasive evidence on the relationship between patent protection and innovation because pharmaceuticals, at least in developed countries, are heavily reliant on patent protection. Therefore, one would expect the introduction of pharmaceutical patents to have a pronounced incentive effect.

The experiences recounted here reveal an important reality about innovation in developing countries: in some industries, innovation may be so technically complex or resource-intensive that developing countries simply do not have the capacity to innovate and compete globally. Moreover, even if innovation may be less technologically or financially demanding, the domestic industry may be so far behind the international technological frontier that innovation is again currently unattainable. In light of these arguments, Professor Carlos Correa has concluded that:

> With the exception of a few developing countries which have been able to build up a reasonable R&D infrastructure (such as the East

[189] Scherer & Weisburst, *supra* note 137, at 1009.

[190] *Id.*

[191] *Id.* at 1020–23. Although some have noted that the lack of innovation in Italy may be due to other intervening factors, such as stringent price controls. Cynthia M. Ho, *Patent Breaking or Balancing?: Separating Strands of Fact from Fiction Under TRIPS*, 34 N.C. J. INT'L L. & COM. REG. 371, 454 n.409 (2009).

[192] Scherer & Weisburst, *supra* note 137, at 1022. Scherer and Weisburst did not reach a definitive conclusion on why this happened. Their conjecture was that "importers become more competitive in Italy after gaining patent protection, while Italian manufacturers, unable to copy the newest drugs developed in other nations, saw their ability to sustain relatively strong export sales ebb." *Id.*

[193] MASKUS, *supra* note 48, at 165.

[194] Scherer & Weisburst, *supra* note 137, at 1023.

> Asian "Tigers," India and Brazil), most developing countries are unlikely to substantially improve their innovative performance just on the basis of an expanded and stronger IPRs [intellectual property rights] regime.[195]

As many industries in developing countries simply have no inventors who can take advantage of the innovation incentives generated by the patent system, the costs of a pro-patent policy are incurred in vain. This is consistent with Stewart's criticism of Jamaica's decision to exempt agreements related to intellectual property from the purview of antitrust law: "Yet, there is little or no innovation requiring conferring of industry property rights on locals, and there is ample historical evidence of firms using monopoly power derived from intellectual property rights to create barriers to entry by other [sic] or to divide up markets geographically."[196] Many of the least-developed countries are likely to be similar to Jamaica in their lack of innovative capacity.[197] These countries should not aim to develop innovative capacity, but to acquire imitative capacity.[198]

While developing countries are capable of producing innovations, economists have observed that developing countries tend to see more of the process kind of innovations instead of the product kind.[199] It has been noted that it was through process innovations that the United States and Germany caught up with the U.K. in the nineteenth century, and that Japan did the same with the United States after the Second World War.[200] These process innovations are described as those "of the organizational type[,] that allowed for simultaneous exploitation of scale economies and flexibility, leading to high through-put, efficient inventory management, high quality/reliability, and a proven ability to adjust to the needs of the end-user."[201] An example is the kanban, or just-in-time, manufacturing system developed by the Japanese automobile industry to increase responsiveness

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[195] CORREA, *supra* note 70, at 38.

[196] TAIMOON STEWART, JULIAN CLARKE & SUSAN JOEKES, COMPETITION LAW IN ACTION: EXPERIENCES FROM DEVELOPING COUNTRIES 26 (2007).

[197] *See* Shamnad Basheer & Annalisa Primi, *The WIPO Development Agenda: Factoring in the Technologically Proficient Developing Countries*, *in* IMPLEMENTING THE WORLD INTELLECTUAL PROPERTY ORGANIZATION'S DEVELOPMENT AGENDA 100, Annex. A (Jeremy de Beer ed., 2009).

[198] *See* discussion *infra* Part VI.C.

[199] CORREA, *supra* note 70, at 39; Jan Fagerberg & Manuel M. Godinho, *Innovation and Catching-Up*, *in* THE OXFORD HANDBOOK OF INNOVATION, *supra* note 29, at 514, 519–20. Product innovation refers to the creation of a new product, while process innovation refers to better ways of producing an existing product, or an improvement of the production process. The creation of a new drug would count as a product innovation, while a more energy efficient way of producing a chemical would be a process innovation.

[200] Fagerberg & Godinho, *supra* note 199, at 515, 519–20.

[201] *Id.*

to changes in consumer demand and to reduce inventory.[202] The success of the Japanese automobile industry—especially Toyota, which originated the system—is too familiar to warrant repetition here.[203] At this juncture, one may recall a finding from the Yale survey that patent protection is the least important appropriation mechanism for process innovations, which are difficult for competitors to discover and understand merely from the final product, and can be effectively protected through trade secret laws. This means that developing countries have a weaker need to extend patent protection to induce innovations, which are mostly of the process kind.

Another fact in support of the relative dispensability of patent protection in developing countries is that most innovations originating from those countries are likely to be incremental or adaptive. For example, the Brazilian agricultural machinery industry is known for its successful adaptations of foreign machines to the domestic environment that have allowed it to dominate the Brazilian market.[204] Most innovations from developing countries are not patentable, because they are not novel or non-obvious enough to meet patentability standards.[205] Providing patent protection will not create incentives for these incremental innovations, but will impose significant costs in terms of consumer welfare loss. A pro-patent stance in the patent-antitrust interface will have little impact on these incremental innovations.

In conclusion, there is scant evidence that the extension of patent protection in developing countries will lead to increased innovation. When evaluating innovation-based claims in patent-antitrust cases, a developing country antitrust authority must be mindful of the limitations of the country's innovative capacity. No developing country would want to repeat Jamaica's mistakes. In particular, the authority should consider whether there is any innovative capacity in a particular industry, and if so, what kind of innovation it is capable of producing, product or process, novel or incremental.

C. Developing Countries Should Not Weigh Innovation Incentive Externalities in the Patent-Antitrust Interface

With the advent of globalization, the innovation incentives generated by a country's patent system are no longer confined within its borders. With increased trade and the possibility of FDI, these incentives may be felt by foreign inventors as well. Given that the market for many innovations is no longer domestic, a multinational inventor will consider the innovation

[202] *Id.* at 519–20.

[203] For a further discussion of the success of the Japanese automobile industry, see KOICHI SHIMOKAWA, JAPAN AND THE GLOBAL AUTOMOTIVE INDUSTRY (2010).

[204] Maskus et al., *supra* note 75, at 299.

[205] CORREA, *supra* note 70, at 39.

incentives provided by its various markets when making an investment decision. In short, innovation incentives spill over national boundaries and can have substantial externalities. When considering the impact of its decision in patent-antitrust cases, an antitrust authority may need to take these externalities into account.

The question is whether a developing country antitrust authority should pay heed to innovation incentive externalities. To formulate it slightly differently, the question is whether such an authority should consider the patentee reward accruing to foreign inventors when determining the legality of a patent exploitation practice. For a small developing country, the answer would seem to be negative. There are good reasons to doubt that a multinational firm will consider the innovation incentives provided by every market in which it operates. The fact that most innovations are only patented in a limited number of jurisdictions attests to this.[206] A multinational firm will focus on its large markets, including the industrialized economies and the large developing countries.[207] For small developing countries, the profit potential from their domestic markets is so small that the technology investment decisions of multinational firms are unlikely to depend on it.[208] Even if one were to aggregate the profit potential generated by these small developing countries, it is unlikely to exceed a few percent of the global profit for a multinational corporation.[209] An invention that would have been abandoned with the loss of a few percent of profit potential is unlikely to be groundbreaking and a significant boost to global welfare. As Scherer noted, one wonders how

[206] *See* Jeffrey Atik & Hans H. Lidgard, *Embracing Price Discrimination: TRIPS and the Suppression of Parallel Trade in Pharmaceuticals*, 27 U. PA. J. INT'L ECON. L., 1043, 1058 (2006).

[207] Mark V. Pauly, *Measures of Costs and Benefits for Drugs in Cost-Effectiveness Analysis*, *in* PHARMACEUTICAL INNOVATION: INCENTIVES, COMPETITION AND COST-BENEFIT ANALYSIS IN INTERNATIONAL PERSPECTIVE 212 (Frank A. Sloan & Chee-Ruey Hsieh eds., 2007) ("R&D often would be undertaken based on expected global sales, primarily in other [larger] countries, and the level of local sales need not appreciably affect R&D in small countries.").

[208] In the context of pharmaceutical patenting, Scherer observed:

> [L]egislators of many small and/or poor nations have viewed the addition to [multinational enterprise (MNE)] profits resulting from their granting, as opposed to not offering, drug product patent protection within their borders as so small relative to the profits realized by MNEs in other parts of the world that their marginal impact on MNE research and testing decisions is negligibly small.

Scherer & Weisburst, *supra* note 137, at 1012–13.

[209] *See* Jean O. Lanjouw, *A Patent Policy Proposal for Global Diseases* 7, BROOKINGS POL'Y BRIEF, No. 84, June 2001, at 7, *available at* http://www.brookings.edu/~/media/research/files/papers/2001/6/globaleconomics%20lanjouw/pb84.

much worse off society would be by foregoing such innovations.[210]

In contrast, the innovation incentives generated by large developing countries may have a substantial impact on technological investments on a global scale. This still does not mean that these countries should consider innovation incentive externalities in patent-antitrust cases. The provision of innovation incentives entails welfare transfer from consumers to inventors.[211] In the global context, this transfer flows from developing country consumers to multinational firms.[212] Given the impoverished state of consumers in many developing countries, this tradeoff should not be lightly made. A developing country antitrust authority cannot be faulted for giving priority to the welfare of its downtrodden domestic consumers. If an innovation is of sufficient global importance, developing countries are right to wonder whether they should be the ones to provide additional incentives through their patent systems.

Development economists have come up with a number of theoretical models that predict the effect of strengthening intellectual property protection in developing countries on innovation that originates from developed countries. As far as innovation incentives are concerned, strengthening patent protection and tightening antitrust restrictions on patent exploitation have similar impacts. Surprisingly, and perhaps somewhat counter-intuitively, these models consistently show that innovation in developed countries will fall after developing countries raise their intellectual property protection.[213] Based on the international product cycle, Carmelo Parello constructed a model to study the impact of heightened intellectual property protection in developing countries on the rate of innovation in developed countries and the rate of imitation in developing countries.[214] In the absence of FDI, Carmelo concludes that improved protection induces a short-run slowdown in the innovation rate in developed countries and impedes technology transfer by imitation.[215] Edwin Lai supplements Parello's analysis by examining the effect of enhanced protection in developing countries on the rate of innovation in developed countries when the means of technology transfer comprises both imitation and FDI.[216] When imitation is the only means of technology

[210] Scherer, *supra* note 48, at 448.

[211] *See* HOVENKAMP ET AL., *supra* note 7, ch. 1, at 10.

[212] Scherer, *supra* note 18, at 1129–34.

[213] Carmelo Pierpaolo Parello, *A North-South Model of Intellectual Property Rights Protection and Skill Accumulation*, 85 J. DEV. ECON. 253, 265–66 (2008); *see also* Edwin Lai, *International Intellectual Property Rights Protection and the Rate of Product Innovation*, 55 J. DEV. ECON. 133, 135 (1998).

[214] Pierpaolo Parello, *supra* note 213.

[215] *Id.* at 255, 265–66.

[216] Lai, *supra* note 213.

transfer, Lai's conclusions are similar to Parello's.[217] When technology transfer is accomplished through investment, Lai finds that both the rate of innovation and the rate of imitation rise in response to enhanced protection in developing countries.[218] Although his analysis is slightly more complicated, Helpman reaches the same result under the assumptions of no FDI and low imitation rate.[219] Lastly, a theoretical study by Glass and Saggi lends further support to the conclusions from Parello, Lai, and Helpman, positing that "if innovative firms expected slower loss of their technological advantages they could earn higher profits per innovation, reducing the need to engage in R&D."[220] In light of this considerable body of literature, there is even less reason for a developing country's antitrust authority to consider innovation incentive externalities.

There is one possible exception to the above line of argument, which concerns technologies that are only useful to developing countries. A prime example is drugs for tropical diseases. Multinational pharmaceutical companies consistently under-invest in the development of these drugs.[221] For these products, the innovation incentives developing countries provide will be critical. Development economists, such as Yong Yang, have suggested that developing countries should cooperate to offer innovation incentives to developed country inventors by forming what he calls "cooperation coalitions."[222] Unfortunately, even with the aid of such coalitions, the prognosis is unpromising for developing countries. Scherer concludes that the number of new drugs introduced must treble in order to compensate developing country consumers for the welfare loss they have suffered as a result of the introduction of pharmaceutical patenting under

[217] *Id.* at 135. The difference in results is due to the fact that in the former case, heightened protection in developing countries will induce inventors in developed countries to invest in more innovation, raising the demand for skilled labor in developed countries. The resulting increase in wages for these workers lifts the costs of innovation. This increase in costs will, in fact, overwhelm any gains to the inventors from the enhanced IPR protection in developing countries, causing the overall rate of innovation to drop.

[218] *Id.*

[219] Elhanan Helpman, *Innovation, Imitation, and Intellectual Property Rights*, 61 ECONOMETRICA 1247, 1275 (1993).

[220] Amy Glass & Kamal Saggi, *Intellectual Property Rights and Foreign Direct Investment*, 56 J. INT'L ECON. 387 (2002).

[221] Scherer, *supra* note 18, at 1137–40.

[222] Yong Yang, *Why Do Southern Countries Have Little Incentive to Protect Northern Intellectual Property Rights?*, 31 CANADIAN J. ECON. 800, 807–10 (1998). Yang proposes that countries within these coalitions offer higher patent protection than those outside of the coalitions. In fact, non-coalition developing countries are likely to lower their protection to free-ride on the effort of the coalition countries. However, once the number of countries in these cooperation coalitions is large enough, developed country inventors will receive sufficient incentives to invest in technologies needed by developing countries.

TRIPS.[223] Regrettably, he predicts that the number of new drugs would only grow by 15.5%.[224] The price that these consumers need to pay for drugs that are uniquely demanded by them, that is, drugs for tropical diseases, is arguably too high. Other policy interventions are necessary to incentivize research on these drugs.[225]

To sum up, despite the spillover effects of innovation incentives from developing countries, the antitrust authorities in a vast majority of them would be doing their consumers a tremendous disservice by attaching undue weight to innovative incentives. The exceptions may be large developing countries, such as India, China, and Brazil, whose markets are large enough that innovation incentive externalities from them may have significant impact on global innovation.

D. Rethinking the Relationship between Antitrust and Innovation

Having explored the relationship between patent protection and innovation, it is important to turn our attention to the relationship between antitrust and innovation. How exactly do the two relate to each other? The conventional understanding is that antitrust rules affect innovation by altering the scope of patent exploitation, which in turn adjusts the patentee reward.[226] Antitrust interacts with innovation incentives by adjusting the size of patentee reward through relaxing or tightening the scope of patent exploitation. The more stringent the restrictions imposed by antitrust rules on patent exploitation, the smaller the patentee reward, and hence, the smaller the incentive to innovate. For instance, the scope of patent exploitation can be tightened by prohibiting resale price maintenance of patented product, by prohibiting market allocation under a licensing agreement, or by prohibiting the imposition of post-expiration royalty in a licensing agreement. These restrictions limit a patentee's ability to maximize its financial return on its invention, and hence, reduce the size of its patentee reward.[227] If there is a direct relationship between patentee reward and innovation incentives, then the stringency of antitrust rules on patent exploitation is inversely related to innovation incentives.[228]

However, as the foregoing demonstrates, patentee reward is not necessary for generating innovation in many industries. The appropriability conditions of these industries may be such that firms can recoup their R&D costs without resorting to patent protection. This weakens the inverse relationship between antitrust rules and innovation incentives and gives the

[223] Scherer, *supra* note 18, at 1129.
[224] *Id.*
[225] Scherer & Weisburst, *supra* note 137, at 1140.
[226] Kaplow, *supra* note 1, at 1823–24.
[227] *Id.* at 1829–31.
[228] *Id.*

patent-antitrust interface greater leeway to focus on consumer welfare loss and other developmental considerations.

E. Summing Up

The foregoing theoretical discussion and review of empirical studies firmly refutes the notion that patent protection is necessary for securing innovation.[229] The extent to which innovation incentives rely on the patent system varies by industry. In most industries, firms are spurred to innovate not by patentee reward, but by the need to secure a first-mover advantage. The costs and time lag of imitation allow first-movers to reap substantial profits before imitators enter the market. Brand loyalty further reinforces this advantage. Lead time also allows the innovating firm to improve the product before imitation appears.

Empirical studies by a great number of eminent economists have repeatedly produced the same conclusion that patent protection is not the most important motivation for innovation. First-mover advantage, learning curve advantages, and sales and marketing efforts are consistently rated as more significant in most industries. The secondary role of patent protection for securing innovation is not unique to the United States; it is observed in other industrialized economies as well. There are no doubt outliers in these studies. The two most notable examples are pharmaceuticals and chemicals. Outliers, however, should be treated as outliers, and should not be allowed to hijack the entire policy discussion. As far as the patent-antitrust interface is concerned, the dynamic efficiency gains of patent protection have been overstated.

[229] The discussion thus far has focused on the question of whether increased patent protection will boost innovation, which in turn will hopefully promote economic growth. The relationship between patent protection and economic growth being investigated is an indirect one. Some economists have attempted to determine the direct relationship between patent protection and economic growth. Their results have largely been inconclusive. Using a regression model, Gould and Gruben measured the significance of patent protection to growth prospects and found the coefficient for patent protection statistically insignificant. David M. Gould & William C. Gruben, *The Role of Intellectual Property Rights in Economic Growth*, 48 J. DEV. ECON. 323 (1996). Ginarte and Park conducted an elaborate study involving more sophisticated quantification of the strength of intellectual property rights. Juan C. Ginarte & Walter G. Park, *Intellectual Property Rights and Economic Growth*, 15 CONT. ECON. POL'Y 51 (1997). They actually found a negative correlation between the strength of intellectual property protection and economic growth, although the correlation was again deemed to be statistically insignificant. Finally, after an exhaustive review of empirical studies, Professors Bessen and Meurer conclude that "the empirical economic evidence strongly rejects simplistic arguments that patents universally spur innovation and economic growth." James E. Bessen & Michael J. Meurer, *Do Parents Perform Like Property?* 21 (Boston Univ. Sch. of Law, Working Paper No. 08-08, 2008), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1103143. In sum, the evidence showing that raising patent protection directly contributes to economic growth is ambiguous at best.

Developing countries should take care to scrutinize claims about innovation incentives. In addition, they should adopt an industry-based approach to the patent-antitrust interface. There are industries, such as pharmaceuticals and chemicals, in which patent protection does promote innovation. Dynamic efficiency considerations hence should be emphasized. For most other industries, however, the need to protect innovation incentives is accordingly weaker, and hence, antitrust in these industries should exhibit greater readiness to limit the scope of patent exploitation. A reduction in the patentee reward in these industries is unlikely to have a significant impact on innovation incentives or to cause future innovations to deteriorate dramatically.

V. TECHNOLOGY TRANSFER AND THE PATENT-ANTITRUST INTERFACE

Apart from promoting innovation, it has been said that patent protection induces technology transfer from developed country firms to developing countries.[230] The underlying rationale is simple. Multinational firms would only transfer technology to a developing country when they know that their technology is protected from imitation and they can reap the full benefits of their inventions. Technology transfer redounds substantial benefit to developing countries.[231] A developing country can improve its technological capacity in three main ways: domestic innovation (where possible), domestic imitation (or unintentional technology transfer by developed countries), and intentional technology transfer by developed country firms. For developing countries that lack innovative capacity, technology transfer is one of the two main ways in which new technology can be acquired.[232] For developing countries that lack even imitation capacity, technology transfer is the only means for technological progress.[233] One may recall from the earlier discussion about economic growth that technological progress is a key to economic growth. Therefore, technology transfer could be a major engine of growth in developing countries.

Economists have identified three main ways in which technology is intentionally transferred: trade of technological goods,[234] FDI, and

[230] Keith E. Maskus, *The Role of Intellectual Property Rights in Encouraging Foreign Direct Investment and Technology Transfer*, *in* INTELLECTUAL PROPERTY AND DEVELOPMENT: LESSONS FROM RECENT ECONOMIC RESEARCH, *supra* note 75, at 41, 60.

[231] Keith E. Maskus, *Intellectual Property Rights and Foreign Direct Investment* 12 (Univ. of Adelaide Ctr. for Int'l Econ. Studies, Working Paper No. 0022, 2000), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=231122.

[232] Lai, *supra* note 213, at 133–35.

[233] *Id.*

[234] Even though economists generally believe that trade of technological goods constitutes intentional technology transfer, their belief is only true in the sense that the

licensing. In addition, there are three main ways in which technology is unintentionally transferred: unauthorized imitation,[235] reverse engineering, and patent disclosure.[236] When choosing between the various means of intentional transfer, a multinational firm considers a number of factors. Professor John Dunning has proposed the OLI paradigm for analyzing the decision-making process.[237] OLI stands for the advantages of ownership, localization, and internalization.[238] Ownership advantages—which include "technology and information, managerial, marketing and entrepreneurial skills, organisational systems, incentive structures, and favored access to intermediate or final goods markets"[239]—identify the competitive advantages of a multinational firm in the global market that will allow it to extend its reach to multiple markets. Localization advantages—such as "the costs and quality of particular factor endowments, the size, character, and growth of domestic markets[,] and the policies of host government, for example, taxes and fiscal incentives"[240]—determine whether the firm will choose to produce the good in a foreign location and export it to the country at issue, or to locate production facilities in that country. In other words, localization advantages explain the firm's choice between trade on the one hand, and FDI or licensing on the other hand. Internalization advantages are reasons "why a foreign firm prefers to retain full control over the production process instead of licensing its intangible assets to local firms."[241] The decision may be due to "high transaction costs involved in regulating and enforcing licensing contracts."[242] It may also be attributted

technology has physically entered into the realm of the developing country. For technology transfer to be meaningful, it must be conveyed to a producer that can replicate and practice it in the future. After all, technology transfer must consist of transfer of tacit knowledge or know-how, which usually must be done deliberately by the technology owner. Most multinational firms exporting technological goods to developing countries do not transfer their technology to local producers. Nor is tacit knowledge transferred. The technology is only transferred to the extent that local producers are able to imitate or reverse engineer the technology. Thus, trade of technological goods may in fact count as unintentional, or more aptly, involuntary transfer of technology.

[235] Imitation can be authorized or unauthorized. Authorized imitation is tantamount to technological licensing. Unauthorized imitation is copying without consent, sometimes called piracy by intellectual property advocates.

[236] MASKUS, *supra* note 48, at 136–37.

[237] JOHN H. DUNNING & SARIANNA M. LUNDAN, MULTINATIONAL ENTERPRISES AND THE GLOBAL ECONOMY 116–44, 318–27 (2d ed. 2008).

[238] *Id.* at 101–02.

[239] *Id.* at 96.

[240] *Id.* at 324.

[241] Beata Smarzynska Javorcik, *The Composition of Foreign Direct Investment and Protection of Intellectual Property Rights: Evidence from Transition Economies*, *in* INTELLECTUAL PROPERTY AND DEVELOPMENT: LESSONS FROM RECENT ECONOMIC RESEARCH, *supra* note 75, at 133, 136.

[242] *Id.*

to the legal regime. In other words, internalization advantages inform the firm's choice between FDI and licensing.

Among the three means of intentional technology transfer, FDI probably provides the greatest developmental benefits on a developing country while trade provides the least. Through trade, the developing country only acquires the good at issue. Its terms of trade[243] deteriorate as a result.[244] Any gains in terms of technological capacity would depend on its ability to reverse engineer the technology from the product. If reverse engineering is not feasible, the developing country actually enjoys little technological gains. Meanwhile, FDI results in improved productivity, which is clearly beneficial to a developing country.[245] In addition, there may be R&D spillover from the multinational firm's local manufacturing facility to its local rivals.[246] The overriding question to be answered in this Part is whether a pro-patent stance in the patent-antitrust interface in developing countries can be justified on the grounds that technology transfer will be facilitated.

The patent-antitrust interface implicates technology transfer in a number of ways. The means of technology transfer that is most obviously affected by antitrust law is licensing. Antitrust imposes a host of restrictions on patent licensing practices that may influence licensing revenue, which in turn augments or reduces the patentee's incentive to license.[247] Alternatively, if excessive pricing is deemed to be a violation under antitrust, as it is in some jurisdictions, antitrust may require the patentee to lower its royalty or order compulsory licensing.[248] This kind of intervention will clearly have an impact on technology transfer.

To the extent that licensing conditions are tightly regulated by antitrust, a patentee may choose to pursue FDI instead, or perhaps trade. In this sense, the ability to circumvent antitrust restrictions can be said to be an internalization advantage that steers the multinational firm to keep

[243] "Terms of trade is the ratio of export and import prices." OECD GLOSSARY OF STATISTICAL TERMS 782 (2007). "Terms of trade" is otherwise defined as the price of a country's exports divided by the price of its imports. PAUL R. KRUGMAN & MAURICE OBSTFELD, INTERNATIONAL ECONOMICS THEORY AND POLICY 94 (6th ed. 2008).

[244] Helpman, *supra* note 219, at 1274; Scherer & Weisburst, *supra* note 137, at 1014.

[245] Andreas Waldkirch, *The Effects of Foreign Direct Investment in Mexico since NAFTA* 16–20, (March 2008) (unpublished manuscript), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1115300.

[246] Economists, however, have cautioned that these benefits should not be overestimated as some multinational firms have engaged in what is known as "enclave production," which greatly limits the R&D spillover effect. MASKUS, *supra* note 48, at 152.

[247] For an overview of the restrictions antitrust imposes on licensing, see HOVENKAMP ET AL., *supra* note 7, chs. 21–25.

[248] For the treatment of the demand for excessive royalty by European Union law, see RICHARD WHISH, COMPETITION LAW 793 (2009).

production in-house. Antitrust restrictions on patent exploitation practices may also affect trade by limiting the patentee's ability to tie the sale of a patented product to an unrelated product, or by preventing the patentee from specifying the resale price of the patented product.[249] To the extent that the latter is true, the patentee may, for example, choose to invest in the developing country at issue and build its own distribution network to sell to consumers directly. In contrast, absent restrictions on resale price maintenance, the patentee may choose to export the good to the country.

Even though much of the trade and development economics literature has only examined the relationship between changes in intellectual property protection on the one hand, and trade flow, FDI, and technology transfer on the other hand, its conclusions can be readily applied to the patent-antitrust interface in most instances. A more pro-patent stance in the interface broadens the scope of the patent exploitation and increases patentee rewards. It is no different from increasing patent protection in the form of longer patent duration or more vigilant enforcement. These policy changes all result in an increase in patentee rewards. This is consistent with one of the key insights of Professor Louis Kaplow's analysis: there is little economic difference between adjusting the patent length or the patent scope.[250] Therefore, for the purpose of the discussion in this Part, expansion of patent protection and a relaxation of antitrust restrictions on patent exploitation will be treated as qualitative equivalents as far as their effects on patentee rewards are concerned.

A. Impact of Relaxation of Antitrust Restrictions on Patent Exploitation on Trade Flow

Whether increased patent protection, and by extension a relaxation of antitrust restrictions on patent exploitation, raises or lowers trade flow depends on the balance of two effects: the market power effect and the market expansion effect. Market power effect refers to the fact that increased patent protection augments the patentee's market power, and reduces the elasticity of demand for its patented product.[251] This allows the patentee to raise price and still earn more profit. This, of course, would require the patentee to reduce its export to the country at issue.[252] More permissive antitrust rules on patent exploitation would similarly allow the patentee to extract more profit out of its patent by raising the price or imposing restrictions on distribution. The result would also likely be a drop in demand. Market expansion effect results from the elimination or

[249] For an overview of antitrust restrictions on tying involving patented products or resale price maintenance, see HOVENKAMP ET AL., *supra* note 7, chs. 21, 24.

[250] Kaplow, *supra* note 1, at 1819.

[251] MASKUS, *supra* note 48, at 112.

[252] *Id.*

marginalization of imitated products in the local market, increasing demand for the patentee's product.[253] Similarly, reluctance on the part of antitrust to compel licensing makes it more difficult for potential competitors to license the patented technology to compete with the patentee's product.[254] Again, potentially competing products are eliminated or marginalized.

Whether trade flow increases or decreases depends on the relative strength of these two effects, which—economists have postulated and subsequently confirmed—in turn depends on the size of the country and the presence of local imitation or licensed production capacity. Maskus and Penubarti hypothesize that "the market-expansion effect is likely to dominate in larger countries with highly competitive local imitative firms, while the market-power effect would be stronger in smaller economies with limited ability to imitate. The effects would be expected to vary sector by sector as well."[255] This prediction was largely confirmed by Smith, who concluded that whether U.S. exports to a developing country increase or decrease depends on the local imitation capacity.[256]

Trade economists generally believe increased trade enhances global welfare and efficiency.[257] Increased trade allows countries to utilize their comparative advantages, improving allocative efficiency on a global scale.[258] This may lead to the conclusion that if increased patent protection augments trade flow, developing countries should encourage trade by relaxing antitrust rules on patent exploitation. One must, however, also wonder whether it is in a developing country's best interests to increase its import of technological goods, which worsens the developing country's terms of trade, may cause balance of payment issues, and results in the relocation of manufacturing facilities to developed countries.

Both Helpman and Scherer believe that worsening terms of trade will be the likely consequence of increased intellectual protection for developing

[253] *Id.*

[254] Howard A. Shelanski, *Unilateral Refusals to Deal in Intellectual and Other Property*, 76 ANTITRUST L.J. 369, 370 (2009).

[255] MASKUS, *supra* note 48, at 112.

[256] Pamela J. Smith, *Are Weak Patent Rights a Barrier to U.S. Exports?*, 48 J. INT'L ECON. 151, 153 (1999). According to Smith, developing countries can be classified along two dimensions: strength of patent protection and imitative capacity. She found that to countries with strong patent and weak imitation, and countries with weak patent and weak imitation, U.S. exports would actually fall as a result of improved intellectual property protection. In these countries, the market-power effect dominates the market expansion effect. In contrast, countries with strong imitation and weak patents would receive a greater amount of U.S. exports following heightened intellectual property protection. In sum, the determining factor is the imitation capacity of the country or sector at issue. If a developing country has high imitation capacity, improving intellectual property protection would increase U.S. exports to that country.

[257] KRUGMAN & OBSTFELD, *supra* note 243, at 19–21.

[258] *Id.* ch. 2.

countries.[259] Scherer asserts:

> [P]atent protection may shield product imports from imitative local competition, permitting production to be centralized in some other nation where economies of scale are exploited more fully or wage conditions are more favorable. Lacking such patent protection, MNEs may feel compelled to commence on-shore production[260] in order to neutralize "made-at-home" advantages enjoyed by indigenous rivals.[261]

As argued earlier, there are reasons why developing country antitrust authorities should not focus excessively on global economic efficiency.[262] Given their underdeveloped or in some cases impoverished state, developing countries are simply not in a position to sacrifice domestic consumer and producer welfare for global allocative efficiency. This is vividly illustrated by the previously mentioned example from Jamaica, which exempts agreements pertaining to intellectual property from its antitrust law at the expense of local consumer welfare.[263]

It is worth noting that even economists do not believe that adjusting patent protection to increase trade flow is necessarily an efficient or optimal outcome. Maskus notes that "the meaning of 'trade distortion' is inherently ambiguous in the intellectual property context,"[264] and that "[t]he optimal pattern of production and trade [concerning intellectual property] is generally unknown . . . ."[265] If increased trade flow on its own is not worthy of pursuit, developing countries should only strive for it if it redounds other benefits to the country.

One possible benefit is that increased trade flow facilitates technology transfer by allowing developing country producers to reverse engineer the technology from the imported product. In order to do that, a developing country firm only needs to import a small number of the product. Import need not be done on a substantial scale to permit reverse engineering. In fact, reverse engineering can be accomplished so long as the developing country firm can acquire a sufficient number of sample products somewhere in the global market.[266] Therefore, facilitation of technology transfer as an

[259] Helpman, *supra* note 219, at 1274; Scherer & Weisburst, *supra* note 137, at 1014.

[260] On-shore production refers to production in the location where the good is sold. In this case, the on-shore production occurs in developing countries.

[261] Scherer & Weisburst, *supra* note 137, at 1014.

[262] *See supra* discussion in introduction to Part IV.

[263] *See supra* discussion Part IV.B.

[264] MASKUS, *supra* note 48, at 111.

[265] *Id.*

[266] For an overview of how a developing country pursues reverse engineering, see Morteza Raei Dehaghi & Masoud Godarzi, *Reverse Engineering: A Way of Technology Transfer in Developing Countries like Iran*, 1 INT'L J. E-EDUC., E-MGMT. & E-LEARNING 347

incidental benefit of increased trade flow does not justify a pro-patent stance in the patent-antitrust interface.

A second possible benefit is that increased trade flow promotes growth, which obviously would be beneficial to developing countries. Helpman, however, has concluded that openness to trade can increase or decrease growth, and that the direction of the effect is ambiguous.[267] Absent a stronger showing of benefits from increased trade flow, trade flow effects should not be an important consideration in the patent-antitrust interface in developing countries.

B. Impact of Relaxation of Antitrust Restrictions on Patent Exploitation on Foreign Direct Investment

Foreign direct investment (FDI) creates numerous benefits for developing countries. It brings in new technology and capital goods.[268] It increases local employment.[269] It introduces new managerial, manufacturing, and organizational techniques to the country.[270] It also stimulates local competition and may have spillover effects on local rivals that indirectly enhance their efficiency.[271] FDI may ultimately boost economic growth, which is perhaps why developing countries so assiduously court foreign investors.[272] Therefore, to the extent that a pro-patent stance in the patent-antitrust interface attracts more FDI, it would be a substantial boost to the economic prospect of a developing country.

This is where the matter gets complicated. Economists have not been

(2011) (discussing, at page 350, how Iran managed to reverse engineer the BGM-71 Tow Missile).

[267] HELPMAN, *supra* note 34, at 69.

[268] Maskus, *supra* note 231, at 12.

[269] Syed Zia Abbas Rizvi & Mohammad Nishat, *The Impact of Foreign Direct Investment on Employment Opportunities: Empirical Evidence from Pakistan, India and China*, 48 PAK. DEV. REV. 841 (2009), *available at* http://www.pide.org.pk/pdf/PDR/2009/Volume4/841-851.pdf.

[270] Maskus, *supra* note 230, at 66–67.

[271] *Id*. at 67. The extent to which FDI results in technology spillover is uncertain. Maskus notes that many multinational firms "have been criticized as enclave producers that fail to integrate effectively with the broader economy in ways that would facilitate learning." MASKUS, *supra* note 48, at 152. In a way, this is unsurprising, because it is in these firms' interests to safeguard their technology and prevent leakage to the local competitors. Enclave production may be exactly what many of them want. One must wonder why these firms would want to disseminate their technology and invite local competition that would undercut their profit.

[272] The positive impact of FDI on growth depends on the quality of human capital in the recipient country. Paul Romer, *Idea Gaps and Object Gaps in Economic Development*, 32 J. MONETARY ECON. 543, 555 (1993); Eduardo Borenzstein, Jose de Gregorio & Jing-Wha Lee, *How Does Foreign Direct Investment Affect Economic Growth?*, 45 J. INT'L ECON. 115, 122 (1998). With low educational attainment in the local population, FDI is unlikely to be much of a boost to growth.

able to determine the precise effects increased patent protection—and by extension, the relaxation of antitrust restrictions on patent exploitation — may have on FDI. After reviewing a host of theoretical studies, Maskus concludes that "the relationships between IPRs and FDI are subtle and complex. While the weight of the theory seems to lie on the side of a positive impact, the overall impact is ambiguous."[273] The rationale underlying this conclusion is intuitive. Intellectual property protection, such as patents, is but one of many considerations for a multinational firm when picking an investment destination. The firm will also consider market size and growth, local demand patterns, transport costs and distance from markets, low wage costs in relation to labor productivity, and natural resources.[274] If a destination country possesses an overwhelming advantage in one or some of these factors, the country's weakness in intellectual property protection may be offset. Maskus notes:

> [S]trong IPRs are insufficient for generating strong incentives for firms to invest in a country. If that were the case, recent FDI flows to developing countries would have gone largely to Sub-Saharan Africa and Eastern Europe. In contrast, Brazil, China, and other high-growth, large-market developing economies with weak protection would not have attracted nearly as much FDI if investment were heavily depended solely on IPRs.[275]

The indeterminate relationship between intellectual property protection and FDI is confirmed by a vast body of empirical literature, which draws conflicting conclusions on the issue.[276]

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[273] MASKUS, *supra* note 48, at 130; *but see* Shih-Tse Lo, *Strengthening Intellectual Property Rights: Experience from the 1986 Taiwanese Patent Reforms*, 29 INT'L J. INDUS. ORG. 524 (2011) (noting that patent reform attracted more FDI in sectors in which patents are widely used).

[274] MASKUS, *supra* note 48, at 121.

[275] Maskus, *supra* note 230, at 54.

[276] For studies showing that increased intellectual property protection induces FDI, see Javorcik, *supra* note 241, at 135; Jeong-Yeon Lee & Edwin Mansfield, *Intellectual Property Protection and U.S. Foreign Direct Investment*, 78 REV. ECON. & STAT. 181 (1996); Keith E. Maskus, *The International Regulation of Intellectual Property*, 134 WELTWIRTSCHAFTLICHES ARCHIV 186 (1998). For a study finding a neutral relationship between intellectual property protection and FDI, see CORREA, *supra* note 70, at 27. For studies yielding a negative correlation between intellectual property protection and FDI, see Michael Ferrantino, *The Effect of Intellectual Property Rights on International Trade and Investment*, 129 WELTWIRTSCHAFTLICHES ARCHIV 300 (1993); Keith Maskus & Denise Eby-Konan, *Trade-Related Intellectual Property Rights: Issues and Exploratory Results*, *in* ANALYTICAL AND NEGOTIATING ISSUES IN THE GLOBAL TRADING SYSTEM 401 (Alan V. Deardorff & Robert M. Stern eds., 1994); Carlos A. Primo-Braga & Carsten Fink, *The Relationship between Intellectual Property Rights and Foreign Direct Investment*, 9 DUKE J. COMP. & INT'L L. 163 (1998); Edwin Mansfield, *Unauthorized Use of Intellectual Property: Effects on Investment, Technology Transfer, and Innovation*, *in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY

Fortunately, there is some guidance on the issue. First, unsurprisingly, the least developing countries receive very little FDI.[277] Regardless of their patent policy, the limited domestic market, low productivity of local labor, and underdeveloped human capital cause them to remain unattractive FDI locations.[278] FDI, thus, should not be a significant consideration for these countries when deciding patent-antitrust cases. Meanwhile, countries with larger populations are more likely to attract FDI in manufacturing facilities.[279] This is attributed to the desire of multinational firms to gain proximate access to local markets.[280] The extent to which patent protection is a consideration in FDI also depends on the stage of production at which the investment is targeted.[281] Understandably, investment in R&D facilities is most sensitive to the state of patent protection, while investment in sales and distribution is the least dependent.[282] Manufacturing components and complete products, and rudimentary production facilities fall sequentially between these investments in descending order of dependence on the state of patent protection.[283] The importance of market size in attracting FDI and the disparate sensitivity of FDI in different stages of production to patent protection together mean that large developing countries probably need to consider the effect of the patent-antitrust interface on FDI.[284] Lastly, the impact of patent protection, and by extension, the patent-antitrust interface, on FDI varies by sector. FDI in low-technology sectors and services, such as textiles and apparel, hotel and tourism, and electronics assembly, does

RIGHTS IN SCIENCE AND TECHNOLOGY 107 (Mitchell B. Wallerstein, Mary E. Mogee & Roberta A. Schoen, eds., 1993).

[277] CORREA, *supra* note 70, at 30.

[278] Secretary-General of the U.N. Conference on Trade and Development, *Foreign Direct Investment in LDCs: Lessons Learned from the Decade 2001-2010 and the Way Forward*, 18 (April 2011), *available at* http://unctad.org/en/docs/diaeia2011d1_en.pdf.

[279] Jarvocik, *supra* note 241, at 155. This is corroborated by Boldrin & Levine's finding that larger countries invest a higher proportion of their GDP in R&D. BOLDRIN & LEVINE, *supra* note 74, at 196. To the extent that FDI creates spillover effects on the host country, the boost to innovation in large countries could be substantial.

[280] K.C. Fung, Hitomi IIzaka & Sarah Tong, Foreign Direct Investment in China: Policy, Trend and Impact 6 (June 2002) (unpublished manuscript), *available at* http://www.hiebs.hku.hk/working_paper_updates/pdf/wp1049.pdf (highlighting large market potential as the reason for multinational corporation FDI in China's telecommunications, automobile, and petrochemical industries).

[281] Edwin Mansfield, *Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer* 1–2 (Int'l Fin. Corp., Discussion Paper No. 19, 1994).

[282] *Id.* While patent protection may not have significant relevance for investments in sales and distribution, antitrust restrictions on patent exploitation may. This is especially true if antitrust prohibits a patentee's resale price maintenance, which may drive the patentee to internalize the sales and distribution process.

[283] *Id.*

[284] This is because large developing countries tend to attract manufacturing FDI, and intellectual property is an important consideration for this type of FDI.

not show much sensitivity to patent protection.[285] In contrast, sectors that employ sophisticated yet easily imitable technologies do.[286]

These empirical observations should help guide developing country antitrust authorities as they decide the weight to accord to FDI considerations in the patent-antitrust interface. In sectors in which technology matters, a developing country antitrust authority should pay close attention to how its patent-antitrust decisions influence incentives to undertake FDI. This is particularly true if the country at issue is large and if the stage of production is one for which technology and patent exploitation is important. The authority should also be mindful of whether there is any potential innovator in a particular sector. In the absence of any potential for developing innovative or imitation capacity, patent policy should be accorded less weight.

One final observation about relaxing patent-antitrust rules to attract FDI to developing countries: such effort could turn into a race to the bottom for developing countries. When the first developing country relaxes the patent-antitrust rules, it may succeed in attracting FDI. When the second country does the same, it may draw some of the first country's FDI to itself and more FDI from the rest of the developing countries. By the time all the developing countries have adopted the same policy, FDI will be allocated based on non-antitrust related considerations, just as it was before the race began.[287] The only consequence for these countries by relaxing the patent-antitrust rules is to incur all the costs of relaxation, such as consumer welfare loss, restricted access to basic necessities, and loss of domestic imitation, with little corresponding benefit in technological progress. This is especially true if the principal benefit of FDI is its spillover effects on domestic rivals.

C. Impact of Relaxation of Antitrust Restrictions on Patent Exploitation on Technology Licensing

The patent-antitrust interface has a direct impact on technology licensing, as antitrust regulates the scope of patent exploitation. By reducing a patentee's licensing revenue and scope of action, tighter restrictions on patent exploitation practices may steer patentees to choose other forms of technology transfer, such as FDI or trade of technological goods. For example, a prohibition of resale price maintenance imposed on the licensees will most likely reduce the patentee's profit.[288] This may drive

[285] MASKUS, *supra* note 48, at 125.

[286] Maskus, *supra* note 230, at 56.

[287] The situation admittedly would be different if raising patent protection attracts more FDI to developing countries as a group by drawing FDI away from developed countries.

[288] Marina Lao, *Resale Price Maintenance: A Reassessment of its Competitive Harms and Benefits*, *in* MORE COMMON GROUND FOR INTERNATIONAL COMPETITION LAW 59, 73–74

the patentee to seek other means of technology transfer or even abandon the transfer altogether, which would be against the interest of developing countries.

The extent to which antitrust authorities should be concerned about technology licensing incentives in patent-antitrust cases depends on the existence of domestic firms capable of licensing and commercializing the technology. In the absence of these firms, effects on technology licensing incentives deserve little weight in the patent-antitrust interface. Again, this is likely to be true for the vast majority of least-developed countries. The technological capacity to commercialize a licensed technology varies by sector.[289] The remaining developing countries are likely to possess some capacity in this respect within certain industries. Outside of these industries, however, developing countries need not give serious consideration to licensing incentives in the patent-antitrust interface.

A decision by a multinational firm to eschew licensing is not tantamount to abandonment of technology transfer altogether. The firm can choose other means of transfer if the licensing environment proves unfavorable. The important question then becomes whether developing countries should prefer one means of transfer to another. As established in the above discussion, of the three means of technology transfer, licensing is probably the most beneficial to the acquisition of technological capacity by developing countries. While trade of technological goods requires reverse engineering, and the technological benefits of FDI may be constrained by so-called enclave production, technology transfer by way of licensing is direct and immediate. A multinational firm licenses its technology to the local licensee. The firm most often also provides technical assistance and transfers tacit knowledge and know-how to ensure that the licensee can successfully implement and commercialize the technology.[290] Local technological capacity is unequivocally enhanced.

D. Conclusions

The foregoing discussion suggests that among the three means of intentional technological transfer, trade of technological goods should not be given much weight in the patent-antitrust interface. This is due to its ineffectiveness as a means of technological transfer and its ambiguous impact on the overall welfare of a developing country. Both FDI and

(Josef Drexl et al. eds., 2011) (noting that resale price maintenance results in higher prices for products and maximized profits for manufacturers and retailers).

[289] Martin Bell & Kevin Pavitt, *Technological Accumulation and Industrial Growth: Contrasts between Developed and Developing Countries*, *in* TECHNOLOGY, GLOBALISATION AND ECONOMIC PERFORMANCE 83, 114–19 (Daniele Archibugi & Jonathan Michie eds., 1997).

[290] Helpman, *supra* note 219, at 1276.

licensing are important means of technological transfer and could potentially have a beneficial impact on the domestic welfare of a developing country. Compared to FDI, licensing is a more effective and beneficial means of technological transfer, as tacit knowledge and know-how are also transferred in the process. Licensing also avoids the problem of enclave production that may limit the beneficial impact of technological transfer on the domestic economy. The possibility of licensing, however, depends on the existence of domestic firms that can utilize the licensed technology. Likewise, the beneficial spillover effects of FDI on domestic firms also depend on the technological capabilities of these firms.

Myriad factors affect a multinational firm's FDI decision; patent-antitrust rules are but one of the considerations. As suggested earlier, a small least-developed country is unlikely to be an attractive FDI destination anyway. Its antitrust authority need not pay much attention to FDI when calibrating its patent-antitrust rules. For countries that are viable FDI destinations, the extent to which patent-antitrust rules affect FDI varies by the sector and type of investment. FDI in low-technology sectors are not substantially affected by the patent-antitrust interface; the incidence of patent-antitrust cases is likely to be lower in low-technology sectors. The same is true for investment in sales and distribution. For other types of investment in sectors in which technology plays a more important role, countries will need to consider the impact of the patent-antitrust rules on FDI. Given that patent-antitrust rules are likely to have direct impact on licensing, technology transfer by licensing should be a relevant consideration for patent-antitrust rules in developing countries. The weight of this consideration is particularly great if licensing, as opposed to FDI, is the preferred means of technology transfer by multinational firms.

VI. OTHER CONSIDERATIONS IN THE PATENT-ANTITRUST INTERFACE

Aside from its impact on innovation incentives and technology transfer, the patent-antitrust interface may have a host of other implications for developing countries. First and foremost, a patent exploitation practice may exacerbate the welfare loss that results from the grant of patent protection. A patent exploitation practice may allow the patentee to raise the price or restrict the distribution of a patented product even further. If the patented product is a basic necessity, restriction of output raises broader development concerns and inflicts further harm on developing countries that may not be fully captured by the traditional welfare analysis. Deprivation of basic healthcare and nutrition for a substantial part of the population will impede a developing country's ability to move up the development ladder. Finally, refusal to license and other patent exploitation practices that impair the domestic firms' ability to imitate a patented technology will retard the acquisition of technological capacity, which, as

discussed, is critical to economic growth. These considerations are closely examined in the ensuing discussion.

A. Permissive Patent-Antitrust Rules Result in Excessive Consumer Welfare Loss

One of the most serious welfare consequences of permissive patent-antitrust rules is loss in consumer welfare. After all, patentee reward comes from monopoly profit for the patentee, which in turn must come from consumers. It is textbook economics that following a price increase, quantity demanded will fall and a deadweight loss will result.[291]

Most of the economic studies on the introduction of patent protection and its impact on pricing and consumer welfare have emanated from the pharmaceutical sector.[292] They firmly establish that price increases will follow the introduction of pharmaceutical patenting.[293] The same result was observed in China after the country voluntarily introduced pharmaceutical patenting in the early nineties, well before the country acceded to the World Trade Organization.[294] These economic studies were equally unanimous on the welfare effects of such price increases.[295] Scherer estimates that the total surplus accruing to consumers in least-developed countries under competitive imitation is four times the surplus they realize under monopoly pricing.[296] The annual welfare loss to India following the introduction of

[291] N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 158–65 (6th ed. 2011).

[292] This is largely because of the general importance of the sector, the controversial nature of the TRIPS Agreement's mandate that all member nations adopt pharmaceutical patenting, and the natural experiments that came out of the introduction of pharmaceutical patenting by many developing countries following TRIPS.

[293] A number of economic studies have shown that drug prices have gone up substantially after patent protection was introduced for pharmaceutical products in developing countries. *See, e.g.*, Jean O. Lanjouw, *The Introduction of Pharmaceutical Product Patents in India: "Heartless Exploitation of the Poor and Suffering?"* (Nat'l Bureau of Econ. Research, Working Paper No. 6366, 1998); Julio Nogues, *Social Costs and Benefits of Introducing Patent Protection for Pharmaceutical Drugs in Developing Countries*, 31 DEV. ECON. 24 (1993); Frederick T. Schut & Peter A.G. Van Bergeijk, *International Price Discrimination: The Pharmaceutical Industry*, 14 WORLD DEV. 1141 (1986); Jayashree Watal, *Introducing Product Patents in the Indian Pharmaceutical Sector: Implications for Prices and Welfare*, 20 WORLD COMPETITION 5 (1999).

[294] Maskus et al., *supra* note 75, at 311.

[295] Admittedly, these studies only indicate the welfare loss following the introduction of pharmaceutical patenting, and do not measure the welfare effect of a relaxation of antitrust rules on patent exploitation. The author has been unable to locate any such study. The wholesale introduction of patent protection is likely to have greater impact on the market price and consumer welfare than an adjustment in the permissible scope of patent exploitation. Yet, the indisputable fact remains that this adjustment entails a tradeoff between consumer welfare and patentee reward. Consumers lose out when antitrust allows patentees a greater scope of exploitation.

[296] Scherer & Weisburst, *supra* note 137, at 1012 (reaching results under the assumption

pharmaceutical patenting was estimated to range from U.S.$162 million to U.S.$1.26 billion, while annual profit transfer to foreign firms was estimated to be between U.S.$101 million and U.S.$839 million.[297] A World Bank study showed that the welfare loss for Argentina, Brazil, India, Mexico, Korea, and Taiwan would be in the range of U.S.$3.5 billion to U.S.$10.8 billion, while between U.S.$2.1 billion and U.S.$14.4 billion of profit would accrue to foreign patent owners.[298]

The welfare loss in developing countries is exacerbated by the high-price, low-volume strategy adopted by many pharmaceutical companies in developing countries. A deliberate decision has been made by pharmaceutical companies to focus on the wealthiest customers in low-income developing countries.[299] For example, it was found in a cross-country study of the price of Zantac that Mongolian consumers have to pay nine times as much for the drug as Australian and New Zealand consumers.[300] Such shocking price discrimination against developing country consumers inflicts further welfare losses.

Aside from general consumer welfare losses, spillovers from innovation have contributed to a dramatic increase in the living standards of the general public in the industrialized world over the last 2 and 1/2 centuries.[301] Baumol argues that if innovators had been able to capture and monetize all the private and social benefits of their innovations, society as a whole would have been much worse off.[302] A majority of the population would continue to languish in severe poverty. Furthermore, spreading the benefits of innovation to the general public in the form of improved healthcare and education may help to improve labor productivity, raising a developing country's output level.

B. Impaired Access to Basic Necessities

From a development perspective, access to basic necessities such as foodstuffs and medicine is particularly important. It is only when developing country citizens are healthy and nourished that they can have a chance of realizing their full potential and lift themselves out of poverty.

of linear demand and cost functions).

[297] CORREA, *supra* note 70, at 35.

[298] *Id.*

[299] Pretorius, *supra* note 140, at 189.

[300] *Id.* The experience with HIV/AIDS drugs seems to be different. Scherer found: "Pricing did conform in a crude way to the Ramsey predictions, but with a great deal of variation about central tendencies." Frederic M. Scherer & Jayashree Watal, *Post-TRIPS Options for Access to Patented Medicines in Developing Nations*, 5 J. INT'L ECON. L. 913, 932 (2002). The general evidence seems to indicate that higher-income developing countries pay a higher price for the drugs.

[301] BAUMOL, *supra* note 42, at 125.

[302] *Id.* at 122.

Access to basic medicine and education improves the productivity of the workforce and the prospects of economic development for a developing country.[303] Therefore, in patent-antitrust cases involving basic necessities, development needs should be given extra weight. A pro-patent stance in patent-antitrust cases involving basic necessities may impair availability of such necessities. TRIPS already provides for a mechanism for ordering compulsory licensing in the event of a public health emergency under Article 31.[304] In situations not covered by this and other exceptions contained in TRIPS, developing countries need to rely on domestic antitrust laws to safeguard their consumers' access to basic necessities. How this is to be done will be elaborated *infra* in Part VII.

C. Stifling of Domestic Imitation

One possible consequence of a pro-patent stance in the patent-antitrust interface is the stifling of technological development in developing countries. After all, exclusion of rivals is the raison d'être of the patent system. Lerner found that strengthening patent protection attracts a greater number of foreign patentees, but domestic inventors' patenting rate usually slowed down after the change.[305] Moreover, he found the slowdown effect to be more pronounced in developing countries.[306] Helpman argues that growth rates across nations would converge if R&D spillovers were international in scope and knowledge was shared across borders.[307] On the contrary: "If, for example, the R&D performed by these industrial countries enhanced their common knowledge stock but did not feed knowledge into the less-developed countries, then international R&D spillovers would provide a major force of divergence between the rich North and the poor South."[308] One of the most direct means of R&D spillover is imitation.[309] The importance of imitation as a means for acquiring technological capacity

[303] Jocelyn Finlay, *The Role of Health in Economic Development* (Program on the Global Demography of Aging, Working Paper No. 21, 2007); Ilhan Ozturk, *The Role of Education in Economic Development: A Theoretical Perspective*, 33 J. RURAL DEV. & ADMIN. 39 (2001).

[304] Carlos M. Correa, *Pro-competitive Measures under TRIPS to Promote Technology Diffusion in Developing Countries*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 40, 48–49; James Love, *Access to Medicine and Compliance with the WTO TRIPS Accord: Models for State Practice in Developing Countries*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 74, 74–75.

[305] Josh Lerner, *150 Years of Patent Protection*, 92 AM. ECON. REV 221, 223 (2002).

[306] *Id.* at 223–24.

[307] HELPMAN, *supra* note 34, at 67.

[308] *Id.* at 80.

[309] *See* Edwin Mansfield, Mark Schwartz & Samuel Wagner, *Imitation Costs and Patents: An Empirical Study*, 91 ECON. J. 907, 907 (1981).

is underscored by the experience of industrialized economies, many of which suppressed patent protection in the early stages of their development.

History is replete with instances of countries eschewing patent protection to allow themselves to catch up with the global technological leader, which for most of the nineteenth century was the U.K.[310] The United States was a major culprit of intellectual property infringements in the nineteenth century, copying patented technologies from the U.K. and denying foreign authors copyright protection in order to give its low-cost domestic printing industry a boost.[311] The United States developed its early industrial capacity by free-riding on the innovations developed by the leading European nations. Examples include U.S. free-riding on the U.K. for textiles, steam engines, and machinery, and France for gunpowder.[312] In fact, until 1836, foreigners were not allowed to obtain patents in the United States unless they had resided in the country for at least two years and declared their intent to naturalize.[313] As the U.S. economy industrialized and the number of domestic inventors rose, a growing demand for heightened intellectual property protection emerged. In response, Congress progressively increased the strength of patents and other intellectual property rights throughout the nineteenth and the twentieth centuries.[314]

A similar strategy of free-riding or cheap-riding was adopted by other developed nations, such as Japan, Switzerland, and the Netherlands, in their early stages of development.[315] Japan's patent system initially was designed to facilitate technology transfer. It was only remodeled in the 1980s and 1990s to reflect its role as a major source of innovation in the world. In the late-nineteenth century:

> Japan did adopt a comprehensive patent regime, though its features were distinctive from the American and major European systems. It was designed to encourage industrial development through emphasizing technology acquisition from abroad, domestic information diffusion, and incremental innovation. In short, the system was developed with the interests of a technology *follower* in mind. The Japanese regime significantly limited patent scope and breadth. For example, pharmaceutical patents were not provided until the 1970s . . . . As Japan matured into an industrial power and technological leader, features of its patent system attracted increasing complaints from both foreign and domestic enterprises, leading to its

[310] Fagerberg & Godinho, *supra* note 199, at 515.

[311] Granstrand, *supra* note 85, at 280; Scherer, *supra* note 18, at 1140.

[312] Scherer, *supra* note 18, 1140.

[313] *Id.*

[314] MASKUS, *supra* note 48, at 144.

[315] ERIC SCHIFF, INDUSTRIALIZATION WITHOUT NATIONAL PATENTS 65–92 (1971).

reform in 1994.[316]

Similar to the United States, foreigners were initially barred from applying for patents in Japan.[317] This discriminatory policy only ended in 1899, when Japan acceded to the Paris Convention.[318] Even after the Second World War, the patent system and intellectual property were generally only seen as "one component of a broader complex of policies for trade, industry, and technology that focused on reconstruction and 'catch-up' with the West, especially the United States."[319]

Switzerland adopted a similar anti-patent strategy in its development. Despite repeated attempts to introduce a patent system, Switzerland only adopted one after the domestic watch industry had become threatened by foreign imitation and technologically sophisticated enough to benefit from it.[320] Even then, the original patent law only provided protection to mechanical inventions, but not chemical inventions.[321] This was a deliberate policy choice as the domestic watch industry only produced mechanical inventions.[322] Meanwhile, the emerging Swiss chemical industry wanted to catch up with its more advanced German counterpart by way of imitation.[323] The domestic chemical industry, alongside the textile industry—which also relied heavily on foreign technology—strongly opposed the introduction of a patent system.[324] It was, hence, in Switzerland's interest to deny patent protection for chemical compounds. Switzerland did not extend patent protection to chemicals until Germany threatened trade sanctions in 1907.[325]

Swept by the anti-patent movement that was fomenting in Continental Europe in the mid-nineteenth century, the Netherlands abolished its patent system in July 1869.[326] The abolition was not entirely motivated by strategic development concerns, and the patent system was eventually reestablished in 1910.[327] A number of economists have concluded that the

316 MASKUS, *supra* note 48, at 143.

317 Granstrand, *supra* note 85, at 272.

318 *Id.*

319 *Id.*

320 *Id.* at 270–71; Burk & Lemley, *supra* note 123, at 1586; MARTIN KHOR, *Rethinking Intellectual Property Rights and TRIPS*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 201, 205.

321 Granstrand, *supra* note 85, at 271.

322 *Id.*

323 ERICH KAUFER, THE ECONOMICS OF THE PATENT SYSTEM 10 (1989).

324 Petra Moser, *How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World's Fairs*, 95(4) AM. ECON. REV. 1214 (2005).

325 Granstrand, *supra* note 85, at 271.

326 JAFFE & LERNER, *supra* note 81, at 89.

327 *Id.*

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Netherlands industrialized successfully in the absence of a patent system.[328] Even the U.K., a technological leader in the world for much of the nineteenth and early-twentieth century, excluded chemical compounds from patent protection in 1919 in response to the perceived might of the German chemical industry.[329]

This brief historical overview shows that many industrialized economies deliberately chose, as a strategy for technology acquisition, to suppress patent rights to allow domestic industries to imitate cutting-edge foreign technology. Their experiences lead to the inevitable conclusion that "the patent system in particular, ha[s] been neither necessary nor sufficient for historically significant technical and/or economic progress at national and company level."[330] If the goal is the acquisition of technological competence in the shortest time possible, developing countries should try to facilitate domestic imitation rather than stifle it. Professors Boldrin and Levine call imitation "a powerful tool of economic development" and "key components of the competitive markets that benefit us on a daily basis."[331] It is only when the domestic firms have acquired the technological capacity to imitate that these countries should turn their attention to spurring domestic innovation.

This conclusion is supported by the experiences of a number of developing countries, such as India, whose domestic pharmaceutical industry blossomed after the country abolished pharmaceutical patents,[332] and South Korea and Taiwan, which aggressively imitated technologies from the United States and Japan, among others.[333] In fact, the benefits of imitation extend beyond the acquisition of technological capacity to the attainment of more inclusive growth. As suggested earlier, inclusive growth requires that the fruits of economic growth be shared broadly within society,[334] which means that small- and medium-sized enterprises should be allowed to prosper. Studies show that such enterprises often engage in imitative activity.[335] Stifling of imitation, hence, would harm these

[328] SCHIFF, *supra* note 315, at 67; KAUFER, *supra* note 323, at 45.

[329] Drahos, *supra* note 142, at 165.

[330] Granstrand, *supra* note 85, at 284.

[331] BOLDRIN & LEVINE, *supra* note 74, at 162. In fact, they go one step further and argue that imitation will not eliminate innovation incentives or undermine the flow of innovation in competitive markets so long as "industry capacity is low enough that there are rents to be earned in selling copies of ideas at a price higher than marginal cost." *Id.* at 163.

[332] Fink, *supra* note 136, at 229–31.

[333] ATUL KOHLI, STATE-DIRECTED DEVELOPMENT: POLITICAL POWER AND INDUSTRIALIZATION IN THE GLOBAL PERIPHERY 94–95 (2004); Amy J. Glass, *Imitation as a Stepping Stone to Innovation* 1 (Texas A&M Univ. Dept. of Econ., Working Paper No. 99-11, 1999), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=170879.

[334] *See* discussion *supra* Part III.

[335] CORREA, *supra* note 70, at 38.

enterprises and undermine the attainment of inclusive growth.

The most direct way to facilitate imitation is by lowering, or even eliminating, patent protection. Many developing countries did just that in the 1960s and 1970s with pharmaceutical patents.[336] With the signing of the TRIPS Agreement, this option is no longer available.[337] The room for adjusting the level of patent protection has been severely curtailed. One possible way out of this quagmire is to adopt an aggressive stance in antitrust enforcement in patent cases. By limiting a patentee's ability to impose restrictions on licensees, and perhaps by making it easier for rivals to obtain a license from a patentee, antitrust can facilitate authorized imitation.[338]

VII. SOME PROPOSED GUIDING PRINCIPLES FOR DEVELOPING COUNTRIES

A. Guiding Principles

Based on the foregoing discussion, a number of guiding principles can be offered to developing countries on how they can adjust the prevailing approaches to patent-antitrust cases in developed countries to suit their particular needs. Given that antitrust law is most established in developed country jurisdictions, developing countries will likely look to developed country jurisprudence when confronted by novel patent-antitrust issues. However, the crux of the argument in this Article is that developing countries cannot blindly follow developed country approaches, and instead need to tailor these approaches to suit their needs. The following are a number of principles that will assist developing countries in this adjustment process.

The first guiding principle is that developing countries need to be prepared to ask tough questions about innovation-based justifications for patent exploitation practices. Patent protection is not essential for

[336] Kumariah Balasubramaniam, *Access to Medicines: Patents, Prices and Public Policy—Consumer Perspectives*, *in* GLOBAL INTELLECTUAL PROPERTY RIGHTS: KNOWLEDGE, ACCESS AND DEVELOPMENT, *supra* note 76, at 90, 97.

[337] CORREA, *supra* note 70, at 42.

[338] The efficacy of antitrust in facilitating imitation should not be overstated, however, as it has limited impact on unauthorized imitation. Yet, it is possible that by circumscribing a patentee's freedom to set royalty, antitrust can help to convert unauthorized imitators to authorized ones. The choice between authorized and unauthorized imitation often comes down to a tradeoff between royalty payments and access to tacit knowledge. If royalty becomes more affordable, developing country firms may be more willing to license the technology rather than obtain it through illegal copying. This will be especially true if the technology requires significant tacit knowledge to implement, which can be most readily obtained from the licensor.

generating innovation incentives in a great many industries.[339] The importance of patent protection depends on the appropriability conditions of the industry at issue, and in particular, on the existence and relative importance of other types of appropriation mechanisms, such as first-mover advantages, brand and marketing, and learning curve advantages.[340] While developed country competition authorities may choose to ignore this large body of evidence and continue to defer to innovation incentives-based arguments for patent rights, developing country authorities are not in a position to commit the same mistake. There are two reasons for this.

First, the patentee reward that is generated by supra-competitive pricing ultimately is derived from consumers.[341] While developed country consumers may be wealthy enough to withstand a consumer welfare loss, developing country consumers are not. Every penny lost to them may have a real impact on their standard of living. Therefore, developing country competition authorities should be very careful about incurring consumer welfare loss.

Second, there are more potential innovators in developed countries to benefit from the innovation incentives generated by the patent system and preserved by the antitrust rules. The same is not true of developing countries, especially the least-developed ones. The innovative capacity of a developing country probably differs by sector. However, in general, it is true that developing countries possess less innovative capacity than developed countries.[342] If a developed country accepts an innovation incentives-based argument and upholds a patent exploitation practice, the patentee reward still redounds to domestic firms. In a developing country, the patentee reward is likely to go from the pocket of domestic consumers to foreign firms, as there may be few innovators in the country to take advantage of the innovation incentives generated by the patent system. Therefore, developing country antitrust authorities must scrutinize innovation incentives-based arguments more closely and be less deferential to patent policy than developed country authorities.

A related issue is innovation incentives externalities. As suggested earlier, the effect of innovation incentives generated by a domestic patent system is not confined to its national boundary; a patent system may provide incentives to foreign inventors as well.[343] The extent to which that is true depends on the size of the domestic market. While it may be true for

[339] *See* discussion *supra* Part IV.B.

[340] *See* discussion *supra* Part IV.A.3.

[341] *See* Kaplow, *supra* note 1, at 1825 (describing the patentee reward as a transfer of wealth from consumers to patentees).

[342] Developing countries account for a very small portion of global R&D expenditure. *See* UNESCO INST. OF STAT., *supra* note 24.

[343] *See* discussion *supra* Part IV.C.

some large, middle-income developing countries, for most of the least-developed nations it is unlikely that the innovation incentives generated by their domestic patent systems will be taken into consideration by foreign inventors. Every developing country must come to its own determination about two questions: (1) how likely it is that the innovation incentives generated by its domestic patent system will be taken into account by foreign inventors, and (2) even if the answer to question (1) is positive, whether it wants to sacrifice domestic consumer welfare to incentivize foreign inventors, many of which are multinational corporations. If the answer to question (2) is negative, then that developing country's competition authority needs to attach even less weight to innovation incentives-based arguments when tackling a patent-antitrust case involving a foreign patentee.

A second guiding principle for developing countries is that a sector-specific approach to patent-antitrust cases is required, given that the importance of patent protection as a source of innovation incentives varies widely by industry. While a *de novo* examination of appropriability conditions in every case may be too time-consuming and resource-intensive for any antitrust authority or court to undertake, *a priori* classifications of industries can certainly be made to facilitate the analysis. A sector-specific approach is also consistent with the finding that the importance of innovation incentives to technology transfer and FDI varies by industry.

Third, developing countries need to bear in mind that the most effective way for many of them to acquire technological capacity is by imitation. This is what many developed countries themselves did when they were moving up the global technological ladder.[344] Given the importance of technological progress to growth and development—as stated earlier, growth rates will continue to diverge absent a technological catch-up—developing country competition authorities should facilitate domestic imitation of foreign technologies and technology transfer to the extent consistent with conventional antitrust principles. Developing country competition authorities should be more willing to impose a duty to license on the patentee and to scrutinize licensing agreements for unduly excessive restrictions on the licensees.[345]

Fourth, developing country competition authorities should be particularly vigilant about protecting domestic consumer welfare.[346] Given the general impoverished state of most domestic consumers, they can ill-afford to sacrifice their welfare in the name of generating innovation incentives. Some goods are likely to be much more important to domestic consumer welfare than others. For example, access to basic necessities,

[344] *See* discussion *supra* Part VI.C.
[345] *See* discussion *supra* Part IV.E.
[346] *See* discussion *supra* Part VI.A.

such as foodstuffs and medicine, will likely have a more direct bearing on consumer welfare than, say, access to luxury goods or fancy consumer electronics. Not every consumer should be treated the same, even within a developing country, especially given the severe income inequality prevalent in most of them. A restrictive patent exploitation practice affecting a technology that is so advanced and expensive that it is only consumed by the wealthiest consumers deserves less attention than one that implicates a basic necessity. The wealthiest consumers in a developing country are often just as able to withstand a welfare loss as consumers in developed countries. Meanwhile, a patent exploitation practice that curtails the supply of basic necessities will have disproportionate impact on the poorest of developing country consumers. A developing country antitrust authority therefore should take a particularly pro-antitrust stance in cases involving such a practice. This is especially true given that access to basic necessities carries a special developmental dimension in that it affects an individual's ability to achieve self-fulfillment.

Fifth, the welfare of domestic small- and medium-sized enterprises should feature prominently in the calculus of developing country competition authorities. In particular, these authorities need to pay closer attention to the effect of patent exploitation practices on domestic small- and medium-sized enterprises. This is because of the role played by these enterprises in alleviating poverty and providing an opportunity for the impoverished to improve their economic well-being. As noted earlier, small- and medium-sized enterprises are often the most effective means for the poor to move up the socio-economic ladder.[347] Developing country competition authorities should be wary of domestic small- and medium-sized enterprises being excluded from the market by patent exploitation practices, denying their owners of the opportunity to move out of poverty.

Sixth, developing countries need to take the argument that a pro-antitrust stance on patent-antitrust cases may undermine technology transfer and FDI with circumspection. The connection between the patent-antitrust rules and technology transfer is complex and varied. As far as trade flow as a means of technological transfers is concerned, it has been established that a developing country firm only needs to import a small amount of the relevant product to reverse engineer the technology.[348] Import need not be done on a substantial scale to permit reverse engineering.[349] Therefore, facilitation of technology transfer as an incidental benefit of increased trade flow does not justify a pro-patent stance in the patent-antitrust interface. As the OLI paradigm suggests, there are many factors that determine the choice

[347] *See* discussion *supra* Part III.B.
[348] *See* discussion *supra* Part V.A.
[349] *See* discussion *supra* Part V.A.

of an FDI destination.[350] The patent-antitrust rules are only a small part of the calculus. Economic evidence fails to reach a conclusive relationship between FDI and intellectual property protection, and by extension, the patent-antitrust rules. Country-specific factors may affect the attractiveness of the country as an FDI destination. For example, there are developing countries that are such unattractive FDI destinations due to the size of the domestic market and other reasons that even extremely favorable patent-antitrust rules are not going to matter.[351] These include the small and least-developed countries.[352] Meanwhile, developing countries with larger populations may be more viable FDI destinations, and therefore may need to be concerned with how its patent-antitrust rules affect FDI.

The seventh point is one that has not been raised earlier, but is a necessary implication of the foregoing analysis and discussion. The imperative of protecting consumers from supra-competitive pricing and domestic firms from being denied opportunities to acquire imitation capacity means that developing country antitrust authorities may need to be more vigilant against excessive pricing and more ready to order compulsory licensing.[353] For a product that incorporates a highly valuable and perhaps unique technology, there may be no meaningful close substitutes in the market, and the patentee may possess so much market power that it can maximize its reward without engaging in any restrictive patent exploitation practices. All it has to do is sell the product at a monopolistic price. In these circumstances, the only way for the antitrust authority to alleviate the consumer welfare loss is either to find the patentee guilty of excessive pricing and impose some sort of price regulation remedy, or to order compulsory licensing to introduce competition into the market. If the product is a necessity, and the industry at issue is one in which patent protection is only a secondary source of innovation incentives, the justification for the proposed intervention would be strong.

It is true that most developed country antitrust authorities are averse to imposing price regulation. The desire to avoid such regulations was one of the reasons cited by the United States Supreme Court in refusing to impose an antitrust duty to deal in *Trinko*.[354] Yet developed and developing countries may stand in different stead as far as the need for price interventions is concerned. Some economists have argued that developing countries should impose price regulation of some kind to alleviate the harmful effects of patent protection, especially for pharmaceutical

[350] Dunning & Lundan, *supra* note 237, at 320–29.

[351] *See* discussion *supra* Part V.B.

[352] CORREA, *supra* note 70, at 30.

[353] *See* discussion *supra* Part V.

[354] Verizon Commc'ns, Inc. v. Law Offices of Curtis V. Trinko, LLP, 540 U.S. 398, 414–15 (2004).

products.[355] The Indian government has long regulated the prices of medicine.[356] Such regulation is usually administered by some sectoral regulator instead of the antitrust authority.[357] To the extent that price regulation is already handled by a different government body, a developing country's antitrust authority can take a more hands-off approach. However, not every good is subject to price control, and antitrust authorities may confront cases involving products that are not subject to such control. In those cases, a remedy of price regulation of some kind may be called for.

Compulsory licensing is equally, if not more, controversial than price regulation within the antitrust circles.[358] It is controversial because it is considered a direct affront to the very essence of a patent: the right to exclude competitors. Moreover, it contradicts the nature of patents as a property. In developed countries, especially in the United States, private property is highly respected and a government order to compel sharing of private property is regarded with the utmost suspicion, and rightly so. Compulsory licensing, however, is also superior to price regulation as a tool for tackling supra-competitive pricing. First, compulsory licensing introduces competition to the market.[359] Not only will the price be lower for consumers, competition will also hopefully induce the firms to cut costs and achieve production efficiency. Allocative efficiency is likely to be improved by compulsory licensing as compared to a price-regulated market. Second, compulsory licensing creates a huge benefit to developing countries by allowing local firms to practice advanced technology.[360] This will result in a boost to the local technological capacity. The fact that a number of firms now practice the technology also increases the probability

[355] MASKUS, *supra* note 48, at 220.

[356] Lanjouw, *supra* note 293, at 4.

[357] Damien Geradin & J. Gregory Sidak, *European and American Approaches to Antitrust Remedies and the Institutional Design of Regulation in Telecommunications*, *in* 2 HANDBOOK OF TELECOMMUNICATIONS ECONOMICS: TECHNOLOGY, EVOLUTION AND THE INTERNET 517, 518 (2005) (noting sectoral regulator's tendency to resort to price regulation remedy).

[358] Jay Pil Choi, *Compulsory Licensing as an Antitrust Remedy*, 2 WORLD INTELL. PROP. ORG. J. 74, 75 (2010).

[359] This is illustrated by the fact that antitrust authorities occasionally require merging parties to grant a compulsory license to third parties to introduce competition to the relevant market to alleviate competition concerns. *See* U.S. DEPT. OF JUST. & FED. TRADE COMM'N, COMMENTARY ON THE HORIZONTAL MERGER GUIDELINES 43 (2006); *see also* Alberto do Amaral Junior, Compulsory Licensing and Access to Medicine in Developing Countries 2 (2005) (unpublished manuscript), *available at* http://www.law.yale.edu/documents/pdf/Compulsory_Licensing.pdf.

[360] Eric Bond & Kamal Saggi, Compulsory Licensing, Price Controls, and Access to Patented Foreign Products 4–5 (Apr. 2012) (unpublished manuscript), *available at* http://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_econ_ge_4_12/wipo_ip_econ_ge_4_12_ref_saggi.pdf.

and quality of further improvements and cumulative innovation. Commentators have argued that the firm best able to make follow-on innovations need not be the original inventor.[361] Increasing the availability of a technology improves the probability of follow-on innovation.

Notwithstanding property rights-based arguments, the strongest objection to compulsory licensing has usually been that it undermines innovation incentives. The standard theoretical argument is that if potential inventors know that they will be subject to compulsory licensing, they will be less willing to invest in creating new inventions.[362] To the extent that innovation incentives depend on patentee reward, this argument has great intuitive appeal. This argument, however, is not supported by the empirical evidence. Both Scherer and the Yale survey found that compulsory licensing does not undermine innovation incentives in most industries.[363] These results are consistent with the central conclusion from the bulk of the studies discussed in Part IV that patent protection is not the most important source of innovation incentives for most industries. The only two industries which the Yale survey identified as being adversely affected by compulsory licensing were the metal container and electron tube industries.[364] For the remainder of the industries covered in their exhaustive survey, compulsory licensing was not deemed to be an important concern.

Compulsory licensing is, in fact, not as rare as it is generally believed to be. U.S. antitrust authorities have regularly imposed compulsory licensing in Section 2 monopolization and merger cases in the past. For example, the GE-Westinghouse monopoly over the electric lamp was broken by royalty-free compulsory licensing.[365] AT&T was ordered to license 9,000 of its patents in 1956.[366] In both cases, there was no observable deterioration in innovation incentives.[367] Until TRIPS came into effect and Canada joined NAFTA, both the U.K. and Canada had compulsory licensing laws. The U.K. law applied to all kinds of products while Canada's only applied to pharmaceuticals.[368] Canada's law, in particular, was utilized extensively: 227 licenses were issued between 1969 and 1977.[369] In short, developing countries should not shy away from compulsory licensing if it is warranted by an antitrust violation.

[361] Lemley, *supra* note 73, at 135–41.

[362] Net Le, *Sunk Costs, Free-Riding Justifications, and Compulsory Licensing of Interfaces*, 1 REV. ECON. RES. ON COPYRIGHT ISSUES 29, 29–30 (2004).

[363] Scherer, *supra* note 48, at 456–57; Levin et al., *supra* note 49, at 804.

[364] Levin et al., *supra* note 49, at 804.

[365] Scherer, *supra* note 108, at 17. Unfortunately, in this instance, the market did not become markedly more competitive as a result.

[366] *Id.* at 27.

[367] *Id.* at 33; Scherer, *supra* note 48, at 456–57.

[368] Scherer & Watal, *supra* note 300, at 918–20.

[369] *Id.* at 919.

Commenting on the general aversion to compulsory licensing in the U.S. antitrust circles, Professor Herbert Hovenkamp asserts that "ordering compulsory licensing for a proven antitrust violation is no different than fining a firm or ordering divestiture of a plant. While we do not want to deter innovation, we do want to deter antitrust violations either."[370] Professor Hovenkamp was right to observe that we want to deter antitrust violations, especially those that directly undermine the growth prospects of developing nations.

Compulsory licensing would only be a meaningful remedy if there were other producers in the local market capable of commercializing the technology. If there are no local producers in a particular industry, as is likely to be case in many small developing countries, there would be no one to whom to license the technology. While compulsory licensing as an antitrust remedy need not be granted to domestic producers, Article 31 of the TRIPS Agreement requires the products produced under compulsory licensing to be predominantly for local use.[371] Commentators have disputed the precise scope of this limitation.[372] However, it is unlikely that large-scale export of products produced under compulsory licensing would be compatible with Article 31. Therefore, for a developing country that possesses no local capacity to manufacture the product, and whose market is too small to allow foreign firms to reap sufficient scale economies to build a local plant, direct price regulation may be the only feasible remedy available to its antitrust authority.

B. Illustrative Examples

How these guiding principles can be applied in real cases can be illustrated with a number of examples. Assume that a multinational agricultural product company has developed a genetically modified seed that produces a significantly improved yield. The company would only sell the seed to farmers in a least-developed country if that country's farmers also purchase fertilizers from the company. The market share for the seed is less than 30%. This is a typical tying case.[373] Further assume that this seed is for a staple in this country—many residents of this country rely on it as their basic foodstuff—but the country has no current innovative capacity

[370] Hovenkamp, *supra* note 9, at 27.

[371] Agreement on Trade-Related Aspects of Intellectual Property Rights art. 31, Annex 1C of Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1869 U.N.T.S. 299, 33 I.L.M. 1197 [hereinafter TRIPS Agreement]; Scherer & Watal, *supra* note 300, at 925.

[372] U.N. CONFERENCE ON TRADE AND DEV. & INT'L CTR. FOR TRADE AND SUSTAINABLE DEV., RESOURCE BOOK ON TRIPS AND DEVELOPMENT 474 (2005); CARLOS M. CORREA, TRADE RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS 85–89 (2007).

[373] A typical case involves a seller conditioning the sale of a product on the buyer's purchase of another product.

in genetic engineering and modification of agricultural products, and no realistic chance of developing any such capacity. There are simply no agricultural companies in the country engaged in any meaningful genetic research at the moment. The country is also too small and too deficient in human capital to be a viable FDI destination for multinational agricultural companies. Meanwhile, there are small domestic enterprises producing fertilizers that would be excluded from the fertilizer market by the multinational company's tying conduct. The multinational company justifies its tie on the ground that it needs to maximize its returns from its patented genetically modified seed.[374]

Tying would be analyzed under U.S. antitrust law under the modified per se rule laid down by the Supreme Court in *Jefferson Parish Hospital District No. 2 v. Hyde*.[375] Under this modified per se rule, the plaintiff must show that: (1) there are two separate products; (2) the defendant has substantial market power in the tying product market; (3) there is actual evidence that the seller has coerced the buyer to accept the tied product; and (4) the amount of interstate commerce affected in the tied product market is not insubstantial.[376] *Jefferson Parish* has been understood to establish a presumption that less than 30% market share is insufficient to satisfy the market power in the tying product market requirement.[377] Therefore, the tying practice of this multinational company would be unlikely to be held illegal under U.S. law.

However, the competition authority of this developing country would be well-advised to look beyond U.S. law and to apply a more stringent standard to this tying practice for a variety of reasons. First, to scrutinize the innovation incentive argument put forward by the defendant, the developing country at issue is a very small one, and hence the profits obtained from this country are unlikely to feature prominently in the R&D investment calculus of the company at issue. Moreover, the competition authority may rightfully wonder whether welfare of the consumers in this country should be sacrificed to generate innovation incentives for this multinational corporation. Second, the tie is likely to have substantial impact on the consumers and fertilizer producers of the country. Presumably the defendant is selling the fertilizer at a higher price than the prevailing domestic price. If domestic farmers are forced to pay a higher price for fertilizers, they may be compelled to raise the price of their

[374] LAWRENCE A. SULLIVAN & WARREN S. GRIMES, THE LAW OF ANTITRUST: AN INTEGRATED HANDBOOK 400–01 (2000) (noting that increasing returns from innovation is often given as a reason for tying).

[375] 466 U.S. 2 (1984).

[376] *Id.* at 15–18.

[377] HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE 399–400 (3d ed. 2005).

produce. Given that the crop is a staple in the country, an increased price is likely to have a pronounced impact on consumer welfare. The tie is also said to exclude domestic fertilizer producers from the market. Domestic small- and medium-sized enterprises are set to suffer as a result. Lastly, given that there are no domestic agricultural companies engaged in high-level research at the moment and the country is not a viable FDI destination for multinational agricultural companies, the competition authority need not worry about the impact of its decision on technology transfer or the development of domestic innovative capacity. The competition authority of this developing country should prohibit this tie.

As another example, assume that in a rapidly industrializing developing country with a fairly large population, there is a firm developing a technology in food processing that will compete with the prevailing international standard. However, for the firm to successfully produce products incorporating this new technology, it must obtain licenses to some technology held by a foreign firm that currently deploys the internationally-prevailing technology. To forestall emerging competition, the foreign firm refuses to license the required technology to the domestic firm. As a rapidly industrializing developing country with a substantial population, it is a viable FDI destination. There are a sufficient number of domestic firms in the relevant industry that can benefit from technology transfer from developed country firms. Also, a substantial number of firms possess imitative and innovative capacity in the industry at issue.

Under prevailing U.S. antitrust law, it is exceedingly difficult to prevail in a unilateral refusal to license claim. Under the leading case on this issue from the Federal Circuit, *In re Independent Service Organizations Antitrust Litigation (Xerox)*, a patentee's refusal to deal will not be questioned absent fraud on the U.S. Patent and Trademark Office, sham litigation, or illegal tying.[378] In *Data General Corp. v. Grumman Systems Support Corp*., the First Circuit did not go as far as the Federal Circuit, but nonetheless proclaimed that "while exclusionary conduct can include a monopolist's unilateral refusal to license a copyright, an author's desire to exclude others from use of its copyrighted work is a presumptively valid business justification for any immediate harm to consumers."[379] Even in the more permissive case of *Image Technical Services v. Eastman Kodak*, the Ninth Circuit only upheld an imposition of a duty to deal because the court found that the defendant's intellectual property justification for refusing to deal was only pretextual.[380] According to these leading cases, unilateral refusal to license is practically presumptively legal under U.S. antitrust law. Should the competition authority in this country deviate from

[378] 203 F.3d 1322, 1327 (Fed. Cir. 2000).
[379] 36 F.3d 1147, 1154 (1st Cir. 1994).
[380] 125 F.3d 1195 (9th Cir. 1997).

prevailing U.S. law and condemn the unilateral refusal to license the required technology?

Imposing a duty to deal is the most direct affront to the patent right to exclude. Hence, it directly implicates the innovation incentive rationale of patent rights. In deciding whether to impose a duty to deal, the competition authority of this country should be reminded of the copious economic evidence that patent protection is not essential for generating innovation incentives in every industry. Food processing is not one of the industries which economists have found to rely on patent protection for innovation incentives.[381] Therefore, imposing a duty to deal over this technology will have less direct impact on innovation incentives. Yet, the calculus for this competition authority is somewhat complicated by the fact that the innovation incentives generated by the domestic patent system benefit both foreign and domestic firms. As noted earlier, domestic firms in the industry also possess innovative capacity. Therefore, setting a precedent of imposing a duty to license may affect both foreign and domestic firms. Also, the competition authority must be mindful of how imposing a duty to deal may affect technology transfer and foreign investment, as the country is a viable FDI destination and there are domestic firms that may benefit from technology transfer. The authority will have to undertake a detailed analysis of the likely impact of imposing a duty to deal on foreign investment and technology transfer. Against all these potentially adverse impacts is the facilitation of the acquisition of domestic innovative capacity by the firm seeking to license and possible lower prices for consumers after the introduction of a competing technology. The authority may want to take into account the fact that the refusal to license was motivated by a desire to forestall competition from an emerging technology. It will need to balance all these countervailing considerations to reach a conclusion. As compared to the prevailing U.S. approach, a developing country competition authority must demonstrate greater willingness to question the extent to which patent protection is needed to generate innovation incentives. It must also consider a wider range of development-related considerations.

VIII. POSSIBLE CRITICISMS OF THE PROPOSED GUIDING PRINCIPLES

A. Compatibility with the TRIPS Agreement

One possible criticism of the guiding principles proposed above is that they may be incompatible with the TRIPS Agreement. The TRIPS Agreement mandates a minimum level of patent protection by all member

[381] Levin et al., *supra* note 49, at 802.

states,[382] and hence, may restrict the ability of developing countries to curtail patent protection by way of antitrust law.[383] In particular, the TRIPS Agreement prohibits the institution of different levels of patent protection for different industries.[384] This may further restrict the flexibility of action for developing countries.

Fortunately, the TRIPS Agreement expressly allows member states to enact measures to control anticompetitive practices related to intellectual property rights. First, Article 8 of the TRIPS Agreement allows member states to adopt appropriate measures "to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology."[385] Article 8 is said to contain a proportionality requirement, and antitrust restrictions of patent exploitation may not be excessively broad.[386] However, it has been said that this requirement still leaves "a large margin of application to Member countries, since it is their role to determine what represents an abuse of intellectual property rights."[387] Furthermore, Article 40 specifically allows member states to adopt measures to control anticompetitive practices in the patent licensing context.[388] Under Article 40, an anticompetitive practice is defined as a practice that "constitute[s] an abuse of intellectual property rights having an adverse effect on competition in the relevant market."[389] Member states enjoy considerable leeway in their interpretation and application of this phrase.[390] Article 40 enumerates three examples of anticompetitive practices: exclusive grantback conditions, conditions preventing challenges to validity, and coercive package licensing.[391] These three examples are not exhaustive and a member state is free to specify further examples of anticompetitive practices.[392] Moreover, Article 40 requires member states

[382] TRIPS Agreement, *supra* note 371, arts. 27–31, 36–39.

[383] Professors Boldrin & Levine have implicitly characterized the TRIPS Agreement as rent-seeking by multinational corporation. *See* BOLDRIN & LEVINE, *supra* note 74, at 175 ("[T]he equalization of globalization with the need for stronger intellectual property laws is just plain and simple rent-seeking propaganda from existing monopolies."). They argue that the increased monopoly rent available to multinational corporations following the expansion in size of the global market should more than compensate their innovation costs.

[384] *See* TRIPS Agreement, *supra* note 371, art. 27.

[385] *Id.* art. 8.

[386] SECRETARIAT OF THE U.N. CONF ON TRADE & DEV., THE TRIPS AGREEMENT AND DEVELOPING COUNTRIES 54 (1996).

[387] *Id.*

[388] TRIPS Agreement, *supra* note 371, art. 40.

[389] *Id.*

[390] M.B. RAO & MANJULA GURU, UNDERSTANDING TRIPS—MANAGING KNOWLEDGE IN DEVELOPING COUNTRIES 218 (2003).

[391] TRIPS Agreement, *supra* note 371, art. 40.

[392] RAO & GURU, *supra* note 390, at 213.

to determine the legality of a practice on a case-by-case basis.[393] This is understood to require a Rule of Reason analysis of allegedly anticompetitive practices.[394]

The TRIPS Agreement is unlikely to pose obstacles to the application of the proposed guiding principles. The regulation of anticompetitive practices related to intellectual property rights is expressly permitted by Articles 8 and 40.[395] The flexibility of application allowed by both articles means that developing countries should have the ability to apply the guiding principles proposed in this Article for patent-antitrust cases. Professor Eleanor Fox has argued that TRIPS does not impose a categorical limit on how far domestic antitrust law can restrict intellectual property rights, but instead allows for a case-by-case approach to ascertaining these limits.[396] She further argues that under TRIPS, there is an implicit presumption that "existing developed systems of antitrust are presumptively legitimate."[397] Therefore, as long as the approach fashioned by the developing countries does not deviate significantly from the existing approaches of the established jurisdictions, it should be compliant with TRIPS.

Moreover, the proposed guiding principles do not call for a per se approach, but instead requires a case-by-case evaluation that is required by Article 40. In any case, it has been suggested that Article 40 should not prevent developing countries from adopting per se approaches to the regulation of patent exploitation practices or other approaches that "form part of the traditional antitrust enforcement used by some countries."[398] Given the prevalence of Rule of Reason balancing approaches in developed country jurisdictions, it can hardly be argued that the application of the guiding principles proposed in this Article is inconsistent with the international mainstream.

The TRIPS Agreement requires national treatment and does not allow member states to discriminate against foreign right holders.[399] One may argue that according different weights to the interests of domestic and foreign inventors may run afoul of the principle of national treatment. While this principle requires formal equality of treatment between foreign and domestic right holders, it is unlikely to go so far as requiring the interests of domestic and foreign right holders to be given equal weight in the analysis undertaken in administrative or judicial proceedings.

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393 TRIPS Agreement, *supra* note 371, art. 40.

394 RAO & GURU, *supra* note 390, at 214.

395 *See* TRIPS Agreement, *supra* note 371, arts. 8, 40.

396 Eleanor M. Fox, *Trade, Competition, and Intellectual Property—TRIPS and its Antitrust Counterparts*, 29 VAND. J. TRANSNAT'L L. 481, 491–92 (1996).

397 *Id.* at 492.

398 SECRETARIAT OF THE U.N. CONF ON TRADE & DEV., *supra* note 386, at 55.

399 *See* TRIPS Agreement, *supra* note 371, art. 3.

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B. Administrability

A second possible criticism of the proposed guiding principles is that they are too vague to be applied. It may be further argued that the range of issues to be considered in the application of the guiding principles is beyond the capability of any antitrust authority, let alone those in developing countries, to decide. Antitrust authorities and courts are simply not equipped to weigh policy factors such as the impact on FDI or the degree of necessity of a product.

While there is some truth to these claims, the alternative would be to ignore all these vital developmental concerns and decide patent-antitrust cases under a veil of willful obliviousness to the reality of developing countries. The result would be decisions that stifle technological progress, inflict harm on downtrodden consumers, and retard the growth and development of these countries. The adjustment under the guiding principles is marked by considerable open-endedness, and mistakes may be made in the process. However, the best is the enemy of the good. The fact that a comprehensive framework that attempts to take into account all the relevant policy considerations cannot be applied in a precise manner does not mean that these considerations should be dropped from the analysis altogether. A simple rule that permits all patent exploitation practices short of cartel conduct would be easy to administer, but would no doubt be detrimental to developing countries. Instead, antitrust authorities should strive to incorporate relevant considerations and come to the best decision under the circumstances.

The reality is that Rule of Reason type balancing in antitrust cases will always require judgment calls in close cases. These judgment calls are made in light of the general jurisprudential and socio-economic presumptions in a particular jurisdiction. In the United States, the presumption is that competitive markets work, and thus, courts tend to err on the side of non-enforcement in close cases to give markets the opportunity to rectify the anticompetitive conduct. Other jurisdictions have less faith in the market and therefore tend to err on the side of enforcement in close cases. Similarly, in patent-antitrust cases, developing country authorities can decide close cases with the view that when in doubt, err on the side of protecting domestic consumers and potential imitators. In a way, the guiding principles identified in Part VIII can be treated as presumptions that break the tie in close cases.

IX. CONCLUSION

This Article proposes some guiding principles for the patent-antitrust interface that incorporates a broad range of developmental concerns. It argues that such a guiding principles will better suit the circumstances of developing countries and ensure that the opportunities they have to achieve

economic growth and development are not needlessly lost. The approach in this Article has two implications that resonate beyond the immediate topic of the patent-antitrust interface in developing countries. First, even for developed jurisdictions, such as the United States, this Article demonstrates that patent protection is not the most important source of innovation incentives in most industries. This means that the antitrust authorities and the courts in these jurisdictions should re-examine the deference they have shown to patent policy. The pendulum may have swung too far and the patent-antitrust interface in these jurisdictions needs to be brought back to the middle ground.

Second, for global antitrust, this Article is an implicit challenge to the drive for convergence that has consumed the international antitrust community in the last decade. One of the underlying premises of this Article is that antitrust principles and doctrines need to be tailored to domestic economic circumstances. Markets and economies function differently in different countries and antitrust law needs to reflect these differences. Legal doctrines that have served developed countries well are not necessarily suitable for developing countries. This is a particularly important lesson for developing countries as they are prone to copy the approaches of established jurisdictions without local adaptation. The exemption granted by the Jamaican antitrust law for intellectual property agreements vividly illustrates the danger of such an indiscriminate approach. Meanwhile, advocates for convergence should become aware of the limits of a one-size-fits-all approach. Convergence has undoubtedly been a positive development in international antitrust, but it can backfire if pushed too far. In the context of patent-antitrust cases, especially those involving foodstuffs and pharmaceuticals, the consequence in developing countries of injudicious convergence could be dire.